CAN-630 Standard

Bus Interface

Product Manual

07-05-03-05-E-V0204.doc

UL: 07-01-08-02 	631 – Product manual
UL: 07-01-05-06 	635 - Product manual
UL: 07-02-08-03 	637 - Product manual
UL: 07-02-09-01 	637+ - Product manual
UL: 07-02-10-01 	637f - Product manual

CiA Draft Standard 201-207	CAL; CAN Application Layer for Industrial Applications
CiA Draft Standard 301	CANopen; CAL-based Communication Profile for Industrial Systems

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Made in Germany, 2004

Contents

Thanks for your confidence choosing our product.

These operating instructions present themselves as an overview of the technical data and features.

Please read the operating instructions before operating the product.

If you have any questions, please contact your nearest SSD Drives representative.
Improper application of the product in combination with dangerous voltage can lead to injuries.
In addition, damage can also occur to motors or other products.
Therefore please observe our safety precautions strictly.

Safety precautions

We assume that, as an expert, you are familiar with the relevant safety regulations, especially in accordance with VDE 0100, VDE 0113,VDE 0160, EN 50178, the accident prevention regulations of the employers liability insurance company and the DIN regulations and that you are able to use and apply them.
As well, relevant European Directives must be observed.

Depending on the kind of application, additional regulations e.g. UL, DIN are subject to be observed.
If our products are operated in connection with components from other manufacturers, their operating instructions are also subject to be observed strictly.

1 630 Introduction to CAN

1.1 Target group

This documentation describes the functionality of 630 series drives inside a CAN network.
You should be familiar with the basic functions of the 630 drives and with the setup and diagnosis software EASYRIDER®.
The hard- and software you use with the 630 series CAN interface must comply with the guidelines by the CiA.

1.2 Basic properties of the CAN-bus

In contrast to other fieldbus systems, CAN-bus does not operate in a station-based way but uses a (**object oriented**) content-addressing.

This means that the useful data is seen as objects to which names are assigned. Priorities (**identifiers**) for bus access are given to these message objects in the target system under which they can then be requested or sent, respectively.
This feature offers the advantage that the bus is used exclusively by stations with which a transmission request is queued. Thus the bus is not burdened unnecessarily as, for example, with the polling process.

A further advantage with CAN is the **Multi-Master Capability**. This means that each user on the bus has the same access rights. The access authorization alone controls the users among one another via the priority of the communication objects and their **identifiers** (arbitration). This allows direct communication between the individual users without a time-consuming "detour" over a central master.

A CAN telegramm may contain up to **8 byte of user data**.

1.2.1 Transmission

The maximum bus length is depending on the chosen baud rate:

20kBit/s	approx. **800 m**
50kBit/s	approx. **600 m**
125kBit/s	approx. **500 m**
250kBit/s	approx. **250 m**
500kBit/s	approx. **100 m**
800kBit/s	approx. **50 m**
1MBit/s	max. **25 m**

The 630 series drives support all the baud rates listed above.

The user organisation **CiA** (**C**AN **i**n **a**utomation) has declared the bus medium according to ISO/DIS 11898 as their standard. This standard is also supported by the 635/637.
A **shielded twisted pair cable** is to be used as the bus cable. (for pin assignment see chapter 3)

1.3 Attaching the 630 series drives to the CAN-bus

Before using the drive on the CAN-bus you should consider the following questions:

A. How many devices(nodes) will be connected to the bus? (also count additional nodes for future extensions)
B. What is the maximum cable length?
C. Which configuration is needed?

The answers to these questions determine the parameters for baud rate, identifier assignment and configuration mode.

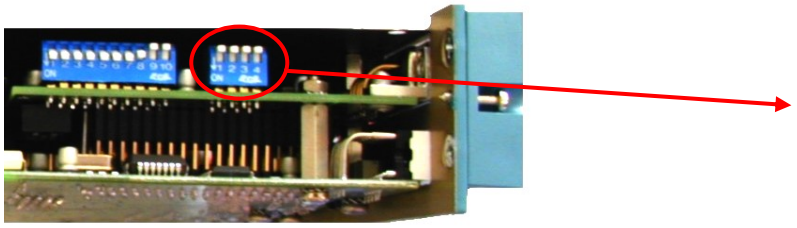
Physical medium

The CAN interface is galvanically isolated. A CAN-transceiver on the 635/637 can be used for coupling onto the bus in accordance with **ISO/DIS 11898**.

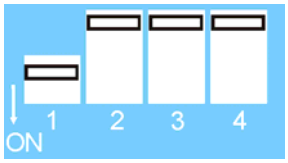
Bus termination

A defined quiescence level on the bus must be guaranteed for communication. It is necessary to use terminal resistors on both ends of the line.
This must be done with special bus plugs with which there is a resistance of approx. 124Ω between CAN_L and CAN_H.
With a 637f and either one of the options RP-2C8 or RP-2Ca you can enable a bus termination resistor by acitvating the DIL-switch 1 for bus-termination.

637f with option RP-2C8 or RP-2CA

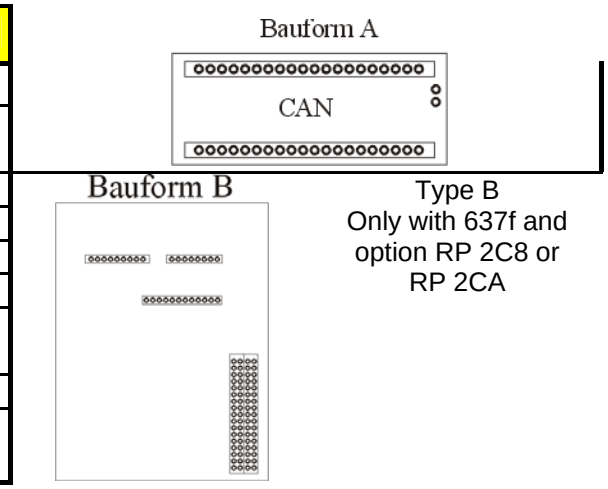


bus-termination active for COM 2

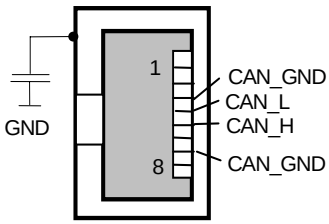
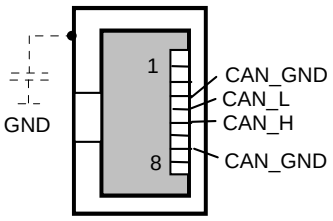


1.3.1 Pin assignment for COM2 - 635/637/637+/637f drive

Pin	Description	Name
1	-	-
2	CAN_L wire (dominant low)	CAN_L
3	Ground	GND
4	-	-
5	-	-
6	Ground	GND
7	CAN_H wire (dominant high)	CAN_H
8	-	-
9	-	-



1.3.2 Pin assignment for X20/21 CAN – 631 drive

Pin	Function	X20	X21
	X20 and X21 are identically and internal switched in parallel with all pins.(X20 = X21) Therfore bus-wiring is easy.	8-pole Modular Jack, screened 	8-pole Modular Jack, screened 
-	internal conn. to GND via capacitor	Case: Shielding	Case: Shielding
1			
2			
3	CAN_GND reference galvanically separated. Coupling-resistor to PE / GND: 1MΩ		
4	CAN_L (dominant low)		
5	CAN_H (dominant high)		
6			
7	(CAN_GND, like Pin 3)		
8			

This Pin-Assignment is related to „CiA Draft Recommendation DR-303, V0.1 / 16.10.98“. The wires on Pins 3/6 and 4/5 should be twisted pairs.

1.4 Configuration modes

Since the CAN-bus functionality of the 630 series drives is constantly advancing different configuration modes had to be realized over the time.

Configuration mode	Properties
0: PC configuration	Addressing is defined through manual input with EASYRIDER. The communication relationships and data contents is statically predefined.
1: PC configuration with node numbers offset	Addressing and node numbers are defined through manual input with EASYRIDER. Data contents is statically predefined.
2: PC configuration + Wait for IBT-communication	Addressing is defined through manual input with EASYRIDER. Data contents is statically predefined. In addition the drive waites for data transfer with the IBT before starting automatic operation mode.
3: CANopen configuration DS301	Addressing is done conforming to the CANopen standard DS301, data contents for PDO1 and PDO2 are statically predefined.
4: CANopen configuration DS402	Addressing and control is done conforming to the CANopen standard DS402 Motion Profil incl. PDO-mapping functions.
5: CANopen configuration DS301+ PDO mapping	Addressing is done conforming to the CANopen standard DS402 Motion Profil incl. PDO-mapping functions. The control of the DS402 State-machine is being ignored. 6040h,6041h control- and statusword are not being evaluated.

1.5 Configuration

Short list of instructions for initializing the 635/637 for CAN bus connection

Initializing the CAN bus connection on the 635/637 can be done with the EASYRIDER software.

