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Gültig ab

FW 378

UNITEK Industrie Elektronik G m b H

A short description of the CAN-Bus interface
Ein kurze Erklärung des CAN-Bus Interfaces

Receive
Empfangen

COB-ID	DLC	Byte1	Byte2	Byte3
RxID	3	RegID	$DATA_{07..00}$	$DATA_{15..08}$

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5
RxID	5	RegID	$DATA_{07..00}$	$DATA_{15..08}$	$DATA_{23..16}$	$DATA_{31..24}$

Transmit
Senden

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4
TxID	4	RegID	$DATA_{07..00}$	$DATA_{15..08}$	Stuff

COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6
TxID	6	RegID	$DATA_{07..00}$	$DATA_{15..08}$	$DATA_{23..16}$	$DATA_{31..24}$	Stuff

1. **As standard drive CAN-Bus command messages are 3 bytes long (16-bit data) or 5 bytes long (32-bit data).**
Standartmässig sind die Regler CAN-Bus Befehl-Telegramme 3 Byte lang (16-Bit Daten) oder 5 Byte lang (32-Bit Daten).

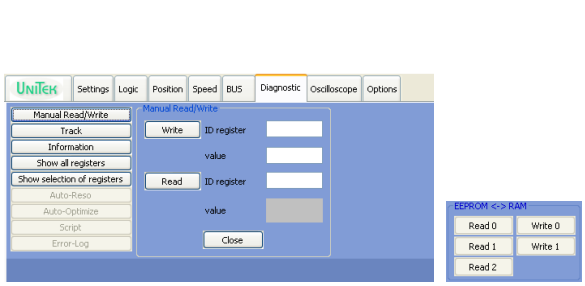
- **"Remote Transmit Requests" (RTR) will be ignored.**
  "Remote Transfer Requests" (RTR) werden ignoriert.
- **If a 3 byte message (16-bit data) is received and 32-bit data expected, the value will be zero / sign extended as required.**
  Wenn ein 3 Byte Telegramm(16-Bit Daten) ankommt und 32-Bit Daten erwartet wird, wirt der Wert nach Bedarf null- / vorzeichen-erweitert.
- **If a 5 byte message (32-bit data) is received and 16 bit data expected, the upper data will be thrown away.**
  Wenn ein 5 Byte Telegramm(32-Bit Daten) ankommt und 32-Bit Daten erwartet wird, werden die oberen Daten wegwerfen

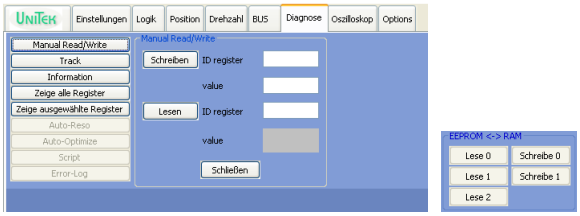
2. **As standard drive CAN-Bus reply messages are 4 bytes long (16-bit data) or 6 bytes long (32-bit data).**
Standartmäsig sind die Regler CAN-Bus Antwort-Telegramme 4 Byte lang (16-bit Daten) oder 6 Byte lang (32-bit Daten).

3. **To get the drive to send all replies as 6 byte messages (32-bit data) a bit in RegID 0xDC has to be manually modified.**
Daß der Regler alle Antworten als 6-Byte Telegramme schicken, muß ein Bit in RegID 0xDC manuell modifiziert werden.

- **In NDrive open "Manual Read/Write" in the Diagnostic window**
  In NDrive "Manual Read/Write" in der Diagnose-Fenster aufmachen.
- **Read / *Lesen*** **ID register** **0xDC** **value** **0x00nn**
- **change upper byte to** **01** **(00 = standard configuration)**
  ändere obere Byte zum ***01*** ***(00 = Standartkonfiruration)***
- **Write / *Schreiben*** **ID register** **0xDC** **value** **0x01nn**

4. **Don't forget to save using "Write 0" in the Settings window.**
Vergesse nicht mit "Schreibe 0" in den Einstellungen-Fenster zum sichern.





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5. Commands with 16-bit formats (as examples)
Befehle mit 16-Bit Formate (als Beispiele)

Command *Befehl* (PC → Drive) *(PC → Regler)*						Range (16-Bit) *Bereich*			Units *Einheiten*
SPEED_COMMAND (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	+100%	+32767	0x7FFF	±32767
	RxID	3	31	0xNN	0xNN	+50%	+16384	0x4000	
			RegID	$Data_{07..00}$	$Data_{15..08}$	0 %	0	0x0000	→ ±100%
STOP ≡ SPEED_COMMAND = 0 (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	−50%	−16384	0xC000	
	RxID	3	31	0x00	0x00	−100%	−32767	0x8001	
			RegID	$Data_{07..00}$	$Data_{15..08}$				
FUNC_REF_START (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3				
	RxID	3	78	0xNN	0xNN				
			RegID	$Data_{07..00}$	$Data_{15..08}$				
TORQUE_COMMAND (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	+150%	+32767	0x7FFF	±32767
	RxID	3	90	0xNN	0xNN	+100%	+21845	0x5555	
			RegID	$Data_{07..00}$	$Data_{15..08}$	0 %	0	0x0000	→ ±150%
						−100%	−21845	0xAAAA	
						−150%	−32767	0x8001	

6. Commands with 32-bit formats (as examples)
Befehle mit 32-Bit Formate (als Beispiele)

Command *Befehl* (PC → Drive) *(PC → Regler)*								Range (32-Bit) *Bereich*		Units *Einheiten*
POS_DEST (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	+2147483647	0x7FFF'FFFF	±65536
	RxID	5	6E	0xNN	0xNN	0xNN	0xNN	+1073741824	0x4000'0000	
			RegID	$Data_{07..00}$	$Data_{15..08}$	$Data_{23..16}$	$Data_{31..24}$	+1048576	0x0010'0000	≡ ±rev
POS_PRESET (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	+65536	0x0001'0000	
	RxID	5	7E	0xNN	0xNN	0xNN	0xNN	+32767	0x0000'7FFF	
			RegID	$Data_{07..00}$	$Data_{15..08}$	$Data_{23..16}$	$Data_{31..24}$	+16384	0x0000'4000	
								0	0x0000'0000	
								−16384	0xFFFF'C000	
VAR1 (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	−32767	0xFFFF'8001	
	RxID	5	D1	0xNN	0xNN	0xNN	0xNN	-65536	0xFFFF'0000	
			RegID	$Data_{07..00}$	$Data_{15..08}$	$Data_{23..16}$	$Data_{31..24}$	-1048576	0xFFF0'0000	
VAR2 (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5	-1073741824	0xC000'0000	
	RxID	5	D2	0xNN	0xNN	0xNN	0xNN	-2147483647	0x8000'0001	
			RegID	$Data_{07..00}$	$Data_{15..08}$	$Data_{23..16}$	$Data_{31..24}$			
VAR3 (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5			
	RxID	5	D3	0xNN	0xNN	0xNN	0xNN			
			RegID	$Data_{07..00}$	$Data_{15..08}$	$Data_{23..16}$	$Data_{31..24}$			
VAR4 (send on requirement *noch Bedarf schicken*)	COB-ID	DLC	Byte1	Byte2	Byte3	Byte4	Byte5			
	RxID	5	D4	0xNN	0xNN	0xNN	0xNN			
			RegID	$Data_{07..00}$	$Data_{15..08}$	$Data_{23..16}$	$Data_{31..24}$			

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7. Commands for an immediate reply request (as examples)
Sofortiger Antwortanforderungsbefehl (als Beispiele)

