Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth Bosch Group

VT-VPCD – Digital closed loop control electronics for axial piston pumps A4VS... with HS4 control and A2V with EO4 control

RE 30028-02-Z/08.06

Start-up CANopen interface

Contents

1 Introduction

1.1 Version

Version: 1.1

1.2 General

The program BODAC can be used for creating tables, in which the user can define, which data are to be cyclically exchanged via a bus system between the amplifier card and a master:

This process will also be called Mapping in the following and can be used for all bus systems of the VPCD (Profibus-DP, CANopen and DeviceNet).

These instructions only describe the installation and operation of the controller card in conjunction with a bus system. For additional information on commissioning the controller card with help of the software BODAC, which is included in the scope of supply, see “Starting up the VPCD Controller Card and Operation of the BODAC Software ". A list of documentation for the VPCD can be found in the section “Associated Documentation".

Associated documentation

Apart from the present instructions, we offer further documentation with regard to the “VT-VPCD – Digital Control Amplifier for Driving Axial Pump Units A4VS... with HS4-Control”.

These include:

- RE data sheet “RE 30 028” in paper form.
- The documentation RE 30 028-B. “VPCD – Digital controller amplifier for operating axial piston pumps of type A4VS... with HS4 control and A2V... with EO4 control: Start up instruction”.
- The documentation RE 30 028-01-B. “VT-VPCD – Digital Control Amplifier for Dricing Axial Pump Units A4VS... with HS4-Control: Start-up and Operation”.
- The documentation RE 30 028-02-Z: “VT-VPCD – Digital Control Amplifier for Dricing Axial Pump Units A4VS... with HS4-Control: Start-up CANopen Interface“
- The documentation RE 30 028-U: “Declaration on environmental compatibility in the field of EMC, climate and mechanical stress”
- On the Internet: http://www.boschrexroth.com/hacd
- Further information about CANopen can be obtained from the association CAN-in-Automation (CiA, http://www.can-cia.org).

1.3 Signs and symbols used

The following signs and symbols are used in the present instructions:

- ➢ Action symbol: The text following this symbol describes activities. These must be carried out in the given order.
- ✓ Result symbol: The text following this symbol describes the results of an action.

Following this symbol you will find notes and useful tips for the optimal use of the controller card.

After this symbol you will find references to additional documentation.

Warning signs

Special safety notes are provided at the relevant locations. These are indicated by the following symbols.

General hazard This sign is placed in front of activities which represent a potential hazard to persons and/or extensive damage to equipment.

1.4 Safety notes

Operate the controller card only when it is in technically perfect condition and in accordance with the intended use, being aware of safety and risks and observing the present documentation!

In the event of faults that affect safety or in the case of changes in the operating behavior, shut the controller card down immediately and inform the responsible personnel.

The proper and safe operation of the controller card implies proper transport, correct storage, and installation as well as thorough commissioning and operation.

The controller card has been built using the latest technology, and in accordance with recognized safety standards. Nevertheless, its use can result in personal injury and damage to property, when:

- the controller card is not used according to the intended purpose (see page 10, proper use)
- the controller card is not installed, commissioned and operated by specialist personnel.
- you modify or convert the controller card improperly.
- you do not observe the safety regulations and safety notes.

The controller card is intended for use in industrial applications.

The card must not be operated until it has been determined that the system in which the controller card is installed, meets all applicable standards and safety regulations for the application.

In European countries: EC Directive 89/392/EEC (Machinery Directive)

Operation is permitted only when applicable EMC regulations for the application are met.

Adherence to limits defined by national regulations and standards is the responsibility of the manufacturer of the system or machine.

In European countries: EC Directive 89/336/EEC (EMC Directive)

In the USA: National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA), as well as local standards should be observed. The operator must comply at any time with the points mentioned before.

2 Connection technique, installation notes

2.1 Pin assignment (terminating resistors, cable type)

The connections for the CAN bus are provided at the rear edge connector on the controller card. The edge connector is a 64-pin, type G (DIN 41612) connector.

Row f:

Pin	Description	Type	Specification
28	CAN_GND	CAN bus reference	CAN specification
30	CAN_L	CAN bus input/output	CAN specification
32	CAN_H	CAN bus input/output	CAN specification

CAN is based on a line-shaped network topology.

For wiring, you should use a shielded twisted-pair cable (according to ISO 11898).

To prevent ground loops, the shield must be connected over the entire cable length and brought into contact on one end. For bus lengths greater than 1 km, the use of repeaters may be required.

The bus must be provided with a terminating resistor of 120 Ω at both ends (between CAN_L and CAN_H). This prevents reflections and is also required for short cable lengths.

In particularly problematic environments, we recommend the use of higher-quality cables such as a shielded Lapp cable UNITRONIC BUS FD P CAN UL/CSA 2x2x0.25.

2.2 Supported baud rate and node ID

The address can be programmed by way of an SDO or be set via the Bus Manager of the operator program “BODAC“.

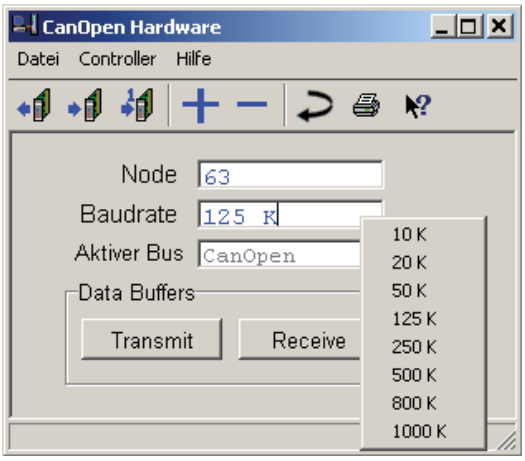

Fig. 1 Bus Manager window “CanOpen Hardware“

Up to 127 stations (nodes) are possible. Station 0 is reserved for Broadcast messages.