- Configuration is done by opening → **Commissioning** → **Fieldbus**

  Here you can adjust the appropriate parameters.
  You must specify the following configuration data:
  - **Configuration mode**
  - **IDENTIFIER or node number (or DIL Switch)**
  - **baud rate (or DIL-Switch)**
  - **reaction on bus-interruption**

- By pressing the Enter key, the initialization data is send to the 630 drive.
- The data has to be saved into the EEPROM bei pressing F7.

Connect the 630 drive with the bus cable.

Open the fieldbus diagnosis in EASYRIDER by chosing „Diagnosis/Fieldbusdiagnosis“ from the menu and check for working communication.

2.0 630 CAN Standard – Introduction

2.1 Configuration and Identifier assignment via EASYRIDER® mode 0 - 2

In configuration mode 0 - 2 the appropriate identifiers must be entered for the message objects.

With the Digital drive 635/637 the following message buffers are established to which an **individual Identifier** must be assigned when the network is configured:

- receive **630 control block**

  With this telegram, a control block can be sent to the 635/637 with parameter data, or control commands, respectively.
- send **630 status**

  Here a participant of the CAN-BUS system can request the status of the 635/637 with the corresponding identifier.
- receive **parameters**

  With this telegram, new parameters are transferred to the 635/637.
- send **requested parameter block**

  The parameter block requested with message 2 is sent.
- **receive and send IBT data**

  With this telegram the communication between the drive and the IBT is controlled.
  (see IBT documentation UL: 09-05-01-..)

2.2 Other CAN-interface modules in mode 0 - 2

- In addition you can chose and activate one from the following CAN-interface modules in config mode 0-2:

2.2.1 SSD DRIVES CAN-absolut-encoder

- dependent on the selected node number (1-32) the following identifierarray is selected
- Receive absolut encoder data
  385d - 415d (181h - 19Fh)
- Initialize absolut encoder
  1537d - 1567d (601h - 61Fh)

see also product manual 🕮 04-02-03-..

2.2.2 SSD DRIVES BCD switch

- dependent on the selected node number (1-32) the following identifierarray is selected
- Receive BCD-data
  1601d - 1631d (641h - 65Fh)
- Confirm BCD-data
  1473d - 1503d(5C1h - 5DFh)

see also product manual 🕮 07-05-08-02-..

2.2.3 SSD DRIVES digital I/O-module

- dependent on the selected node number (1-32) the following identifierarray is selected
- Receive I/O-data
  1601d - 1631d (641h - 65Fh)
- Confirm I/O-data
  1473d - 1503d (5C1h - 5DFh)

see also product manual 🕮 07-04-04-..

2.3 Configuration mode 3 (CANopen DS301)

In configuration mode 3, the 635/637 is integrated dynamically into the CAN network with CAN Open CiA Draft Standard 301

The user organisation, CAN in Automation (CiA), has in this regard developed a suitable protocol of the user layer according to the ISO/OSI reference model..

In addition, a specific node in the network must take over the NMT master services.

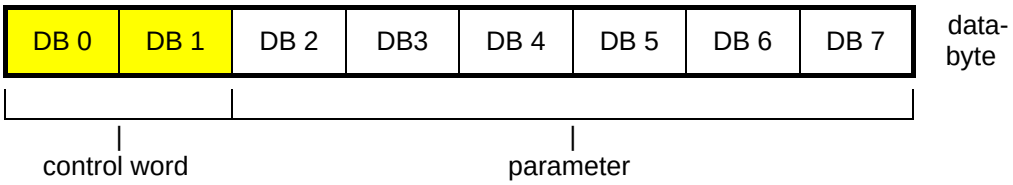
You can find a description of the user functions here.

3.1 630 CAN Standard – Receive control word

Definitions of the data fields

With CAN, a telegram can contain up to 8 bytes of useful data, for the 635/637 the contents of this useful data is described in the following text.
With the 635/637 a **control telegram** is always assembled from **8 bytes** of useful data.
The control telegrams consist of a control Word and the subsequent parameter.:

The first two bytes form the control word that defines the meaning of the telegram. In the remaining useful data (bytes 2 to 7) are the parameters corresponding to the selected control word.



Contents of the control word

Data byte 0		Data byte 1
0	request status	Reserved for status request
1	host login	
2	host logout	
3	start absolute *	
4	start incremental*	
5	start reference run*	
6	stop	
7	stop (with braking ramp)	
8	preset counter* [1)]	
9	set BIAS processing pointer	
10, 0Ah	move + *	
11, 0Bh	move - *	
12, 0Ch	reserved	
13, 0Dh	reserved	
14, 0Eh	reserved	
15, 0Fh	reserved	
16, 10h	reserved	
17, 11h	request parameter	
18, 12h	reserved	
19, 13h	load ramps	
20, 14h	disable drive	
21, 15h	enable drive	
22, 16h	drive RESET **	
23, 17h	save data **	
24, 18h	operating mode speed loop serial	
25, 19h	write variable/flag	

* only after host login ** only after host login and deactivating the drive

For executing the move command the operating mode 4 "position control" or mode 5 "position control with BIAS" must be set. (except for command 24)

[1)] only the drive is active

3.2 630 CAN Standard – control word commands

3.2.1 Control word command 0 – request status

The status of the digital regulator can be requested with the request telegram 'send status'.

In order to get the extended status information, a telegram 'receive control block' with the control word 0 must be sent to the digital drive.
- Byte 1 selects the desired data content
- Byte 2 specifies the variable or flag number,respectively.
The values of byte 3 to 7 should be 0.

The status data will be transfered with the message object "send status".
With a status request of 1 - 3 the selection will be acknowledged in byte 7.

control word / input data

Byte 0	**Byte 1**	Byte 2	0.	1.	2.	3.	4.	5.	6.	7.	(Byte)
0	**0**	-	actual position 1 +/- 2^{31}				input status	output status	status word 2		

Request extended status

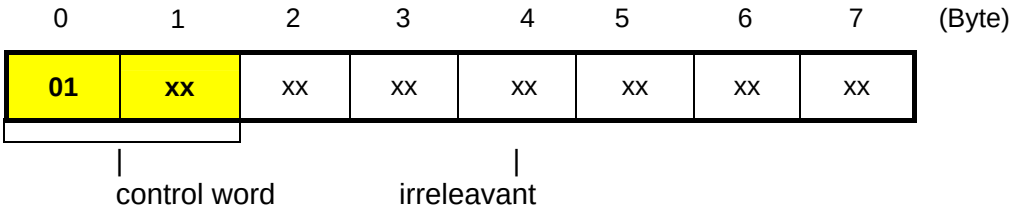
control word / input data

Byte 0	**Byte 1**	Byte 2	0.	1.	2.	3.	4.	5.	6.	7.	(Byte)
0	**1**	-	actual position 2 +/- 2^{31}				status word 1		reserved	1	

Byte 0	**Byte 1**	Byte 2	0.	1.	2.	3.	4.	5.	6.	7.	(Byte)
0	**2**	Nr./ No. 0..255	BIAS variable +/- 2^{31}				actual speed		Nr./ No. 0..255	2	

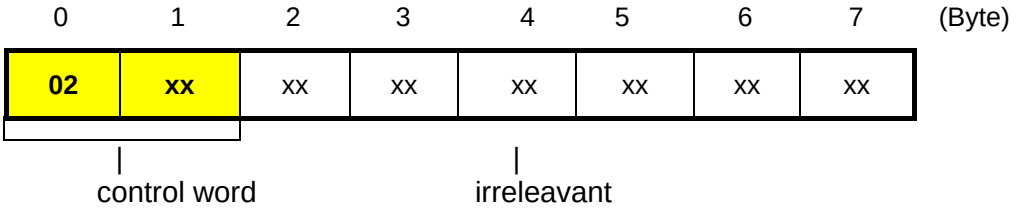
Byte 0	**Byte 1**	Byte 2	0.	1.	2.	3.	4.	5.	6.	7.	(Byte)
0	**3**	Nr./ No. 0..252	error status 1	error status 2	flag	flag +1	flag +2	flag +3	Nr.. 0..252	3	

3.2.2 Control word command 01 – host login



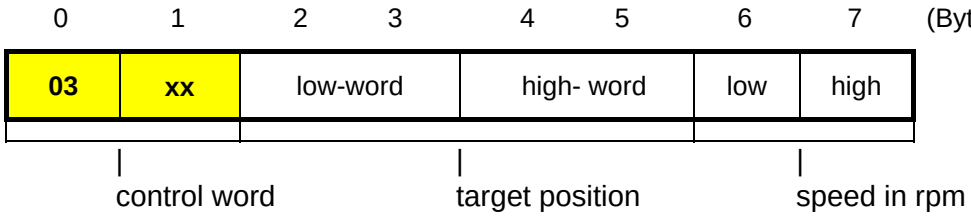
The most telegrams to the digital drive only accept after HOST login. The HOST login is only necessary for one a time after power on.
For host login / logout only the control word of the 635/637 is used. The contents of the data bytes 2 - 7 should be 0. They are not analyzed.
Only one interface will be have a login (COM1 or COM2).