	Request *Anforderung* (PC → Drive) *(PC → Regler)*					→	Reply *Antwort* (Drive → PC) *(Regler → PC)*						Range *Bereich*	Units *Einheiten*
SPEED_RPMMAX_INT (request once *einmal anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0xCE (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 4	Byte1: 0xCE (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	rpm *U/min*
CURRENT_DEVICE (request once *einmal anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0xC6 (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 4	Byte1: 0xC6 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	dA
CURRENT_200PC (request once *einmal anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0xD9 (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 4	Byte1: 0xD9 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	ADC units
						→								
SPEED_ACTUAL (request on requirement *noch Bedarf anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0x30 (RegID)	Byte3: 0x00 (Time)		COB-ID: TxID	DLC: 4	Byte1: 0x30 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	±32767 ≡ ±100%
						→								
CURRENT_ACTUAL (request on requirement *noch Bedarf anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0x20 (RegID)	Byte3: 0x00 (Time)		COB-ID: TxID	DLC: 4	Byte1: 0x20 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	ADC units
						→								
STATUS (request on requirement *noch Bedarf anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0x40 (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 6	Byte1: 0x40 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: 0xNN (Data23..16) Byte5: 0xNN (Data31..24) Byte6: Stuff	32-bit	Bit-Map
						→	COB-ID: TxID	DLC: 4	Byte1: 0x40 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	Bit-Map
LOGICMAP_ERRORS (request on requirement *noch Bedarf anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0x8F (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 6	Byte1: 0x8F (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: 0xNN (Data23..16) Byte5: 0xNN (Data31..24) Byte6: Stuff	32-bit	Bit-Map
							COB-ID: TxID	DLC: 4	Byte1: 0x8F (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	Bit-Map
LOGICMAP_IO (request on requirement *noch Bedarf anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0xD8 (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 4	Byte1: 0xD8 (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: Stuff	16-bit	Bit-Map
POS_ACTUAL (request on requirement *noch Bedarf anfordern*)	COB-ID: RxID	DLC: 3	Byte1: 0x3D (Read)	Byte2: 0x6E (RegID)	Byte3: 0x00 (Time)	→	COB-ID: TxID	DLC: 6	Byte1: 0x6E (RegID)	Byte2: 0xNN (Data07..00)	Byte3: 0xNN (Data15..08)	Byte4: 0xNN (Data23..16) Byte5: 0xNN (Data31..24) Byte6: Stuff	32-bit	±65536 ≡ ±rev

(units conversions *Einheiten-Umstellung*)

$$\widehat{N_{act}}^{[\%]} = 100 \cdot \left(\widehat{SpeedActual}^{RegID(0x30)[units]} \Big/ 32767 \right)$$

$$\widehat{N_{act}}^{[rpm]} = \widehat{SpeedRpmMaxInt}^{RegID(0xCE)[rpm]} \cdot \left(\widehat{SpeedActual}^{RegID(0x30)[units]} \Big/ 32767 \right)$$

$$\widehat{I_{act}}^{[\%]} = 200 \cdot \left(\widehat{CurrentActual}^{RegID(0x20)[units]} \Big/ \widehat{Current200pc}^{RegID(0xD9)[units]} \right)$$

$$\widehat{I_{act}}^{[A]} = \frac{2}{10} \cdot \widehat{CurrentDevice}^{RegID(0xC6)[dA]} \cdot \left(\widehat{CurrentActual}^{RegID(0x20)[units]} \Big/ \widehat{Current200pc}^{RegID(0xD9)[units]} \right)$$

8. Up to 8 time-triggered reply requests can be activated
Bis 8 zeitgesteuerte Antwortanforderungen können aktiviert werden

- The format is as above , with the "Time" entry setup as follows:
  Der Format ist wie oben, mit dem „Time" Feld folgendes definiert:
- 0x00 (Time) **immediate** *sofort* — 0xFF (Time) **suspend transmission** *Senden suspendiert* — **otherwise** *sonst* — 0xNN (Time) **timer setup** *Zeit einstellen* **(1 – 254 ms)** *(1 – 254 ms)*
- **Entries with suspended transmissions can be overwritten by newer requests.**
  Eingaben mit suspendierten Senden können bei neueren Anforderungen überschrieben werden.

M A N U A L

CAN - BUS

for Servo Amplifiers
DS 2xx / DS 4xx / DPCxx
BAMOCAR
BAMOBIL / BAMOBIL Dxx

UNITEK Industrie Elektronik G m b H

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Edition / Version

06/2017 V 04

1 Contents

2 Safety

2.1 Safety advices

Note:

This manual description is only to be used in connection with the hardware manual DS and the software manual NDrive!!

Before installation or commissioning begins, this manual must be thoroughly read and understood by the skilled technical staff involved. If any uncertainty arises, the manufacturer or dealer should be contacted

2.2 Regulations and guidelines

The devices and their associated components can only be installed and switched on where the local regulations and technical standards have been strictly adhered to.

EU Guidelines	2004/108/EG, 2006/95/EG, 2006/42/EG EN 60204-1, EN292, EN50178, EN60439-1, EN61800-3, ECE-R100 ISO 6469, ISO 26262, ISO 16750, ISO 20653, ISO12100
IEC/UL:	IEC 61508, IEC364, IEC664, UL508C, UL840
VDE Regulations/TÜV Regulations:	VDE100, VDE110, VDE160
Regulations of the statutory accident insurance and prevention institution:	VGB4

The user must ensure that in the event of:

- device failure
- incorrect operation
- loss of regulation or control

the axis will be safely de-activated.

It must also be ensured that the vehicles, machines, equipment, or vehicles are fitted with device independent monitoring and safety features.

Unearthed systems (e.g. vehicles) must be protected by means of independent insulation monitors.

Man as well as property must not be exposed to danger at any time!!!

Assembly
- should only be carried out when all voltages have been removed and the units are secured
- should only be carried out by suitably trained personnel

Installation
- should only be carried out when all voltages have been removed and the units are secured
- should only be carried out by suitably trained personnel for electrics
- should only be carried out in accordance with health and safety guidelines

Adjustments and programming
- should only be carried out by suitably trained personnel with knowledge in electronic drives and their software
- should only be carried out in accordance with the programming advice
- should only be carried out in accordance with safety guidelines
- should only be carried out if the path monitoring systems are active for limited travel distances.

CE
When mounting the units into vehicles, machines, and installations the proper operation of the units may not be started until it is ensured that the machine, the installation, or the vehicle comply with the regulations of the EC machinery directive 2006/42/EG, the EMC guideline 2004/108/EG, and the guideline ECE-R100.
On the described installation and test conditions (see chapter ‘CE notes’) it is adhered to the EC guideline 2004/108/EG including the EMC standards EN61000-2 and EN61000-4.
A manufacturer's declaration can be requested.
The manufacturer of the machine or installation is responsible for observing the threshold values demanded by the EMC laws.

QS
Test results are archived with the device serial number by the manufacturer for a period of 5 years.
The test protocols can be asked for.

3 General information

3.1 Logic functions

Originally the serial data bus system CAN (Controller Area Network) was developed for the automobile industry. Since then, the CAN-BUS is used for a wide range of applications in the plant and mechanical engineering. CAN is internationally standardized as ISO11898. CAN meets the particularly high safety requirements of highly available machines and medical equipment. High transmission rates and favourable connection costs are the advantages of the CAN-BUS.

During the CAN data transmission no stations are addressed but the content of a message is marked by a network-wide clear identifier. The identifier also determines the priority of the message.

A high system and configuration flexibility is achieved due to the content-related addressing. Thus, it is very easy to add further equipment to the network.

In all digital UNITEK devices the CAN-BUS interface is installed as **Slave.**
It is intended for being connected to a CAN-BUS master.
The interface is opto-decoupled.
The primary supply is effected internally via DC/DC converters.

The UNITEK CAN-BUS can transmit the following functions:

Examples from master (CNC/SPS/ to slave (DRIVE-DS) (receiving)

Logic functions	Command values	Parameters	
Enable	Torque command value	Control parameters	
Reference run	Speed command value	Settings	
Start, Stop	Position command value		
	Current limits		

Examples from slave (DRIVE-DS) to master (CNC/SPS) (sending, transmitting)

Logic functions	Actual values	Parameters	Signals
RUN	Actual torque value	Control parameter	State signal
ENABLE	Actual speed value	Settings	Error signal
POS	Actual position value		
Limit switch			

The addresses (REGID) are indicated in the parameter survey (see NDrive Manual),
e.g. speed command value (SPEED_CMD) = REGID 0x31 <value in hex>.

4 CAN BUS connections

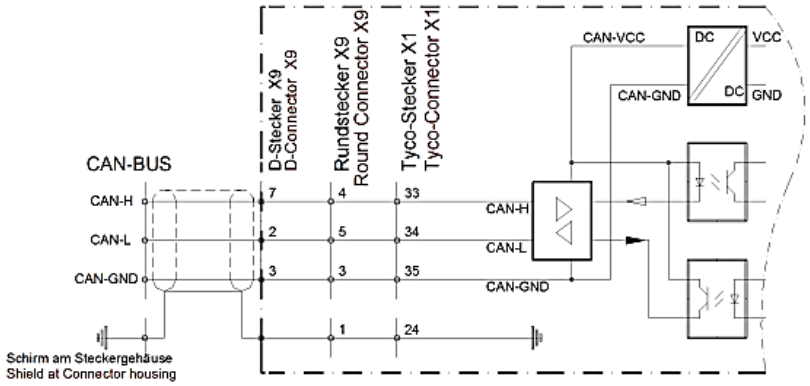
4.1 Connections

The CAN-BUS is the digital connection to the CNC control (CAN master).
The programming and operation is effected via the CAN-BUS by means of the control panel.
Interface acc. to ISO 11898-2.