3.2.3 Control word command 02 – host logout



The most telegrams to the digital drive only accept after HOST login. The HOST login is only necessary for one a time after power on.
For host login / logout only the control word of the 635/637 is used. The contents of the data bytes 2 - 7 should be 0. They are not analyzed.
Only one interface will be have a login (COM1 or COM2).

3.2.4 Control word command 03 – start absolute

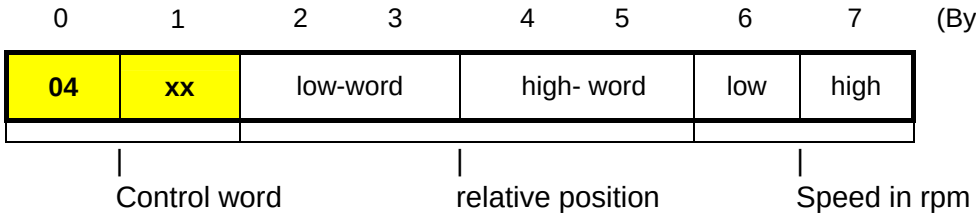


In the operating mode position control only positive speed values are permitted.
The command "start absolute" starts the axis to a defined target position.

A negative position is created through their 2 complement.
Example:

+ 100.000 ≡ 0x000186A0
- 100.000 ≡ 0xFFFE795F

3.2.5 Control word command 04 – start incremental

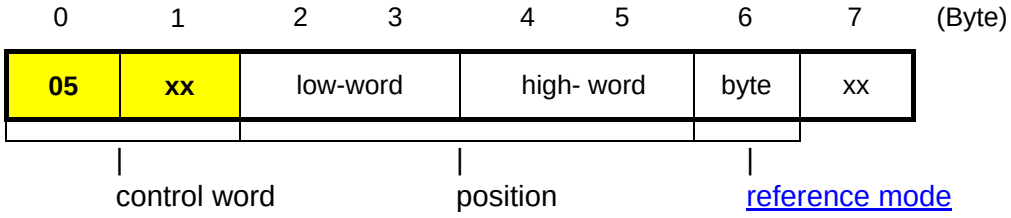


In the operating mode position control only positive speed values are permitted.
The command „start incremental“ starts the axis on the position which results from the sum of the present target position and the relative position defined through the command.

A negative position is created through their 2 complement.
Example:

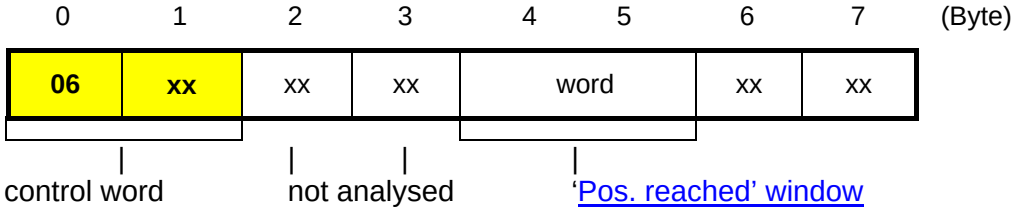
+ 100.000 ≡ 0x000186A0
- 100.000 ≡ 0xFFFE795F

3.2.6 Control word command 05 – start reference run

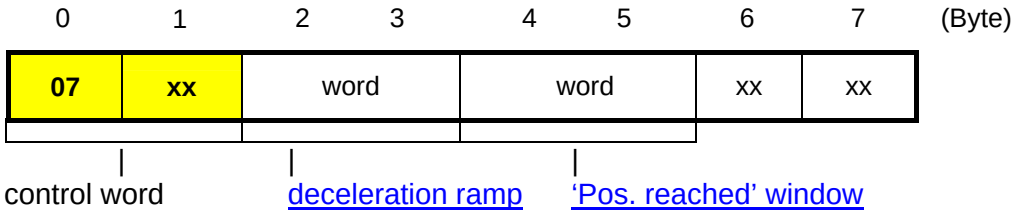


Der Befehl "Starte Referenzfahrt" startet die Referenzfahrt der Achse entsprechend dem angegebenen Referenzmodus.
The speed fort he reference run can be changed with the telegram ’write data block’ with the block number 1E93h or 113h.

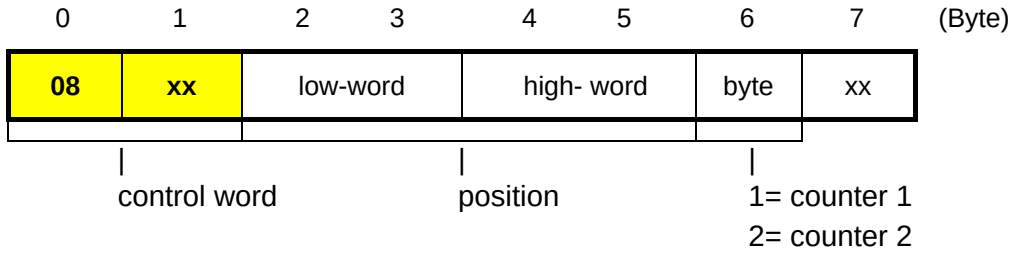
3.2.7 Control word command 06 – stop



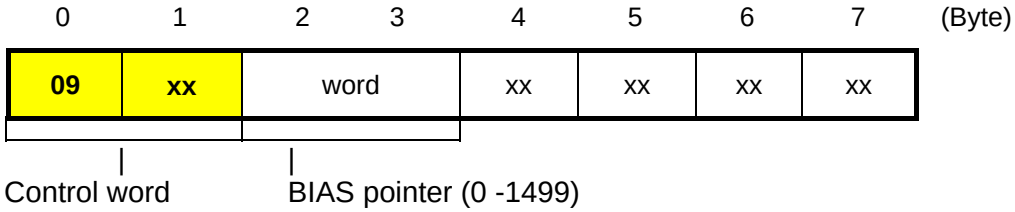
3.2.8 Control word command 07 – stop with braking ramp



3.2.9 Control word command 08 – preset counter

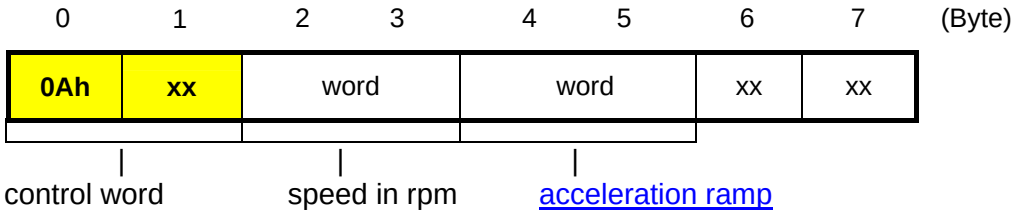


3.2.10 Control word command 09 – set BIAS processing pointer



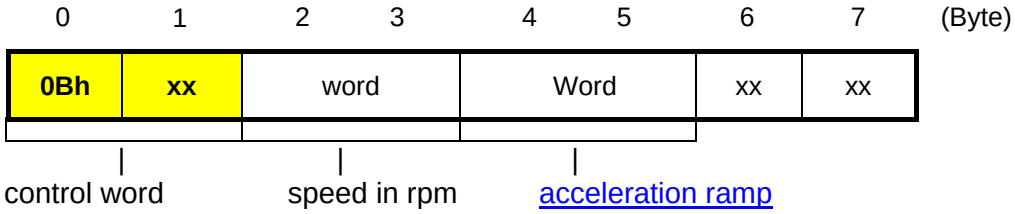
With this telegram the processing pointer in a BIAS program can be Set to a new line.
In order to be able to use this function the operating mode position control with BIAS processing must be set in the digital drive.
During the processing of the BIAS program telegrams be still be sent to the digital drive.
In this regard please observe that move commands via the CAN bus and commands of the BIAS processing have equal status and are processed in the respective task of the digital drive.

3.2.11 Control word command 0Ah – move +



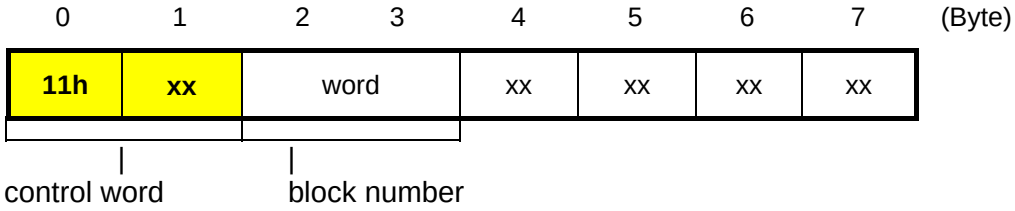
In position control the axis moves infinitely in positive direction.

3.2.12 Control word command 0Bh – move -



In position control the axis moves infinitely in negative direction.

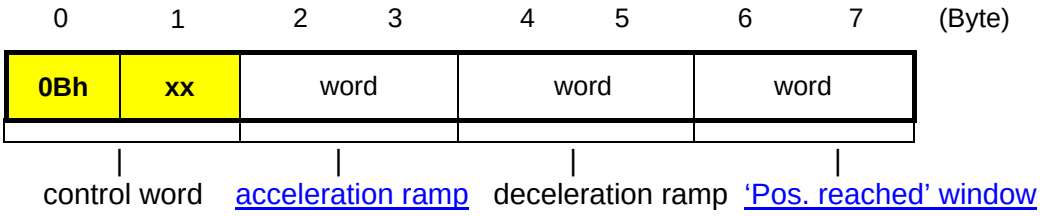
3.2.13 Control word command 11h – request parameter



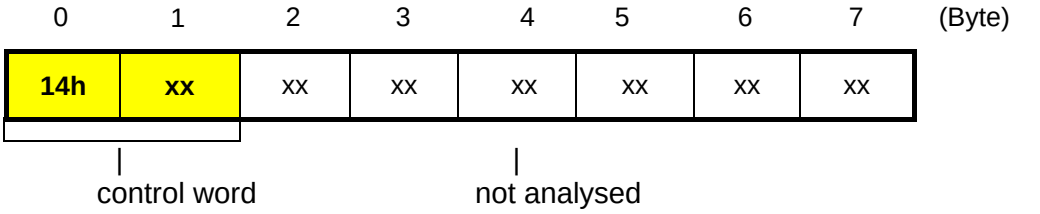
By this comand parameter and data can read from the digital drive with a block number. The request parameter will be send by an **own identifier**.

see also:
- send requested parameter
- receive parameter
- table of block numbers 631,635,637
- table of block numbers 637f

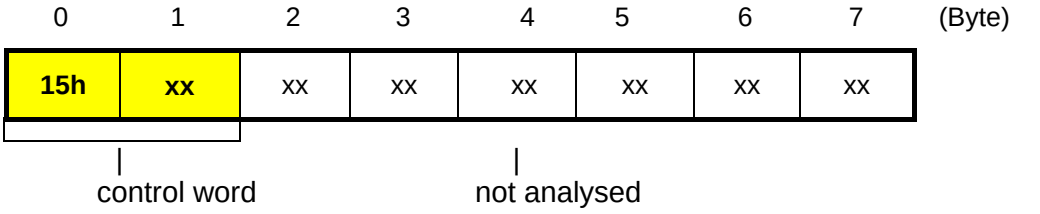
3.2.14 Control word command 13h – load ramp



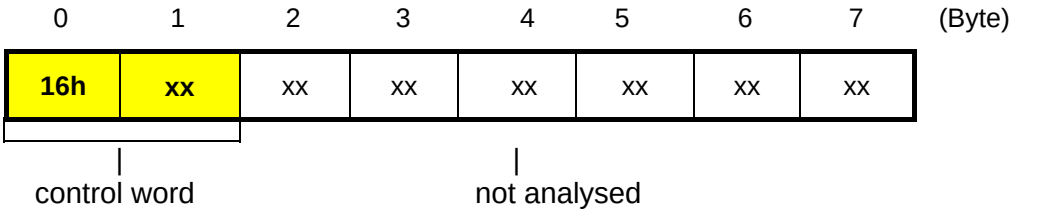
3.2.15 Control word command 14h – deactivate drive



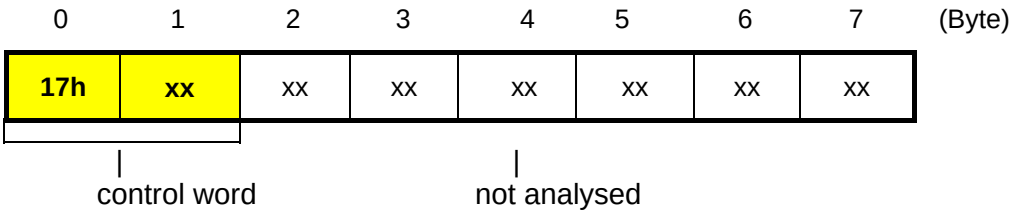
3.2.16 Control word command 15h – activate drive



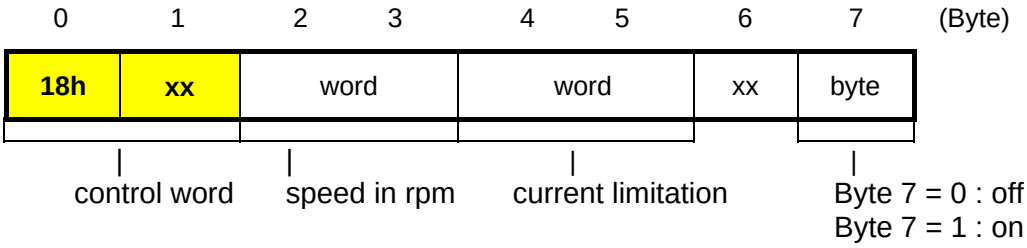
3.2.17 Control word command 16h – drive RESET



3.2.18 Control word command 1h – save data



3.2.19 Control word command 18h – operating mode speed loop



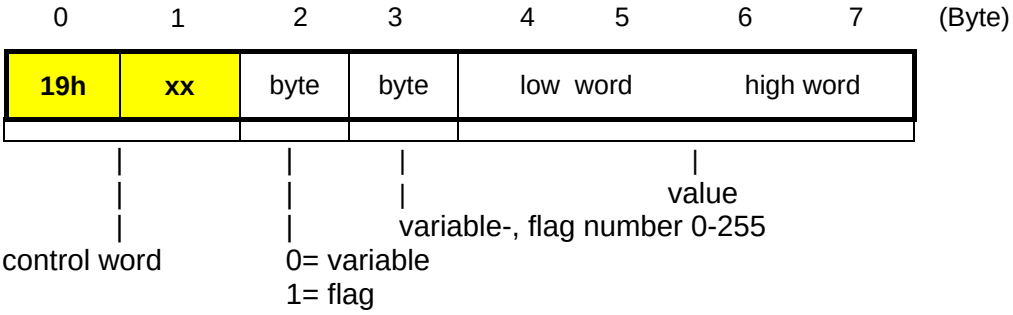
By this telegram you can send new speed values to the digital drive.
With byte 7 you can switch between rated value via CAN Bus and analog rated value.
Caution:
By switch off the speed loop via the CAN bus (byte 7 = 0) a analog value on connector X10 pin 18 and 5 will be used.
By using this function in the digital drive the operation mode speed loop must selected.

A negative speed is created through the
2 complement.
Example:

+ 2000 ≡ 0x7D0
- 2000 ≡ 0xF82F

The value for the integrator can be adapted with the block-no. 1E96h or 116h (only in a deactivated state).

3.2.20 Control word command 19h – write variable/flag



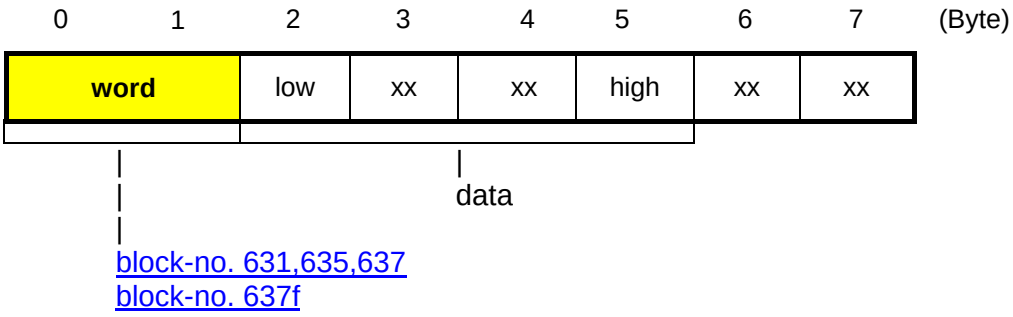
By this telegram the values of the variables an the flags for BIAS programming can changed.

The contents of a BIAS variable or a flag can be requested with a status telegram with
Byte 1 = 2 (variable)
Byte 1 = 3 (flag)
and the variable- or flag number in byte 2.

4 630 CAN Standard parameter commands

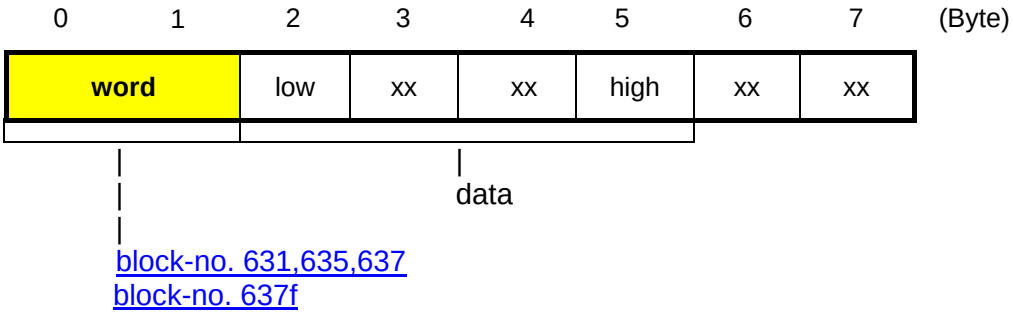
4.1 Message object: Receive parameter

With this message object, parameter data can be sent to the 635/637. To do this, the block number must be noted in data bytes 0 and 1.
Depending on the block number you have to prepare the drive prior to the reception of the data by performing a host login and by deactivating the drive in order to correctly accept the data.