Connection hardware:

Characteristic impedance	120 Ω
Conductor resistance (loop)	160 Ω/km
Operating capacity (800 Hz)	<60 nF/km

nput circuit



Connector pin assignment:
see device manual
Cable colours (recommended)
LiYCY 4x0.25 + shield

CAN-GND	white
CAN-H	green
CAN-L	yellow

(Note: colors may different)

Fig. 4-1

CAN BUS isolated / CAN Gnd to common potential

CAN-BUS connection with several servo amplifiers DS- (slave) (example):
For other device types please observe the connector pin assignment (device manual)

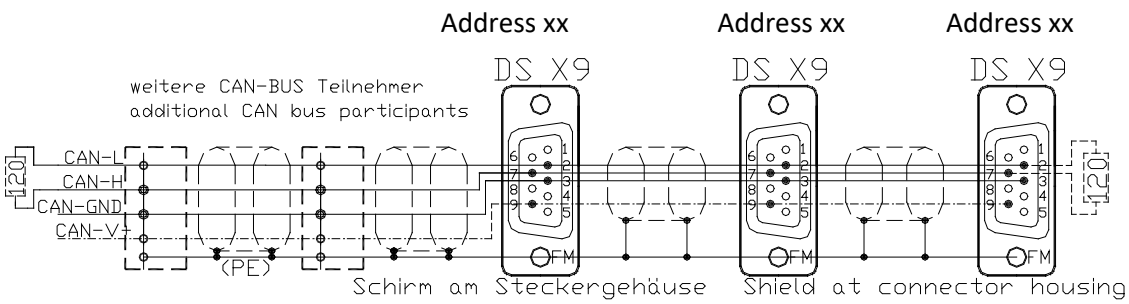


Fig. 4-2

Termination resistance

The line connection resistance (R = 120Ω) must be installed across the first and the last BUS participants between CAN-H and CAN-L.

Power supply

The power supply of the CAN-BUS is internally provided via a DC/DC converter.

CAN BUS setting

The transmission addresses for receiving and sending and the transmission rate are entered via the parameter field 'CAN-Setup' of the pc program NDrive.

Address	Short symbol	Basic value (default)	Range
Receiving address (slave)	RPD01	0x201	0x201 to 0x27F
Transmission address (slave)	TPD01	0x181	0x181 to 0x1FF

Transmission rate NBT	Setting value BTR	Line length max.	
1000 kBaud	0x4002	20 m	
500 kBaud	0x4025	70 m	
625 kBaud	0x4014	70 m	
250 kBaud	0x405c	100 m	
100 kBaud	0x4425	500 m	

5 Software

5.1 Format description

The software format is designed for an optimal communication with the CNC machine controls and CAN modules of the Labod electronic company.
This format does not correspond to CANopen.
The transmission rate (Baud rate) is programmable.
The UNITEK standard is 500 kB/s (Labod 615 kB/s).
The devices UNITEK DSxx and BAxx can be added to a CANopen network (TPDO1, RPDO1) as slave.

Numerical format
Parameter value and parameter no. as Little-Endian format (Intel format)
Bit7 to 0 / Bit15 to 8 / Bit23 to 16 / Bit31 to 24

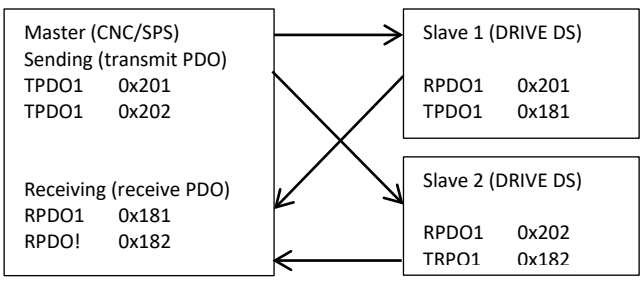
CAN format
The CAN protocol is a 3 or 5 byte data package when received and 4 or 6 when send.
It is also possible to receive data packages of up to 8 byte. In this case, however, it is evaluated as 5 Byte data package. The identifier is 11Bit wide. It comprises the **COB identifier**, the **RTR function** (Remote Transmission Request) and the **DLC information** (Data Length Code).
The byte 0 of the data field is for the REGID index (parameter no.).
The second to the fifth byte (byte 1 to byte 4) contains the data of the REGID index (parameter value).

Range	Head			Data field				
	COB-ID	RTR	DLC	byte 0	byte 1	byte 2	byte 3	byte 4
Function	11 Bit	0	Length	REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24

Master-Slave connection
In order to simplify the configuration a predefined Master/Slave connection set was specified in CANopen. For networks with one master and up to 127 slaves this assignment of COB identifiers offers each participant a simple solution for a CANopen network. Any information is solely distributed from the master. Direct communication among the slaves is not possible.

COB identifier										
Service					Node ID					
10				7		6				0
Example 0 x 181										
0	0	1	1	0	0	0	0	0	0	1
1			8				1			

The preferred objects (slave) are TPDO1 (0x201 to 0x27F) and RPDO1 (0x181 to 0x1FF).
The objects TPDO2..4 and RPDO2..4 can also be used.



Connection from master to slave

5.2 Head field

Range	Head			Data field				
	COB-ID	RTR	DLC	byte 0	byte 1	byte 2	byte 3	byte 4
Function	11 Bit	0	Length	REGID	B7 to 0	B15 to 8	B23 to 16	B31 to 24

5.3 COB ID bits (CAN OBJECT ID)

With CANopen the standard value (default) for TPDO1=0x181 and for RPDO1=0x201.

COB identifier											Object
Service				Node ID							
0	0	1	1	0	0	0	0	0	0	1	TPDO1 0x181-0x1FF
1			8				1				
	1	0	0	0	0	0	0	0	0	1	RPD01 0x201-0x27F
2			0				1				

The address can be changed by entering a direct transmission address in the servo amplifier (DSxx, BAxx) for receiving (CAN-ID-Rx 0x68) and for transmission field CAN-Setup in the NDrive. The addresses of Tx-ID and Rx-ID can also be changed directly via the CAN (see example 1).

5.4 RTR bit (REMOTE TRANSMISSION REQUEST)

The value for RTR is always set to 0 / RTR is not used.

5.5 DLC bits (DATA LENGTH CODE)

The size of the data field is determined by the DLC bits.

Receiving:	value 0x03	corresponds to REGID plus 2 byte (16 bit)
	value 0x05	corresponds to REGID plus 4 byte (32 bit)
Transmission:	value 0x04	corresponds to REGID plus 2 byte plus Dummy (16 bit)
	value 0x06	corresponds to REGID plus 4 byte plus Dummy (32 bit)

5.6 Data field

The length of the data field for messages received in the servo is 3 or 5 byte.
The upper data bytes are registered when received, however, not taken into account.
The message for transmitting from the servo to the CAN-BUS is 4 or 6 byte wide.

5.7 REGID

The first byte is provided for the REGID index (parameter no.).
It is possible to determine up to 254 registers.
The most important parameter indexes are listed in the REGID list (see manual NDrive).

5.8 Data

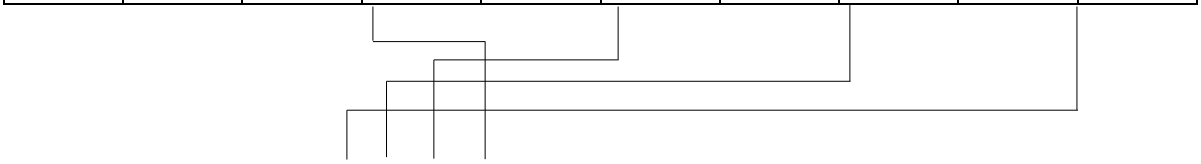
The data length is preset in the field 'DLC bits' (16 or 32 bits).
Byte 2 to byte 5 are for the 32 bit register data (4 byte).
Byte 2 to byte 3 are for the 16 bit register data (2 byte).