4.2 Message object: send requested parameters

With this message object, the parameter data requested by the object 'request control word parameters -17-' is applied by the drive to the bus.
The corresponding block numbers are in data bytes 0 and 1.



4.3 630 CAN list of parameters for 631/635/637 drives

This list describes the memory structure of parameters for the drive types 631, 635 and 637 for the access via the CAN (Standard) bus system.

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
100h	00h	01h	Axis number	reserve	X40-mode	X40-Output resolution
101h	01h	01h	operation mode	reserve	Configuration	
102h	02h	01h	Drive delay brake	„Pos. reached“ low time	Ucc overvoltage	
103h	03h	01h	Ucc Undervoltage		Brake circuit setpoint	
104h	04h	01h	Brake resistance		Brake circuit rated power	
105h	05h	01h	reserve	reserve	reserve	reserve
106h	06h	01h	Motor, rated current		Motor, number of pole pairs	
107h	07h	01h	EMF/1000min-1		Motor inductance	
108h	08h	01h	Motor resistance		I^2t-Supervision time	
109h	09h	01h	Resistance value NTC T1		Resistance value NTC T2	
10Ah	0Ah	01h	Resistance value PTC		reserve	reserve
10Bh	0Bh	01h	Motorname ASCII 18Byte (1-4)			
10Ch	0Ch	01h	Motorname ASCII 18Byte (5-8)			
10Dh	0Dh	01h	Motorname ASCII 18Byte (9-12)			
10Eh	0Eh	01h	Motorname ASCII 18Byte (13-16)			
10Fh	0Fh	01h	Motorname ASCII 18Byte (17- 18)		Reserve	reserve
110h	10h	01h	Max current limitation – step value		P-gain step value current loop	I-gain step value current loop
111h	11h	01h	P-gain Step value speed loop	I-gain Step value speedloop	P-gain position loop	
112h	12h	01h	I-gain position loop		V-gain position loop	
113h	13h	01h	Speed for position loop		Deceleration ramp for position loop	
114h	14h	01h	Acceleration ramp for position loop		“Position reached“ window	
115h	15h	01h	Trail window		Trail fault reaction	n-Filter
116h	16h	01h	Speed set point 0-window		Speed set point integrator	
117h	17h	01h	Speed set point scaling		Current set point scaling	
118h	18h	01h	Analog output, scaling MP1 (X10.17)		Analog output, scaling MP2 (X10.6)	
119h	19h	01h	External current limitation, scaling		0 offset analog input	
11Ah	1Ah	01h	X30 sensor offset		Ramp-filter	reserve
11Bh	1Bh	01h	reserve	reserve	reserve	reserve
11Ch – 137h	1Ch – 37h	01h	reserve	reserve	reserve	reserve

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
200h	00h	02h	Firmware version string: character 1 - 4			
201h	01h	02h	Firmware version string: character 5 - 8			
202h	02h	02h	Firmware version string: character 9 - 12			
203h	03h	02h	reserve	reserve	Reserve	reserve
204h	04h	02h	W_I_LIMIT		reserve	reserve
205h	05h	02h	reserve	reserve	reserve	reserve

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
800h – 8FFh	00h - FFh	08h	Reserved for additional EASYRider information			
900h – 9FFh	00h - FFh	09h	Data for initialization of the 16 possible CAM profiles			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
A00h	00h	0Ah	input definition, input X10.2	input definition, input X10.4	input definition, input X10.11	input definition, input X10.14
A01h	01h	0Ah	input definition, input X10.15	input definition, input X10.24	input definition, input X10.25	output definition, output X10.12
A02h	02h	0Ah	Output definition, Output X10.13	Output definition, Output X10.20	Output definition, Output X10.23	reserve
A03h	03h	0Ah	reserve	reserve	reserve	reserve
A04h	04h	0Ah	Position block 0 job number	--	internal speed	
A05h	05h	0Ah	Acceleration		Deceleration	
A06h	06h	0Ah	"Position reached" window		Set position low word	
A07h	07h	0Ah	Set position high word		Position block 1 job number	--
A08h	08h	0Ah	internal speed		Acceleration	
A09h	09h	0Ah	Deceleration		"Position reached" window	
A0Ah	0Ah	0Ah	Set position			
A0Bh	0Bh	0Ah	Position block 2 job number	--	internal speed	
A0Ch	0Ch	0Ah	Acceleration		Deceleration	
A0Dh	0Dh	0Ah	„Position reached" window		Set position low word	
A0Eh	0Eh	0Ah	Set position high word		Position block 3 Job number	--
A0Fh	0Fh	0Ah	Interal speed		Acceleration	
A10h	10h	0Ah	Deceleration		„Position reached" window	
A11h	11h	0Ah	Set position			
A12h	12h	0Ah	Position block 4 Job number	--	Interal speed	
A13h	13h	0Ah	Acceleration		Deceleration	
A14h	14h	0Ah	„Position reached" window		Set position low word	
A15h	15h	0Ah	Set position high word		Position block 5 Job number	--
A16h	16h	0Ah	Interal speed		Acceleration	
A17h	17h	0Ah	Deceleration		„Position reached" window	
A18h	18h	0Ah	Set position			
A19h	19h	0Ah	Position block 6 Job number	--	Interal speed	
A1Ah	1Ah	0Ah	Acceleration		Deceleration	
A1Bh	1Bh	0Ah	„Position reached" window		Set position low word	
A1Ch	1Ch	0Ah	Set position high word		Position block 7 Job number	--
A1Dh	1Dh	0Ah	Interal speed		Acceleration	
A1Eh	1Eh	0Ah	Deceleration		„Position reached" window	
A1Fh	1Fh	0Ah	Set position			
A20h	20h	0Ah	Position block 8 Job number	--	Interal speed	
A21h	21h	0Ah	Acceleration		Deceleration	
A22h	22h	0Ah	„Position reached" window		Set position low word	
A23h	23h	0Ah	Set position high word		Position block 9 Job number	--
A24h	24h	0Ah	Interal speed		Acceleration	
A25h	25h	0Ah	Deceleration		„Position reached" window	
A26h	26h	0Ah	Set position			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
A27h	27h	0Ah	Special function I-Conversion 4Byte			
A28h	28h	0Ah	Special function S-Conversion 4Byte			
A29h	29h	0Ah	X40-resolution (input)			
A2Ah	2Ah	0Ah	Mode analog output 1	Mode analog output 2	Reserve	reserve
A2Bh-A3Fh	2Bh-3AEh	0Ah	reserve	reserve	Reserve	reserve
A40h	40h	0Ah	BIAS start block		BIAS start mode	
A41h	41h	0Ah	PLC program mode		Mathematics program mode	
A42h – A51h	42h – 51h	0Ah	BIAS-program name 64 Byte			
A52h	52h	0Ah	BIAS-program date Byte 1-4			
A53h	53h	0Ah	BIAS-program date Byte 5-8			
A54h	54h	0Ah	BIAS-program date Byte 9-12			
A55h	55h	0Ah	BIAS-program version Byte 1-4			
A56h	56h	0Ah	BIAS-program version Byte 5+6		Reserve BIAS–program definitions (EASYRIDER)	
A57h	57h	0Ah	Reserve BIAS–programm definitions (EASYRIDER)			
A58h – A7Fh	58h – 7Fh	0Ah	Reserve BIAS–program definitions (EASYRIDER)			
A80h-A83h	80h -83h	0Ah	reserve	reserve	reserve	reserve
A84h	84h	0Ah	SUCOnet K Bus axis-number	SUCOnet K bus interruption	SUCOnet K Bus deceleration ramp	
A85h	85h	0Ah	reserve	reserve	reserve	Reserve
A86h	86h	0Ah	reserve	reserve	reserve	Reserve
A87h	87h	0Ah	reserve	reserve	reserve	Reserve
A88h	88h	0Ah	PROFIBUS axis-number	PROFIBUS bus interruption	PROFIBUS deceleration ramp	
A89h	89h	0Ah	PROFIBUS Mode	reserve	reserve	reserve
A8Ah	8Ah	0Ah	Reserve	reserve	reserve	reserve
A8Bh	8Bh	0Ah	Reserve	reserve	reserve	reserve
A8Ch	8Ch	0Ah	CAN-BUS axis-number	CAN-BUS bus interruption	CAN-BUS deceleration ramp	
A8Dh	8Dh	0Ah	CAN-BUS baud rate	CAN-BUS bus-module ASB, CAL	CAN-BUS extended identifier y/n	CAN-BUS Send Status automatically y/n
A8Eh	8Eh	0Ah	reserve	reserve	reserve	Reserve
A8Fh	8Fh	0Ah	reserve	reserve	reserve	Reserve
A90h	90h	0Ah	CAN_ID Message 0			
A91h	91h	0Ah	CAN_ID Message 1			
A92h	92h	0Ah	CAN_ID Message 2			
A93h	93h	0Ah	CAN_ID Message 3			
A94h	94h	0Ah	CAN_ID Message 4			
A95h	95h	0Ah	CAN_ID Message 5			
A96h	96h	0Ah	CAN_ID Message 6			
A97h	97h	0Ah	CAN_ID Message 7			
A98h	98h	0Ah	CAN_ID Message 8			
A99h	99h	0Ah	CAN_ID Message 9			
A9Ah	9Ah	0Ah	CAN_ID Message A			
A9Bh	9Bh	0Ah	CAN_ID Message B			
A9Ch	9Ch	0Ah	CAN_ID Message C			
A9Dh	9Dh	0Ah	CAN_ID Message D			
A9Eh	9Eh	0Ah	CAN_ID Message E			
A9Fh	9Fh	0Ah	CAN_ID Message F			
AA0h	A0h	0Ah	INTERBUS ASB profile = 0	INTERBUS S bus interruption	INTERBUS S deceleration ramp	
AA1h	A1h	0Ah	reserve	reserve	reserve	reserve
AA2h - ABFh	A1h - BFh	0Ah	reserve	reserve	reserve	reserve