Example for the data field
Position command value for num 300010000

Function	**Hex value**
Transmission address for receiving	0x201
Data length 4 byte	DLC=5
REGID for the position command value (POS_SOLL)	0x6E
Data length 4 byte	DLC=5
Data for the position command value Num 300010000	0x11E1CA10

Data input

Byte 0		Byte 1		Byte 2		Byte 3		Byte 4	
REGID		Data bits 7 to 0		Data bits 15 to 8		Data bits 23 to 16		Data bits 31 to 24	
6	E	1	0	C	A	E	1	1	1



Data = 0x**11E1CA10** (corresponds to the num. position 300010000)

The input format is Little-Endian (Intel format)

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 2	**0x201**	**5**	**0x6E**	**0x10**	**0xCA**	**0xE1**	**0x11**

6 Examples

6.1 Receiving CAN BUS data

Transmission address at the DS servo	COB ID	(default = 0x201)
Data format	DLC	(3, 4, 5)
Parameter	Byte 0	(REGID – see parameter list)
Parameter content	Byte 1 to byte 4	

Examples:

Changing the transmission address via CAN	see example 1
Disable the controller (no enable)	see example 2
Speed command value	see example 3
Position command value	see example 4
Torque command value	see example 5
Parameter value	see example 6
Write EEPROM	see example 7

6.2 Transmission of CAN data from the DSxx and BAxx servo to the CAN BUS

In general the following is valid for the request to transmit from the DS servo:

Data field:	Byte 0 =	0x3D	Parameter transmission request
(DLC = 3)	Byte 1 =	REGID Value	Content of this REGID
	Byte 2 =	0x??	Time interval

1. Transmitting once: (see example 8)

Data field:	Byte 0 =	0x3D	Parameter transmission request
(DLC = 3)	Byte 1 =	0xA8	Content of this REGID
	Byte 2 =	0x00	Transmitting once

2. Cyclic transmission: (see example 9)

Data field:	Byte 0 =	0x3D	Parameter transmission request
(DLC = 3)	Byte 1 =	0xA8	Content of this REGID
	Byte 2 =	0x0A	Transmitting every 10ms (0 to 254ms)
Note:	*Byte 2 =*	*0xFF*	*Stop cyclic transmission*

3. Request for a status message after action: (see example 10)

Data field:	Byte 0 =	0x51	REGID for data after action
(DLC = 3)	Byte 1 =	0x10	Activation via bit 4
	Byte 2 =	0x00	*Don't care*

6.3 Sending from the master to the CAN bus to the DS servo

Example 1: Changing the transmission address via CAN

The address for receiving (slave) on a new DSxx, BAxx servo is 0x201 (default).
This address is to be changed in 0x210.
The REGID index for the receiving ID for the configuration of this address is 0x68 (FORE_CANIDREAD).

Function	**Hex value**
Transmission address to the Servo	0x201
Data length 2 byte	DLC=3
REGID for CAN-Rx address	0x68
Value for a new CAN-Rx address	0x0210

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 1	0x201	3	0x68	0x10	0x02	---	---

Changing the transmission address in the pc program NDrive

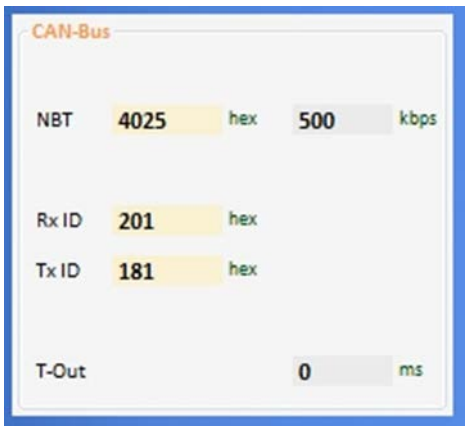


Fig. 6-1

Inputs:

NBT Transmission rate (kBaud)

Rx ID Receiving address in the DS (default 0x201)
Tx ID Transmission address from the DS (default 0x181)

T-Out Time error monitoring

Example 2: Disable the controller (no enable) **Message to the servo**

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for disable (MODE)	0x51
Value for the disable MODE BIT2	0x0004

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 2	**0x201**	**3**	**0x51**	**0x04**	**0x00**	---	---

Example 3: Speed command value **Message to the servo**

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for the speed command value (SPEED_SOLL)	0x31
Value for 10% speed num. 3277	0x0CCD (100 % ≙ 32767)

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 3	**0x201**	**3**	**0x31**	**0xCD**	**0x0C**	---	---

Example 4: Position command value **Message to the servo**

Function	**Hex value**
Transmission address to the servo	0x201
Data length 4 byte	DLC=6
REGID for the speed command value (POS_DEST)	0x6E
Value for position 3000000	0x2DC6C0

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 4	**0x201**	**5**	**0x6E**	**0xC0**	**0xC6**	**0x2D**	**0x00**

Example 5: Torque command value **Message to the servo**

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for speed command value (TORQUE-CMD)	0x90
Value for 50% torque num 16380	0x3FFC

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 5	**0x201**	**3**	**0x90**	**0xFC**	**0x3F**	---	---

Beispiel 6: Einstell-Parameter **Message to the servo**

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for parameter acceleration (ACC ramp)	0x35
Data for 1000ms acceleration	0x03E8

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 6	**0x201**	**3**	**0x35**	**0xCD**	**0x0C**	---	---

Example 7: Writing EEPROM **Message to the servo**

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID to write EEPROM	0x84
EEPROM level 0 (EEPROM level1 = 0X0001)	0x0000

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 7	**0x201**	**3**	**0x84**	**0x00**	**0x00**	---	---

6.4 Transmission from the DS servo to the CAN BUS

All examples have the default transmission addresses (Rx ID=0x201 receiving, Tx ID=0x181 transmitting)

Example 8: Status message **One-time transmission from the servo**

In order to receive the information of a specified REGID a transmission request must be send to the servo. In the following example a one-time transmission of the REGID information is requested.

Message to the servo for a transmission request:

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for reading data from the servo and transmission to the CAN (READ)	0x3D
REGID for status (KERN_STATUS)	0x40
Time interval (transmitting once)	0x00

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 8	**0x201**	**3**	**0x3D**	**0x40**	**0x00**	---	---

Retransmitted information from the servo:

Function	**Hex value**
Transmission address to the servo	0x181
Data length 2 byte	DLC=4
REGID for status (KERN_STATUS)	0x40
Value of KERN_STATUS (0x40) are	0x0181

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 8	**0x181**	**4**	**0x40**	**0x81**	**0x01**	**0x****	

(Data range byte 1 to byte 4 in Little Endian format)

Current state of the status = 0x0181:

Bit0	Enable drive	(Ena)
Bit7	Position control	(P-N)
Bit8	Speed control	(N-I)

Example 9: Actual speed value **Cyclic transmission from the servo**

For the cyclic retransmission the register REGID_READ is programmed with a repeating time.
For the transmission repetition a cycle time (in ms) is entered in the byte 2 in hex format (1-254ms).

Message to the servo for a transmission request:

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for reading data from the servo and transmission to the CAN (READ)	0x3D
REGID for actual speed value (SPEED_IST)	0x30
For the repeating time 100ms the input in byte 2 is	0x64
Note:	
The permanent transmission in byte 2 can be stopped by	*0xFF*

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 9	**0x210**	**3**	**0x3D**	**0x30**	**0x64**	---	---

Information retransmitted from the servo within the interval of 100ms

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=4
REGID for actual speed value (SPEED_IST)	0x30
Value of the speed command value 100% (num 32767)	0x7FFF

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 9	**0x190**	**4**	**0x30**	**0xFF**	**0x7F**	**0x****	---

Note:
It is possible to configure max. 8 state values which send their status cyclically.

Example 10: Status message after an event **Transmission from the servo (0x51 – BIT4)**

Activation:
The automatic transmission is activated according to a specified configuration by setting of bit 4 in the REGID address 0x51. The device status signal (REGID 0x40) is automatically sent. In case of a modification of the device status the transmission takes place according to a configuration mask (bit mask (REGID 0x52)).

Configuration:
The configuration is effected via the bit mask (REGID 0x52). The bit mask has a preset value of 0x0030. That is, in case the status bit 12 (Cal) or status bit 13 (Tol) is modified the complete status message (KERN_STATUS bit 0 to bit 15) is send to the CAN BUS.

Transmission request to the servo:

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for data after an event (event trigger)	0x51
REGID for MODE BIT 4	0x10

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Beispiel 10	**0x201**	**3**	**0x51**	**0x10**	**0x00**	---	---

Information retransmitted from the servo:

In the example the target position of a positioning run is reached and bit 13 is set in the device status (Tol). Thus, the automatic transmission of the device status (REGID 0x40) is triggered.