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1000h-1FFFh	00h - FFh	10h-1Fh	CAM profile (computed by EASYRIDER)			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
2000h-2FFFh	00h - FFh	20h-2Fh	BIAS-program 0 – 1499 blocks á 8Byte			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
3000h-3FFFh	00h - FFh	30h-3Fh	Reserve			

4.4 630 CAN list of parameters for 637f drives

This list describes the memory structure for the parameters of the 637f drive for the access via the CAN (Standard) bus system.

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
0000h-0FFFh	00h - FFh	00h-0Fh	CAM profile (computed by EASYRIDER)			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1000h-1BB7h	00h – B7h	10h-1Bh	BIAS-program 0 – 1499 blocks á 8Byte			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1BB8h-1BFFh	B8h - FFh	1Bh-1Bh	Reserve			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1C00h – 1CFFh	00h - FFh	1Ch	Reserved for additional EASYRider information			
1D00h – 1DFFh	00h - FFh	1Dh	Data for initialization of the 16 possible CAM profiles			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1E00h	00h	1Eh	BIAS start block		BIAS start Mode	
1E01h	01h	1Eh	PLC program Mode		Mathematics program Mode	
1E02h – 1E11h	02h – 11h	1Eh	BIAS–program name 64Byte			
1E12h	12h	1Eh	BIAS-program date Byte 1-4			
1E13h	13h	1Eh	BIAS-program date Byte 5-8			
1E14h	14h	1Eh	BIAS-program date Byte 9-12			
1E15h	15h	1Eh	BIAS-program version Byte 1-4			
1E16h	16h	1Eh	BIAS-program version Byte 5+6		Reserved BIAS–program definitions (EASYRIDER)	
1E17h	17h	1Eh	Reserved BIAS–program definitions (EASYRIDER)			
1E18h – 1E3Fh	18h – 3Fh	1Eh	Reserved BIAS–program definitions (EASYRIDER)			
1E40h-1E43h	40h - 43h	1Eh	reserve	reserve	reserve	reserve
1E44h	44h	1Eh	SUCOnet K Bus axis number	SUCOnet K bus interruption	SUCOnet K Bus deceleration ramp	
1E45h	45h	1Eh	reserve	reserve	reserve	reserve
1E46h	46h	1Eh	reserve	reserve	reserve	reserve
1E47h	47h	1Eh	reserve	reserve	reserve	reserve
1E48h	48h	1Eh	PROFIBUS Axis number	PROFIBUS Bus interruption	PROFIBUS Deceleration ramp	
1E49h	49h	1Eh	PROFIBUS Modus	reserve	reserve	reserve
1E4Ah	4Ah	1Eh	reserve	reserve	reserve	reserve
1E4Bh	4Bh	1Eh	reserve	reserve	reserve	reserve
1E4Ch	4Ch	1Eh	CAN-BUS Axis number	CAN-BUS Bus interruption	CAN-BUS Deceleration ramp	
1E4Dh	4Dh	1Eh	CAN-BUS baud rate	CAN-BUS bus-module ASB, CAL	CAN-BUS extended identifiers y/n	CAN-BUS Send Status automatically y/n
1E4Eh	4Eh	1Eh	reserve	reserve	reserve	reserve
1E4Fh	4Fh	1Eh	reserve	reserve	reserve	reserve

1E50h	50h	1Eh	CAN_ID Message 0			
1E51h	51h	1Eh	CAN_ID Message 1			
1E52h	52h	1Eh	CAN_ID Message 2			
1E53h	53h	1Eh	CAN_ID Message 3			
1E54h	54h	1Eh	CAN_ID Message 4			
1E55h	55h	1Eh	CAN_ID Message 5			
1E56h	56h	1Eh	CAN_ID Message 6			
1E57h	57h	1Eh	CAN_ID Message 7			
1E58h	58h	1Eh	CAN_ID Message 8			
1E59h	59h	1Eh	CAN_ID Message 9			
1E5Ah	5Ah	1Eh	CAN_ID Message A			
1E5Bh	5Bh	1Eh	CAN_ID Message B			
1E5Ch	5Ch	1Eh	CAN_ID Message C			
1E5Dh	5Dh	1Eh	CAN_ID Message D			
1E5Eh	5Eh	1Eh	CAN_ID Message E			
1E5Fh	5Fh	1Eh	CAN_ID Message F			
1E60h	60h	1Eh	INTERBUS ASB Profile = 0	INTERBUS S Bus interruption	INTERBUS S Deceleration ramp	
1E61h	61h	1Eh	reserve	reserve	reserve	reserve
1E62h – 1E7Fh	62h - 7Fh	1Eh	reserve	reserve	reserve	reserve

Blocknr	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1E80h	80h	1Eh	Axis number	reserve	X40-Mode	X40-resolution output
1E81h	801h	1Eh	Operating mode	reserve	Configuration	
1E82h	82h	1Eh	Drive delay brake	„Position reached“ low time	Ucc Overvoltage	
1E83h	83h	1Eh	Ucc Undervoltage		Brake circuit setpoint	
1E84h	84h	1Eh	Brake resistance		Brake circuit rated power	
1E85h	85h	1Eh	Shift factor speed	Shift factor P_gain	pole finding mode	
1E86h	86h	1Eh	Motor rated current		Motor, number of pole pairs	
1E87h	87h	1Eh	EMF/1000min-1		Motor inductance	
1E88h	88h	1Eh	Motor resistance		I^2t-monitoring time	
1E89h	89h	1Eh	Resistance value NTC T1		Resistance value NTC T2	
1E8Ah	8Ah	1Eh	Resistance value PTC		Positive speed limitation	
1E8Bh	8Bh	1Eh	Motor, name ASCII 18Byte (1-4)			
1E8Ch	8Ch	1Eh	Motor, name ASCII 18Byte (5-8)			
1E8Dh	8Dh	1Eh	Motor, name ASCII 18Byte (9-12)			
1E8Eh	8Eh	1Eh	Motor, name ASCII 18Byte (13-16)			
1E8Fh	8Fh	1Eh	Motor, name ASCII 18Byte (17- 18)		Negative speed limitation	
1E90h	90h	1Eh	Max current limitation - step value		P-gain step value current loop	I-gain step value current loop
1E91h	91h	1Eh	P-gain step value speed loop	I-gain step value speed loop	P-gain position loop	
1E92h	92h	1Eh	I-gain position loop		V-gain position loop	
1E93h	93h	1Eh	Speed for position loop		Deceleration ramp for position loop	
1E94h	94h	1Eh	Acceleration ramp for position loop		“Position reached“ window	
1E95h	95h	1Eh	Trail window		Trail fault reaction	n-Filter
1E96h	96h	1Eh	Speed set point, 0-window		Speed set point, integrator	
1E97h	97h	1Eh	Speed set point, scaling		Current set point, scaling	
1E98h	98h	1Eh	Analog output scaling MP1 (X10.17)		Analog output scaling MP2 (X10.6)	
1E99h	99h	1Eh	External current limitation, scaling		0 offset analog input	

1E9Ah	9Ah	1Eh	X30 sensor offset	Ramp-filter	reserve
1E9Bh	9Bh	1Eh	Teachvariable 1		
1E9Ch	9Ch	1Eh	Teachvariable 2		
1E9Dh	9Dh	1Eh	Teachvariable 3		
1E9Eh	9Eh	1Eh	Teachvariable 4		
1E9Fh	9Fh	1Eh	Teachvariable 5		
1EA0h	A0h	1Eh	Teachvariable 6		
1EA1h	A1h	1Eh	Teachvariable 7		
1EA2h	A2h	1Eh	Teachvariable 8		
1EA3h	A3h	1Eh	Teachvariable 9		
1EA4h	A4h	1Eh	Teachvariable 10		
1EA5h	A5h	1Eh	Teachvariable 11		
1EA6h	A6h	1Eh	Teachvariable 12		
1EA7h	A7h	1Eh	Teachvariable 13		
1EA8h	A8h	1Eh	Teachvariable 14		
1EA9h	A9h	1Eh	Teachvariable 15		
1EAAh	AAh	1Eh	Teachvariable 16		