Function	**Hex value**
Transmission address to the servo	0x181
Data length 4 byte	DLC=6
REGID for status (KERN_STATUS)	0x40
Value of KERN_STATUS (0x40)	0x0181

Range	**Head**		**Data field**					
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24	b32 to 39
Example 10	**0x181**	**6**	**0x40**	**0x81**	**0x31**	**0x00**	**0x00**	**0x****

Current state of the status (KERN_STATUS) = 0x3181:

Bit0	Enable drive	(Ena)
Bit7	Position control	(P-S)
Bit8	Speed control	(S-I)
Bit12	Calibrated	(Cal)

Example 10-1: Status message after a selected event **Transmission from the servo**

The event trigger is changed to the assigned status bit via the configuration mask (REGID 0x52).

For example: Configuration mask (0x52) = 0x20 corresponds to continuous current (Icns)
Configuration mask (0x52) = 0x12 corresponds to limit switch + and – (Lim+, Lim-)

Determine the trigger event with the configuration mask (0x52).

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for configuration mask	0x52
REGID for status trigger selection (e.g. limit switch)	0x12

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 10-1	**0x201**	**3**	**0x52**	**0x12**	**0x00**	---	---

Transmission of the status after a selected status event:

The set value for the configuration mask (0x52) is 0x0012.
When a limit switch is assigned (+ or -) the complete status message (4 byte) is send.

Function	**Hex value**
Transmission address to the servo	0x201
Data length 2 byte	DLC=3
REGID for data after an event (event trigger)	0x51
REGID for MODE BIT 4	0x10

Range	**Head**		**Data field**				
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24
Example 10-1	**0x201**	**3**	**0x51**	**0x10**	**0x00**	---	---

Information retransmitted from the servo:

Function	**Hex value**
Transmission address to the servo	0x181
Data length 4 byte	DLC=6
REGID for status (KERN_STATUS)	0x40
Data for KERN_STATUS (0x40)	0x0181

Range	**Head**		**Data field**					
	COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Function			REGID	b7 to 0	b15 to 8	b23 to 16	b31 to 24	b32 to 39
Example 10-1	**0x181**	**6**	**0x40**	**0x85**	**0x31**	**0x00**	**0x00**	**0x****

Current state of the status (KERN_STATUS) = 0x3185

Bit 0	Enable drive	(Ena)
Bit 2 oder Bit 3	Limit switch assigned	(Lim+ oder Lim-)
Bit 7	Position control	(P-N)
Bit 8	Speed control	(N-I)
Bit 12	Calibrated	(Cal)

Example 11: Routine for simple speed control

Driving with different speeds and stops (Rx-ID = 0x201; Tx-ID=0x181).

COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Note (master view)
201	3	3D	E2	00				Transmitting transmission request BTB
181	4	E2	01	00	00			Receiving BTB 0xE2
201	3	51	04	00				Transmitting disable
201	3	3D	E8	00				Transmitting transmission request enable (hardware)
181	4	E8	01	00	00			Receiving enable 0xE8
201	3	51	00	00				Transmitting no disable (enable)
201	3	35	F4	01				Transmitting ACC ramp (500ms = 0x01FE4)
201	3	ED	E8	03				Transmitting DEC ramp (1000ms =0x03E8)
201	3	31	D4	03				Transmitting speed command value 0x31 (30%=0x03D4)
201	3	3D	30	64				Transmitting transmission request actual speed value (every 100ms)
181	4	30	xx	xx	xx			Receiving actual speed value 0x30 (value xxx every 100ms)
201	3	31	A4	7F				Transmitting speed command value 0x31 (100% = 0x7FA4)
201	3	31	00	00				Transmitting speed zero
201	3	51	04	00				Transmitting disable

Example 12: Routine for simple position control

Reference run and driving to a target position and back to zero position

COB ID	DLC	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Note (master view)
201	3	3D	E2	00				Transmitting transmission request BTB
181	4	E2	01	00	00			Receiving BTB 0xE2
201	3	51	04	00				Transmitting disable
201	3	31	00	00				Transmitting transmission request enable (hardware)
201	3	3D	E8	00				Receiving enable 0xE8
181	4	E8	01	00	00			Transmitting no disable (enable)
201	3	51	00	00				Transmitting start reference run
201	3	78	01	00				Transmitting value for the configuration mask
201	3	52	30	00				Transmitting speed command value 0x31 (30%=0x03D4)
201	3	51	10	00				Transmitting transmission request status message after an event
181	4	40	xx	xx	xx			Receiving status message (value xxxx)
201	5	6E	C0	C6	2D	00		Transmitting target position 3000000 num
201	3	3D	F4	00				Transmitting transmission request within tolerance
181	4	F4	01	00	00			Receiving in tolerance
201	5	6E	00	00	00	00		Transmitting target position zero
181	3	F4	01	00	00			Receiving within tolerance
201	3	51	04	00				Transmitting disable

7 Units

7.1 Conversion of the measuring units

For position, speed, current, and command value:
The measured values are not converted in the device.
The numerical values (num) are displayed and processed.
These values are to be observed during the data transmission (CAN-BUS, RS232) as well as for the track and oscilloscope display.

Position

Actual position value range	Resolver	Incremental encoder
Pulses/rpm Max. value +/-2147483647 (31bit-1)	65536	65536
Resolution (smallest value)	16 (65536/4096 (12Bit)	65536/Inc x4
Example Spindle drive Slope 5mm/rpm	Travel 1000 mm = 200 rpm 200 rpm = 13107200 Resolution 65536/4096 = 16	Incremental encoder 2048 puls/rpm Travel 1000 mm = 200 rpm 200 rpm = 1638400 Resolution 65536/8192 = 8

Speed

Actual speed value range	Calibration speed (Nmax)	Limitation
Max. value +/- 32767 (15Bit-1)	N max value in the parameter field Motor and speed = 32767	Limitation in the parameter field Speed within the limit
Example	N max = 2000 The speed of 2000 rpm corresponds to 32767	Limit the speed to 1500 rpm Limit = 32767/2000*1500 = 24575 num The max. speed is limited to 1500 rpm

Current

Actual current value range	I 100%	Rated current calibration I-device			Peak current DC disabled		Limitation
Max. value +/- 9Bit	mV	Num	Aeff	A=	Num	A=	
DS 205/405	550	110	5	7	160	10	Limitation in the parameter field.. Motor and current. The smaller value is effective..
DS 412	800	160	12	17	230	24	
DS 420	700	140	20	28	200	40	
							Limit Icont.eff. to 2 A. Icont. = 110 / 5 * 2 = 44 num. The max. continuous current is limited to 2 A.
Example (DS205/4059)							

Command values

Position command value range	Speed command value range	Current command value range		
Max. value +/- 31Bit	**Max. value +/- 15Bit**	**Max. value +/- 9Bit**		
+/- 2147483647 num	+/- 32767 num	DS205/405	rated:110	max:160
		DS 412	rated:160	max:230
		DS 420	rated: 140	max:200

Note: The analog command value (AIN1, AIN2) 10 V corresponds to 29490 (90% of the max. speed).

RegNr	Typ	Hex value	Decimal	Label	(intern name)	Description
0x00	(UK):	0x0000	0	(rsv)	(rsv)	(reserved)
0x01	(UK):	0x0000	0	Usr-Opt	(USER_SPEC_OPT)	(Deif) Options
0x02	(RO):	0x0000	0	SC-info	(USER_SPEC_STA)	(Deif) Safety-State
0x03	(SP):	0x0000	0	Cmd-Spec	(USER_SPEC_DEM)	(Deif) Cmd-Specials
0x04	(SP):	0x0000	0	(Key)	(USER_KEY)	?? (User Key)
0x05	(RW):	0x05dc	1500	F nom	(MOTOR_NOM_F)	Nominal motor frequency (FU)
0x06	(RW):	0x0000	0	V nom	(MOTOR_NOM_V)	Motor nominal voltage (FU)
0x07	(RW):	0x00000000	0	T dc	(UF_TDC)	Time DC-pre-mag. (FU)
0x08	(RW):	0x00000000	0	V dc	(UF_UDC)	DC voltages (FU)
0x09	(RW):	0x00000064	100	F dc	(UF_SPEZIAL)	??
0x0a	(RW):	0x00000000	0	U min	(UF_UMIN)	Minimum voltage (FU)
0x0b	(RW):	0x00000000	0	F min	(UF_FMIN)	Minimum frequency (FU)
0x0c	(RW):	0x00000000	0	V corner	(UF_UECK)	Voltage für max. frequency (FU)
0x0d	(RW):	0x00000000	0	F corner	(UF_FECK)	Frequency for max. voltage (FU)
0x0e	(RW):	0x0000	0	Cos Phi	(UF_POWF)	Power factor (FU)
0x0f	(RW):	0x0064	100	(...)	(UF_EXTRA)	(...)
0x10	(SP):	0x0000	0	Chan	(CAPTURE_CHAN)	Oscilloscope trigger channel
0x11	(RO):	0xcb5e37b4	3411949492	Ctrl	(CONTROL_STATU)	Control-Status
0x12	(SP):	0x7ae8	31464	Trig. Level	(CAPTURE_TRIGL)	Oscilloscope trigger level
0x13	(SP):	0x0001	1	Trig. Edge	(CAPTURE_TRIGE)	Oscilloscope trigger function
0x14	(SP):	0x9134	37172	Trig. Sce	(CAPTURE_TRIGS)	Oscilloscope trigger source
0x15	(SP):	0x0001	1	Source	(CAPTURE_SOURC)	Oscilloscope source
0x16	(SP):	0x0001	1	Skip	(CAPTURE_SKIP)	Oscilloscope skip
0x17	(FN):	0x0000	0	Read Cmd	(CAPTURE_READ)	Oscilloscope read
0x18	(FN):	0xface	64206	Run Cmd	(CAPTURE_RUN)	Oscilloscope Run
0x19	(RW):	0x0000	0	PWM freq.	(PWM-FREQ)	Frequency PWM-stage
0x1a	(SP):	0x0000	0	Look-up	(LOOKUP_TEMP)	lookup field (temperary)
0x1b	(RO):	0x01d8	472	FW	(FW-VERSION)	Firmware
0x1c	(RW):	0x000a	10	Kp	(I_KP)	Proportional amplification curre
0x1d	(RW):	0x03e8	1000	Ti	(I_KI)	Integral action time current cor
0x1e	(RW):	0x0000	0	Cutoff (dig.)	(DIG_CUTOFF)	Cutoff-digital-cmd
0x1f	(RO):	0x07f0	2032	??	(I3_ISTOFFSET)	Offset actual current 3
0x20	(RO):	0x0002	2	I actual	(I_IST)	current actual value
0x21	(SP):	0x0000	0	Id set (dig.)	(I_SOLLOFFSET)	D-current setpoint
0x22	(RO):	0x0000	0	I cmd (ramp)	(I_REF)	current set point numeric
0x23	(RO):	0x0000	0	Id ref	(ID_REF)	D-Current reference
0x24	(RO):	0x013f	319	I max inuse	(I_MAXPLUS)	I max inuse
0x25	(RW):	0x03e9	1001	Ramp	(I_DELTAMAXPLU)	Icmd ramp
0x26	(RO):	0x0000	0	I cmd	(I_SOLL)	command current
0x27	(RO):	0xffff	-1	Iq actual	(IQ_ACTUAL)	Q-current actual
0x28	(RO):	0xfffd	-3	Id actual	(ID_ACTUAL)	D-current actual
0x29	(RO):	0x0000	0	Vq	(VQ)	Q-Outputvoltage
0x2a	(RO):	0x0000	0	Vd	(VD)	D-Outputvoltage
0x2b	(RW):	0x0050	80	TiM	(I_ERRSUMMAX)	Max. integration sample count
0x2c	(RW):	0x000a	10	Kp	(SPEED_KP)	Proportional gain speed
0x2d	(RW):	0x0064	100	Ti	(SPEED_KI)	Integration time speed
0x2e	(RW):	0x0000	0	Td	(SPEED_KD)	D_ speed
0x2f	(RW):	0x10000000	268435456	Ain1 offset/scale	(ANALOG_OFFSET)	Offset/scale Ain1
0x30	(RO):	0x0000	0	N actual	(SPEED_ACTUAL)	Speed actual value
0x31	(RW):	0x0000	0	N set (dig.)	(SPEED_CMD)	Digital Speed Set Point
0x32	(RO):	0x0000	0	N cmd (ramp)	(SPEED_REF)	Command speed after ramp
0x33	(RW):	0x0000	0	N error	(SPEED_ERR)	Speed error
0x34	(RW):	0x7fff	32767	N-Lim	(SPEED_LIMIT)	Speed limit
0x35	(RW):	0x00010064	65636	Accel.	(SPEED_DELTAMA)	Speed/torque acceleration ramp t
0x36	(RW):	0x0000	0	Command	(COMMAND_SOURC)	Selection command speed
0x37	(RO):	0x0002	2	Loop	(SPEED_COUNTMA)	current to speed loop factor
0x38	(RO):	0x0000	0	Iq error	(IQ_ERR)	Current Iq error
0x39	(RO):	0x0000	0	Id error	(ID_ERR)	Current Id error
0x3a	(RW):	0xface	64206	?? (...)	(0x3a (...))	?? (...)
0x3b	(RW):	0x0050	80	TiM	(SPEED_ERRSUMM)	Max. integration sample count
0x3c	(RW):	0x7fff	32767	I-red-N	(I_RD_N)	Current derating speed
0x3d	(FN):	0x0618	1560	Read	(READ)	Function
0x3e	(RW):	0x8000	-32768	N-Lim-	(SPEED_CLIP_NE)	Speed limit negative
0x3f	(RW):	0x7fff	32767	N-Lim+	(SPEED_CLIP_PO)	Speed limit positive