Blocknr	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1EABh	ABh	1Eh	Number of pole-pairs Encoder / Encoder period		Phaseshifting at Imax	
1EACh	ACh	1Eh	Motor, max. current		Motor, max. speed	
1EADh	ADh	1Eh	Motor, static current		Motor, thermal time constant	
1EAEh	AEh	1Eh	GGT		reserve	reserve
1EAFh	AFh	1Eh	Ramp factor		Sobe halbe low	
1EB0h	B0h	1Eh	Sobe halbe high		Positive Position limitation low	
1EB1h	B1h	1Eh	Positive Position limitation high		Negative Position limitation low	
1EB2h	B2h	1Eh	Negative Position limitation high		E_X121_Def - E_X122_Def	
1EB3h	B3h	1Eh	E_X123_Def - E_X124_Def		A_X125_Def - A_X126_Def	
1EB4h	B4h	1Eh	A_X127_Def - A_X128_Def		Reserve	reserve
1EB5h	B5h	1Eh	reserve	reserve	Reserve	reserve
1EB6h	B6h	1Eh	reserve	reserve	Ref_offset	
1EB7h	B7h	1Eh	reserve	reserve	Recipe	Dataset
1EB8h	B8h	1Eh	Riegel		Abs_offset low	
1EB9h	B9h	1Eh	Abs_offset high		SSI Offset low word	
1EBAh	BAh	1Eh	SSI Offset high word		SSI fault reaction	
1EBBh	BBh	1Eh	pole finding max. current		Reserve	reserve
1EBCh	BCh	1Eh	reserve	reserve	Reserve	reserve
1EBDh	BDh	1Eh	reserve	reserve	reserve	reserve
1EBEh	BEh	1Eh	reserve	reserve	reserve	reserve
1EBFh	BFh	1Eh	reserve	reserve	reserve	reserve

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1EC0h	C0h	1Eh	Input definition Input X10.2	Input definition Input X10.4	Input definition Input X10.11	Input definition Input X10.14
1EC1h	C1h	1Eh	Input definition Input X10.15	Input definition Input X10.24	Input definition Input X10.25	Output definition Output X10.12
1EC2h	C2h	1Eh	Output definition Output X10.13	Output definition Output X10.20	Output definition Output X10.23	reserve
1EC3h	C3h	1Eh	reserve	reserve	reserve	reserve
1EC4h	C4h	1Eh	Position block 0 Job number	--	Internal speed	
1EC5h	C5h	1Eh	Acceleration		Deceleration	
1EC6h	C6h	1Eh	"Position reached" Window		Set point position low word	
1EC7h	C7h	1Eh	Set point position high word		Position block 1 Job number	--
1EC8h	C8h	1Eh	Internal speed		Acceleration	
1EC9h	C9h	1Eh	Deceleration		"Position reached" Window	
1ECAh	CAh	1Eh	Set point position			
1ECBh	CBh	1Eh	Position block 2 Job number	--	Internal speed	
1ECCh	CCh	1Eh	Acceleration		Deceleration	
1ECDh	CDh	1Eh	"Position reached" Window		Set point position low word	
1ECEh	CEh	1Eh	Set point position high word		Position block 3 Job number	--
1ECFh	CFh	1Eh	Internal speed		Acceleration	
1ED0h	D0h	1Eh	Deceleration		"Position reached" Window	
1ED1h	D1h	1Eh	Set point position			
1ED2h	D2h	1Eh	Position block 4 Job number	--	Internal speed	
1ED3h	DEh	1Eh	Acceleration		Deceleration	
1ED4h	D4h	1Eh	"Position reached" Window		Set point position low word	
1ED5h	D5h	1Eh	Set point position high word		Position block 5 Job number	--
1ED6h	D6h	1Eh	Internal speed		Acceleration	
1ED7h	D7h	1Eh	Deceleration		"Position reached" Window	
1ED8h	D8h	1Eh	Set point position			
1ED9h	D9h	1Eh	Position block 6 Job number	--	Internal speed	
1EDAh	DAh	1Eh	Acceleration		Deceleration	
1EDBh	DBh	1Eh	"Position reached" Window		Set point position low word	
1EDCh	DCh	1Eh	Set point position high word		Position block 7 Job number	--
1EDDh	DDh	1Eh	Internal speed		Acceleration	
1EDEh	DEh	1Eh	Deceleration		"Position reached" Window	
1EDFh	DFh	1Eh	Set point position			
1EE0h	E0h	1Eh	Position block 8 Job number	--	Internal speed	
1EE1h	E1h	1Eh	Acceleration		Deceleration	
1EE2h	E2h	1Eh	"Position reached" Window		Set point position low word	
1EE3h	E3h	1Eh	Set point position high word		Position block 9 Job number	--
1EE4h	E4h	1Eh	Internal speed		Acceleration	
1EE5h	E5h	1Eh	Deceleration		"Position reached" Window	
1EE6h	E6h	1Eh	Set point position			

Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
1EE7h	E7h	1Eh	Special function I-conversion 4Byte			
1EE8h	E8h	1Eh	Special function S-conversion 4Byte			
1EE9h	E9h	1Eh	X40-resolution (Input)			
1EEAh	EAh	1Eh	Mode analog output 1	Mode analog output 2	reserve	reserve
1EEBh-1FFFh	EBh - FFh	1Eh	reserve	reserve	reserve	reserve

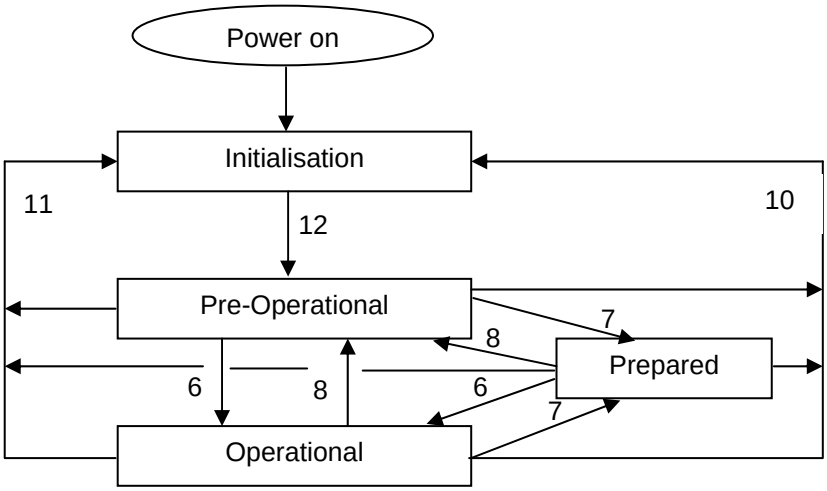
Block no.	DB 0	DB 1	DB 2	DB 3	DB 4	DB 5
2000h	00h	20h	Firmware version string: character 1 - 4			
2001h	01h	20h	Firmware version string: character 5 - 8			
2002h	02h	20h	Firmware version string: character 9 - 12			
2003h	03h	20h	reserve	reserve	reserve	reserve
2004h	04h	20h	W_I_LIMIT		reserve	reserve
2005h	05h	20h	reserve	reserve	reserve	reserve

5 630 CAN Standard DS301

5.1 Fundamental adjustments of CANopen

With configuration mode 3 in the field bus configuration of EASYRIDER software the 635/637 drive can be switched into the CAN-OPEN mode.
In this mode, the baud rate, the bus break reaction and the node number are only required as further parameters. The manual input of the identifiers is not necessary.
The drive then is a SLAVE in the CAN-BUS according to CiA draft standard 301.
Precondition for integration of the drive into a CANopen net it is a net master which coordinates the net services.
(i.e. PLC,IPC,Host station)

This master coordinate the NMT (Network Management) Services and make it possible to configure, initialize, and handle errors in a CAN Network.
The service element "network management" (NMT) forms the basic prerequisite for operating a CAN network
The task of NMT is shown in a simplified form in the following status diagram.



Explanation of the state diagram :

(6)	Start_Remote_Node
(7)	Stop_Remote_Node
(8)	Enter Pre_Operational
(10)	Reset_Node
(11)	Reset_Communication
(12)	Initialisation finished- enter Pre-Operational automatically

5.2 CAN-OPEN objects with 630

The following messages are supported by the 630:

NMT message from master,	**Identifier 0:**	Start node Stop node Enter pre operational Reset node Reset communication
NODE Guarding	**Identifier 700h + nodenumber (1792d+ nodenumber)**	
SDO rx (Service data object),	**Identifier 600h + nodenumber (1536d+ nodenumber)**	
SDO tx (Service data object),	**Identifier 580h + nodenumber (1408d+ nodenumber)**	

INDEX 1000h	device type
INDEX 1001h	error code
INDEX 1004h	number of supported PDO‘s
INDEX 1400h	Receive PDO communication parameter
INDEX 1800h	Transmit PDO communication parameter

PDO 1 rx (Process data object), Identifier 200h + nodenumber (512d+ nodenumber)
function: control command
see chapter 5 and 6.