RegNr	Typ	Hex value	Decimal	Label	(intern name)	Description
0x40	(RO):	0x00000380	896	Status map	(STATUS)	Status
0x41	(RO):	0x0000	0	incr_delta	(INCR_DELTA)	??
0x42	(RO):	0x86b9	-31047	MotorPos mech	(MPOS_ACTUAL_M)	Motor actual angular position me
0x43	(RO):	0x6a13	27155	MotorPos elec	(MPOS_ACTUAL_E)	Motor actual angular position el
0x44	(RW):	0xfdb0	-592	FB-Offset	(MPOS_ISTOFFSE)	phase angle offset Feedback
0x45	(RO):	0x00000000	0	I2t & Regen. Energy	(IT_RG_MONITOR)	monitor i2t & regen circuit
0x46	(RW):	0x7fff	32767	I lim dig	(I_LIMIT)	Current limit with a digital swi
0x47	(RW):	0xface	64206	...	(...)	...
0x48	(RO):	0x013f	319	I lim inuse	(I_LIM_INUSE)	actual current limit
0x49	(RO):	0x0000	0	T-motor	(T_MOTOR)	motor temperature
0x4a	(RO):	0x0000	0	T-igbt	(T_IGBT)	power stage temperature
0x4b	(RO):	0x0000	0	T-air	(T_AIR)	air temperature
0x4c	(RW):	0x0000	0	I-red-TE	(I_RD_TE)	Current derate Temp.
0x4d	(RW):	0x0035	53	I max	(MOTOR_I_MAX)	max. motor current
0x4e	(RW):	0x0035	53	I nom	(MOTOR_I_DAUER)	Motor continuous current
0x4f	(RW):	0x0006	6	M-Pole	(MOTOR_POLE)	Motor pole count
0x50	(RW):	0x0000	0	Cutoff	(AIN1_CUTOFF)	cutoff window Ain1
0x51	(SP):	0x0000	0	Mode	(MODE)	Mode State
0x52	(SP):	0x0000f811	63505	Status mask	(STATUS_MASK)	Status mask
0x53	(RW):	0x0000	0	Cutoff	(AIN2_CUTOFF)	cutoff window Ain2
0x54	(RO):	0xffff	-1	I1 actual	(I1_IST)	Current actual value I1
0x55	(RO):	0x0004	4	I2 actual	(I2_IST)	Current actual value I2
0x56	(RO):	0x0002	2	I3 actual	(I3_IST)	Current actual value I3
0x57	(RO):	0x0000	0	I lim inuse rmp	(I_LIM_INUSE_R)	??
0x58	(RW):	0x0000	0	I-red-TD	(I_RD-TD)	??
0x59	(RW):	0x0bb8	3000	N nom	(MOTOR_RPMMAX)	Rated motor speed
0x5a	(RW):	0x00000808	2056	Device Options	(KERN_OPTIONS)	Device settings (options)
0x5b	(RW):	0x0000	0	Kacc	(SPEED_KS)	Acceleration amplification
0x5c	(RO):	0x86b9	34489	Rotor	(ROTOR)	Rotor signals
0x5d	(RO):	0x0000	0	N cmd (int)	(SPEED_CMD_INT)	Command speed internal
0x5e	(RW):	0x0002	2	Filter	(SPEED_FILTER_)	Filter speed actual value
0x5f	(RO):	0x0000	0	I act (filt)	(I_IST_FILT)	Filtered actual current
0x60	(RW):	0x0000	0	Filter	(AINx_FILT)	
0x61	(RO):	0x0000	0	I t	(IT_MONITOR)	I t monitor
0x62	(RW):	0x075bcd15	123456789	S-Nr.	(DEVICE_SERIAL)	Device Serial number Servo
0x63	(RO):	0x0000	0	fpga Status	(POWER_BOARD_S)	FPGA Status
0x64	(RW):	0x00e6	230	Mains	(DEVICE_MAINS)	Mains supply voltage
0x65	(RW):	0x00500019	5242905	Regen-P, Regen-R	(DEVICE_EXT_RE)	Regenerative Resistor power rati
0x66	(RO):	0xface	64206	Vdc-Bat	(DC_BUS)	Battery voltage
0x67	(RW):	0x00011313	70419	Type	(DEVICE_AUTO_I)	Device type
0x68	(RW):	0x0201	513	Rx ID	(CAN_ID_RX)	CAN-Bus drive rx address
0x69	(RW):	0x0181	385	Tx ID	(CAN_ID_TX)	CAN-Bus drive tx address
0x6a	(RW):	0x000f	15	Kp	(POS_KP)	position controller proportional
0x6b	(RW):	0x01f5	501	Ti	(POS_KI)	integral action time (Integral p
0x6c	(RW):	0x0000	0	Td	(POS_KD)	advancing-time (Differezial-part
0x6d	(RO):	0x000086b9	34489	Pos actual	(POS_ACTUAL)	actuael position numeric
0x6e	(SP):	0x00000000	0	Pos dest	(POS_DEST)	position-destination
0x6f	(RO):	0x00000000	0	Pos actual 2	(RegName_0x6f)	Pos actual 2
0x70	(RO):	0x00000000	0	Pos error	(POS_ERR)	position error
0x71	(RW):	0x0033	51	TiM	(POS_ERRSUMMAX)	Max.integration sample count, po
0x72	(RW):	0x00000000	0	Off. Ref.	(POS_REF_OFFSE)	reference zero offset
0x73	(RW):	0x4025	16421	NBT	(CAN_BTR)	CAN-BUS transmission rate
0x74	(RO):	0x91be	-28226	Zero-Capture	(POS_ZEROCAPTU)	Pos Zero Capture
0x75	(RW):	0x0000	0	Reso edge	(POS_REFRESOED)	Reso pos. at Rsw
0x76	(RW):	0x0078	120	Speed 1	(SPEED_CALIB_F)	Reference speed (fast)
0x77	(RW):	0x0078	120	Speed 2	(SPEED_CALIB_S)	Reference speed (slow)
0x78	(FN):	0x444d	17485	Start park cycle	(FUN_REF_START)	Start park cycle
0x79	(RW):	0x0064	100	Tol-wind	(POS_WINDOW)	Tolerance window for position
0x7a	(SP):	0xfd944f98	4254355352	Preset	(POS_PRESET)	Preset value
0x7b	(RO):	0x00000000	0	Off. Var	(POS_VAR_OFFSE)	user zero offset
0x7c	(RW):	0x00000000	0	ND-Scale	(NDRIVE_SCALE)	Display-conversion factor-positi
0x7d	(RW):	0x00000000	0	ND-Offset	(NDRIVE_OFFSET)	Verschiebefaktor Pos-Anzeige
0x7e	(RW):	0x00000000	0	Factor-ext	(ENCODER_2_SCA)	Scale 2nd encoder
0x7f	(RW):	0x00000000	0	??	(OFFSET_SLACK)	??

RegNr	Typ	Hex value	Decimal	Label	(intern name)	Description
0x80	(RW):	0x86b9	34489	??	(POS_DIFF_SLAC)	??
0x81	(UK):	0xface	64206	...	(...)	...
0x82	(RO):	0xface	64206		(DEVICE_SERIAL)	Device serial number ext.
0x83	(FN):	0x444d	17485	??	(FUN_PARAREAD)	??
0x84	(FN):	0x444d	17485	??	(FUN_PARAWRITE)	??
0x85	(FN):	0x0000	0	Auto-Fn	(FUN_SPEZIAL)	Auto-Functions
0x86	(UK):	0xface	-1330	??	(READ_INFO)	??
0x87	(RW):	0xface	64206	...	(...)	...
0x88	(RW):	0x00000000	0	Rx ID 2	(CAN_ID_RX_2)	CAN-Bus drive rx 2 address
0x89	(RW):	0x00000000	0	Tx ID 2	(CAN_ID_TX_2)	CAN-Bus drive tx 2 address
0x8a	(RO):	0x0000	0	V out	(VOUT)	Output-voltage usage
0x8b	(RW):	0x0000	0	V red	(VRED)	Start point field reduction
0x8c	(RW):	0x0000	0	V kp	(VKP)	Proportional amplification field
0x8d	(RW):	0x0000	0	V-Ti	(VTI)	Time constant integral part fie
0x8e	(FN):	0x444d	17485	??	(FUN_ERRCANCEL)	Clear error list
0x8f	(RO):	0x00000020	32	Warning-Error map	(ERR_BITMAP1)	Description of 0x8f
0x90	(SP):	0x0000	0	M set (dig.)	(TORQUE_SETPOI)	Digital Torque Set Point
0x91	(RO):	0x000086b9	34489	Pos cmd	(POS_COMMAND)	Command position
0x92	(RO):	0x0000	0	??	(CAN_ERROR_BUS)	CAN-BUS Bus-Off count
0x93	(RO):	0x0000	0	??	(CAN_ERRWRITET)	CAN-BUS ??
0x94	(RO):	0x0000	0	fpga 1st error	(POWER_BOARD_E)	FPGA 1st Error
0x95	(RO):	0x0000	0	??	(CAN_COUNTREAD)	CAN-BUS ??
0x96	(RO):	0x0000	0	??	(CAN_COUNTWRIT)	CAN-BUS ??
0x97	(RO):	0x0000	0	??	(CAN_COUNTREJ)	CAN-BUS
0x98	(RO):	0xface	-1330	O-Block	(LOG_O_BLOCK)	O-Block
0x99	(RO):	0x02b5	693	Info Intr	(INFO_INTERRUP)	Info - Interrupt time
0x9a	(RO):	0x0000	0	(dbg) temp	(TEMP)	(dbg) Temp
0x9b	(RO):	0xface	64206	in Block	(LOG_I_BLOCK)	I-Block
0x9c	(UK):	0xface	-1330	Pt100-1	(T-PT-1)	Temp. Sensor Pt100-1
0x9d	(UK):	0xface	-1330	Pt100-2	(T-PT-2)	Temp. Sensor Pt100-2
0x9e	(UK):	0xface	-1330	Pt100-3	(T-PT-3)	Temp. Sensor Pt100-3
0x9f	(UK):	0xface	-1330	Pt100-4	(T-PT-4)	Temp. Sensor Pt100-4
0xa0	(RO):	0x0000	0	M out	(TORQUE_OUT)	Digital Torque Intern
0xa1	(RO):	0x0000	0	Ballast counter	(BALLAST_COUNT)	Ballast counter
0xa2	(RW):	0x15e0	5600	I-red-TM	(I_RD_TM)	??
0xa3	(RW):	0x1b58	7000	M-Temp	(MOTOR_TEMP_ER)	Motor-Temperatur Abschaltpunkt
0xa4	(RW):	0x3001	12289	Label 0xa4	(MOTOR_OPTION)	Description of 0xa4
0xa5	(RW):	0x00000064	100	DC-Bus min, DC-Bus max	(DEVICE_DCBUS_)	Description of 0xa5
0xa6	(RW):	0x0400	1024	FB-Incr (Mot)	(MOTOR_GEBER_I)	Increments per Rpm
0xa7	(RW):	0x0002	2	FB-Pole	(MOTOR_GEBER_P)	Resolver pole
0xa8	(RO):	0x0000	0	N act (filt)	(SPEED_ACTUAL_)	Actual speed value (filtered)
0xa9	(RO):	0x07ef	2031	I3 adc	(I1_ADC)	Current sensor M1
0xaa	(RO):	0x07ee	2030	I2 adc	(I2_ADC)	Current sensor M3
0xab	(RO):	0xfde8	65000	Logic freq.	(LOGIC_HZ)	Forerground frequency
0xac	(RO):	0x0618	1560	pwm1 (5/6)	(PWM1)	pulse widths modulation Ph1
0xad	(RO):	0x0618	1560	pwm2 (3/4)	(PWM2)	pulse widths modulation Ph2
0xae	(RO):	0x0618	1560	pwm3 (1/2)	(PWM3)	pulse widths modulation Ph3
0xaf	(RO):	0x007d	125	T-intr	(TIMER_DELTA)	Intr. time
0xb0	(RW):	0x444d	17485	??	(FUN_SERIALBOO)	??
0xb1	(RW):	0x0000	0	L sigma-q	(MOTOR_INDUCTA)	Stator Leakage inductance
0xb2	(RW):	0x0000	0	Id nom	(ID_NOM)	nominal magnetising current
0xb3	(RW):	0x007b	123	L magnet.	(MOTOR_MAGN_L)	Motor magnetising inductance
0xb4	(RW):	0x0000	0	R rotor	(MOTOR_ROTOR_R)	rotor resistance
0xb5	(RW):	0x0000	0	Id min	(ID_MIN)	minimum magnetising current
0xb6	(RW):	0x07d0	2000	TC rotor	(MOTOR_TR)	time constant rotor
0xb7	(SP):	0x9133	37171	(dbg) ptr1	(TEMP1_PTR)	(dbg) ptr1
0xb8	(UK):	0x0000	0	(dbg) *ptr1	(TEMP1_PTR_IND)	(dbg) *ptr1
0xb9	(SP):	0x902b	36907	(dbg) ptr2	(TEMP2_PTR)	(dbg) ptr2
0xba	(UK):	0x0002	2	(dbg) *ptr2	(TEMP2_PTR_IND)	(dbg) *ptr2
0xbb	(RW):	0x0000	0	L sigma-d	(MOTOR_INDUCTA)	leakage inductance ph-ph
0xbc	(RW):	0x007b	123	R stator	(MOTOR_STATOR_)	stator resistance ph-ph
0xbd	(RW):	0x0000	0	TC stator	(MOTOR_SPECS_I)	time constant stator
0xbe	(RW):	0x8005	32773	Label 0xbe	(LOGIC_DEFINE_)	Description of 0xbe
0xbf	(RW):	0x8004	32772	Label 0xbf	(LOGIC_DEFINE_)	Description of 0xbf

RegNr	Typ	Hex value	Decimal	Label	(intern name)	Description
0xc0	(RW):	0x800c	32780	Label 0xc0	(LOGIC_DEFINE_)	Description of 0xc0
0xc1	(RW):	0x800c	32780	Label 0xc1	(LOGIC_DEFINE_)	Description of 0xc1
0xc2	(RW):	0x0000	0	Label 0xc2	(LOGIC_DEFINE_)	Description of 0xc2
0xc3	(RW):	0x0000	0	Label 0xc3	(LOGIC_DEFINE_)	Description of 0xc3
0xc4	(RW):	0x20a3	8355	I max pk	(DEVICE_I_MAX_)	Limit for peak current (Servo)
0xc5	(RW):	0x3a3d	14909	I con eff	(DEVICE_I_CNT_)	Limit for continius current (Ser
0xc6	(RW):	0x0032	50	I device	(DEVICE_I)	Type current, protected
0xc7	(RW):	0x000a	10	R-Lim	(SPEED_DELTAMA)	Emergency stops time ramp, limit
0xc8	(RW):	0x0e10	3600	Nmax-100%	(SPEED_RPMMAX)	Maximum rotation speed in turns
0xc9	(RW):	0x0000	0	xKp2	(I_KP2)	proportional amplification posit
0xca	(RW):	0x0000	0	Ti	(POSI_KI)	integral action time (Integral p
0xcb	(RW):	0x0000	0	Kf	(I_KF)	...
0xcc	(RO):	0xc953	-13997	0xcc	(POSI_ERR)	0xcc
0xcd	(RW):	0x0000	0	TiM	(POSI_ERRSUMMA)	Limit integral storeroom peak va
0xce	(RO):	0x0e10	3600	Label 0xce	(SPEED_RPMMAX_)	Description of 0xce
0xcf	(RW):	0x0000	0	Label 0xcf	(POSI_KY)	Description of 0xcf
0xd0	(SP):	0x0000	0	T-Out	(CAN_TIMEOUT)	CAN timeout
0xd1	(RW):	0x0000003e	62	Var1	(VAR1)	Comparison variable-1
0xd2	(RW):	0x00002710	10000	Var2	(VAR2)	Comparison variable-2
0xd3	(RW):	0x00000000	0	Var3	(VAR3)	Comparison variable-3
0xd4	(RW):	0x00000000	0	Var4	(VAR4)	Comparison variable-4
0xd5	(RO):	0xffe0ffe0	-2031648	Ain1	(AIN1)	Analog Ain1 in/scaled
0xd6	(RO):	0x00580058	5767256	Ain2	(AIN_2)	Analog Ain2 in/scaled
0xd7	(RW):	0x10000000	268435456	Offset 2	(AIN2_OFFSET)	analog input 2 offset compensati
0xd8	(RO):	0x0020	32	Label 0xd8	(LOGIC_READ_BI)	Description of 0xd8
0xd9	(RO):	0x0349	841	Label 0xd9	(KERN_I_200PC)	Description of 0xd9
0xda	(RW):	0x0000	0		(LOGIC_DEFINE_)	
0xdb	(RW):	0x0000	0		(LOGIC_DEFINE_)	
0xdc	(RW):	0x0030	48	??	(DEFINE_DAC)	??
0xdd	(UK):	0xface	64206	...	(...)	...
0xde	(RO):	0x0000	0	out Dout3	(O_DOUT3)	Digital output 3
0xdf	(RO):	0x0000	0	out Dout4	(O_DOUT4)	Digital output 4
0xe0	(RO):	0x0000	0	out Dout1	(O_DOU1)	Digital output 1
0xe1	(RO):	0x0000	0	out Dout2	(O_DOU2)	Digital output 2
0xe2	(RO):	0x0000	0	out Rdy (BTB)	(O_BTB)	Device ready
0xe3	(RO):	0x0000	0	O Go	(O_GO)	Internal run
0xe4	(RO):	0x0000	0	(in) Limit1	(I_END1)	Digital input END1
0xe5	(RO):	0x0000	0	(in) Limit2	(I_END2)	Digital input END2
0xe6	(RO):	0x0000	0	(in) Din1	(I_DIN1)	Digital input DIN1
0xe7	(RO):	0x0000	0	(in) Din2	(I_DIN2)	Digital input DIN2
0xe8	(RO):	0x0000	0	(in) Run (Frg)	(I_FRG)	Digital input RUN
0xe9	(RO):	0x0000	0	I Fault	(I_FAULT)	internal error message of the po
0xea	(RO):	0x0000	0	I Regen	(I_BALLAST)	message regen circuit
0xeb	(RO):	0x0001	1	Vdc-Bus	(DC_BUS)	DC-Bus voltage
0xec	(RO):	0x0000	0	I LossOfSignal	(I_LOS)	Resolver fault. Incorrect or mis
0xed	(RW):	0x00010064	65636	Decel.	(SPEED_DELTAMA)	Speed/torque deceleration ramp t
0xee	(RW):	0x0226	550	I 100% (Stromsensor)	(IIST_100PC)	Current sensor justage (protecte
0xef	(RO):	0x0001	1	Label 0xef	(O_NOFAULT)	Description of 0xef
0xf0	(RW):	0x0005	5	T-peak	(TIME_IPEAK)	Timing for peak current
0xf1	(RW):	0x00fa	250	Brake delay	(USER_T_BRAKE)	Brake delay time
0xf2	(RO):	0x0001	1	O Brake	(VO_BRAKE)	Brake on
0xf3	(RO):	0x0000	0	O Icns	(VO_ICNS)	message continuous current
0xf4	(RO):	0x0000	0	O Toler	(VO_TOLER)	message position in tolerance
0xf5	(RO):	0x0001	1	O Less N0	(VO_Less_ N0)	message speed <1%
0xf6	(RO):	0x0000	0	Power	(POWER)	Power
0xf7	(RO):	0x0000	0	Work	(WORK)	Work
0xf8	(RW):	0x0000444d	17485	Axis	(ASCII_USER)	Axis label
0xf9	(FN):	0x444d	17485	??	(ASCII_WR_EEP)	??
0xfa	(FN):	0x444d	17485	??	(ASCII_RD_EEP)	??
0xfb	(RO):	0xffd4	-44	Ain1 calc	(AIN1_CALC)	Ain1 calc
0xfc	(RO):	0x0054	84	Ain2 calc	(AIN2_CALC)	Ain2 calc
0xfd	(UK):	0xface	64206	...	(...)	...
0xfe	(UK):	0xface	64206	...	(...)	...
0xff	(UK):	0xface	-1330	rsv	(rsv)	reserved