PDO 1 tx (Process data object),, Identifier 180h + nodenumber (384d+ nodenumber)
function: control command
see chapter 5 and 6.

PDO 2 rx (Process data object) Identifier 300h + nodenumber (768d+ nodenumber)
function: parameter receive message
see chapter 8.

PDO 2 tx (Process data object) Identifier 280h + nodenumber (640d+ nodenumber)
function: parameter receive message
see chapter 8.

Notice :
The usage of the CAN-Open mode with the drive 631 don‘t allow the communication with the SSd Drives CAN-modules IBT, Absolutencoder, BCD switch, I/O module and the BIAS CAN control command !!!

5.3 CAN-OPEN Application with 630

After turning on the drive, the CAN-interface and the CAN-messages will be initialized in accordance with the baud rate and the adjusted node number.

The driver then switches automatically into the operating state "pre operational“

In the operating state"pre operational“ the SDO services are only active. (see chapter 11.2)
The net master has to switch the drive with the NMT service "Start node" into the operating state "operational".
In the operating state „operational“ the process data communication (PDO) is possible.

NMT Master Telegramm

COB ID	0.	1.	Datenbyte data byte
0	01	00	

| |_____ Node ID 1-127 (0 addresses all NMT Slaves)
|_____ command specifier (cs) 1 = Start node

Weitere commmand specifier des NMT Dienstes sind:

cs = 1	START Node	Bus state operational	(05)
cs = 2	STOP Node	Bus state prepared	(04)
cs = 128	Enter-Pre-Operational	Bus state pre-operational	(127)
cs = 129	Reset Node	Bus state pre-operational	(127)
cs = 130	Reset Communication	Bus state pre-operational	(127)

The respective bus state of the drive is visualised in the EASYRIDER field bus diagnosis.

With the node guarding function the master has the possibilitie to get the bus state from the slave with a remote transmit request on the node guarding identifier.

Node guarding Telegramm from slave

COB ID	Bit 7	Bit 6 .....0.	Datenbyte 0 data byte 0
700h + node-nr.	00	xxxxxxx	

| |_____ bus state (04,05,127)
|

|_____ toggle bit from slave (0 after initialisation or reset)

6 630 CAN Standard examples

Examples for operating the 630 via the CAN bus system (mode 0)

6.1 Positioning via CAN

1. Step: Host log**in**
2. Step: check Host log**in**
3. Step: load ramps positioning with 'start absolute'
4. Step: check 'position reached'
5. Step: host log**out** via the CAN bus

1. Step:
Host log**in** via the CAN bus (necessary once after power-on, or always after host logout, respectively)

☞ send control telegram with 01h 'Host log**in**' in the control word byte 0to the 630.

data byte

0.	1.	2.	3.	4.	5.	6.	7.
01	00	xx	xx	xx	xx	xx	xx

xx : don`t care

2. Step:
check host log**in**

☞ request status (with a remote frame)

After host log**in** in the response telegram in the data byte 6 the bit 1 'X20 CAN host login' will be set.

data byte

0.	...	6.	7.
00		xxxx xx1x	

|_X20 CAN 'Host login''

3. Step:
positioning with start absolute'

If, in this connection, the acceleration and deceleration ramps stored in the 630 are not to be taken over, a telegram (control word 19d, 0x13) with the desired ramps must first be sent to the 630.

load ramps

☞ Send control telegram with the control word 'load ramps' and the desired parameters for acceleration and deceleration.

for example:

- acceleration 1000 (≡ 3E8) 5000 [$\frac{min^{-1}}{sec}$]
- deceleration 1500 (≡ 5DC) 7500 [$\frac{min^{-1}}{sec}$]
- offpos window 100 (≡ 64h)

data byte

0.	1.	2.	3.	4.	5.	6.	7.
13_h	00	E8	03	DC	05	64	00
load ramps		acceleration		deceleration		position window	

☞ **send control telegram with the control word 'start absolute' and the parameters for position and speed.**

- Position 500,000 increments (500,000d ≡ 0007A120h)
- speed 1000 [rpm] *2 = 2000 (≡ 7D0h)

data byte

0.	1.	2.	3.	4.	5.	6.	7.
03	00	20	A1	07	00	D0	07
start absolute		position				speed	

4. Step:

check position reached'

☞ request status (with a remote frame)

Request bit 7 'position reached' in data byte 6 in the response telegram and/or compare the position value (bytes 0 - 3) with the setpoint value.

0.	1.	2.	3.	4.	5.	6.	7.	Datenbyte data byte
00	00	00	00	00	00	1xxx xxxx	...	
		position 0				position reached		

5. Step:
host log**out** via the CAN bus

☞ send control telegram to the 630with 02h 'host log**out**' in the control word byte 0.

0.	1.	2.	3.	4.	5.	6.	7.	data byte
02	00	xx	xx	xx	xx	xx	xx	

xx : don`t care

6.2 BIAS program-selection via CAN

1. Step:

Host log**in** via the CAN bus (necessary once after power on, or every time after host logout)

☞ send control telegram with 01h 'Host log**in**' in the control word byte 0 to the 630.

data byte

0.	1.	2.	3.	4.	5.	6.	7.
01	00	xx	xx	xx	xx	xx	xx

xx : don`t care

2. Step:

check host log**in**

☞ request status (with a remote frame)

In the response telegram, bit 1 CAN 'host login' in data byte 6 is set after the host log**in**.

Datenbyte
data byte

0.	...	6.	7.
00		xxxx xx1x	

CAN 'Host login'

3. Step:
Program selection with control word (9) 'set BIAS-processing pointer'

Example:
- start program at processing pointer 100
  (100d ≡ 0064h)

data byte

0.	1.	2.	3.	4.	5.	6.	7.
09	00	64	00	xx	xx	xx	xx

control word | processing pointer

xx : don`t care

4. Step:

host log**out** via the CAN bus

☞ send control telegram to the 631with 02h 'host log**out**' in the control word byte 0.

data byte

0.	1.	2.	3.	4.	5.	6.	7.
02	00	xx	xx	xx	xx	xx	xx

xx : don`t care

7.1 Reference Modes

	Direction	Encoder zero point	Sensor	Sensor + Encoder zero point
	+	**0**	**2**	**4**
	-	**1**	**3**	**5**
Automatic direction selection	+	**6**	**8**	**10**
	-	**7**	**9**	**11**
Reference point shift	+	**12**	**14**	**16**
	-	**13**	**15**	**17**
Automatic direction selection +	+	**18**	**20**	**22**
Reference point shift	-	**19**	**21**	**23**

NOTE: **In** applictions with SIN/COS encoders (-X300 Module =SC1/SC2) only the Reference Modes 0,1,2,3-6,7,8,9 are allowed!!!!!

Encoder-0-position:
The axis starts the reference run in the specified direction.
The actual position is zeroed after the zero mark of the encoder is found.
The axis is stopped with the active deceleration ramp.

Reference sensor:
The axis starts the reference run in the specified direction.
The actual position is zeroed after detection of the low-high slope of the external reference sensor.

Note:

- If no input is configured as "reference sensor", a start fault occurs upon execution of a reference run.
- If the zero position is not reachable in the specified direction, the zero position will not be moved to (see also "Reference run with automatic selection of direction").

Reference sensor & Encoder-0-position:
The axis starts the reference run in the specified direction.
The actual position is zeroed after detection of the low-high slope of the external reference sensor and the zero mark of the encoder is found.

The axis is stopped with the active deceleration ramp.

Note:

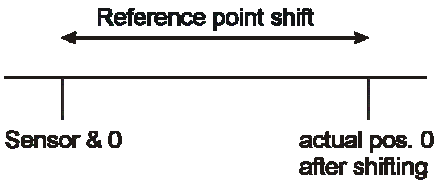
1. If no input is configured as "reference sensor", a start fault occurs upon execution of a reference run.
2. If the zero position is not reachable in the specified direction the zero position will not be moved to (see also "Reference run with automatic selection of direction")

Reference run with automatic selection of direction
The previous reference moves can be combined with the automatic selection of direction.
If the automatic selection of direction is active, there are 2 differences to the previous explanations.

Note:

1. The axis can use both reference directions. As a result, the zero point can always be moved to.
2. 2.With reference runs with reference sensor, the reference run is started in the opposite direction if the reference sensor is already active at the start of the reference run. After the reference sensor becomes free (inactive) the axis is stopped.
   Subsequently the reference sensor is moved to in the specified reference direction and the reference run is ended according to the reference mode.

Reference run with shifting of reference point



The previous reference modes can also be combined with the reference point shifting. With this, the actual position 0 is shifted by the amount specified in the "Position" parameter from the zero position found according to the reference modes

Note:

- If the zero position is not reachable in the specified direction, the zero position will not be moved to (see also "Reference run with automatic selection of direction").

Usage:

BIAS command „Move datum“
Position set mode

Version	Modification	Chapter	Date	Name	Comment
V0104	Replace the manuals 07-05-03-02-.and 07-05-03-03-..	-	29.09.2004	ET- Team	Source Doc-Library
V0204	SSD Drives		02.11.2004	N. Dreilich	Logos

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