The baud rate can also be set here.

With the factory-setting, the node number is pre-assigned to 63 .

3 CanOpen services

The following features were implemented:

- Support of CANopen standard DS301, version 4
- One SDO (Service Data Object)
- Four receive PDOs (mapping via BODAC Bus Manager), CYCL
- Four transmit PDOs (mapping via BODAC Bus Manager), CYCL
- Node-guarding
- Heartbeat
- Life-guarding
- Emergency object
- CANopen slave
- NODE-ID setting via SDO or via BODAC Bus Manager
- Minimum boot-up
- The use in CAL networks is not possible
- Identifier assignment according to the Predefined Connection Set

In conjunction with CANopen, in the case of 2-byte or 4-byte variables, the LSB (= least significant byte = byte 0) is always sent first (Intel format)

All of the data are saved in the volatile memory (RAM) of the card. In the event of, for example, a power failure the set data are lost.

3.1 Network management

The network management describes the status of communication between the master and the slaves and additionally internal operational states of the amplifier card (fault states, waiting for enable, ...).

Bootup protocol

After the supply voltage was switched on, the amplifier card outputs the following message:

COB-ID	DLC	Byte 0
0x700 + node number of the amplifier card addressed	1	0

The message needs not to be acknowledged by the master.

Writing with NMT1 to NMT9

After power-on or a reset, the amplifier card is in the pre-operational state. In this state, only NMT services, node-guarding and service data objects (SDOs) are available for communication and for configuring the amplifier card.

By sending a telegram, the master can set a certain amplifier card or all amplifier cards together to the operational state (ready). Only then can process data objects (PDOs) be transmitted.

By means of an NMT service, the station can also be reset to the pre-operational state and a software reset or a CAN controller reset can be carried out.

COB-ID	Byte 0	Byte 1
0x000 (NMT)	Command 0xYY	Node address 0xZZ

Command for a change of state

Command 0xYY:	Byte 0
0x01	Changes over to the operational state
0x80	Changes over to the pre-operational state
0x81	Reset of amplifier card
0x82	CAN controller reset

Broadcast telegrams

Address 0xZZ:	
0xZZ = 0x00	Message sent to all stations
0xZZ ≠ 0x00	Message sent to nodes with address 0xZZ

Node-guarding

If Node-guarding is to be used, the NMT master must cyclically send a guarding telegram (RTR request) to the amplifier card. This requests a telegram from the relevant bus node.

COB-ID	RTR	DLC
0x700 + node number of the node to be monitored	1	1

The amplifier card replies with the following telegram:

COB-ID	DLC	Byte 0
0x700 + node number of the addressed amplifier card	1	Status byte **0xYY**

The status byte indicates, in which phase the bus communication is. Bit 7 of the status byte is toggled after each telegram. If the bit is not toggled, the NMT master assumes an error in the monitored node.

The status byte can take the following values:

0x05/0x85 (toggled) for the operational state

0x7F/0xFF (toggled) for the pre-operational state

The Guard Time is entered with index 0x100C in the object directory, and the Life Time Factor with index 0x100D. These two entries can be read by means of an SDO access and also changed by the NMT master by means of an SDO access. The time allowed between the Node-guarding telegrams until the amplifier signals a fault is termed Life Time. It is calculated as follows:

Life Time = Guard Time x Life Time Factor

Pre-set values:

Guard Time: 0 (entry in ms)

Life Time Factor: 0

The NMT master can start the Guarding procedure directly at any time by requesting a Guarding telegram. This is also used for activating Life Guarding in the amplifier card, if the entries in object directory 0x100C and 0x100D are greater than 0.

Heartbeat

The Heartbeat is an alternative to Node-guarding. The advantage of Heartbeat is that Remote Frame Messages are not provided. Consequently, it is possible to do without the toggle bit. Due to this, the bus load is lower than with Node-guarding.
The nodes independently generate a cyclic message about their current communication state. This is the so-called Heartbeat.
The simultaneous utilization of both methods is not permitted. If the “Heartbeat Producer Time“ (0x1017) is not equal to 0, the Heartbeat is used instead of Node-guarding.

Producer Telegram:

COB-ID	DLC	Byte 0
0x700 + node number of the amplifier card	1	Status byte **0xYY**

The status byte indicates, in which phase the bus communication is. Bit 7 of the status byte is reserved.

The status byte can take the following values:

0x05 for the operational state

0x7F for the pre-operational state

CanOpen services

The Consumer Heartbeat Time Interval is entered with index 0x1016 in the object directory, and the Producer Heartbeat Time Interval with index 0x1017. These two entries can be read by means of an SDO access and also changed by the NMT master by means of an SDO access.

Pre-set values:

Consumer Heartbeat Time Interval:	0 (entry in ms)
Producer Heartbeat Time Interval:	0 (entry in ms)

3.2 Predefined Connection Set

For CANopen, the most important communication objects are derived according to the following scheme:

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

Communication objects		Function code	Resulting COB-ID	OD-Index
		bin	hex	hex
Broadcast Messages	NMT Node Control	0000	0x000	-
	Sync-Message	0001	0x080	1005,1006
	System Time	0010	0x100	1012,1013
Peer-to-Peer Messages	Emergency Objects	0001	0x081-0x0FF	1014,1015
	Tx-PDO1	0011	0x181-0x1FF	1800
	Rx-PDO1	0100	0x201-0x27F	1400
	Tx-PDO2	0101	0x281-0x2FF	1801
	Rx-PDO2	0110	0x301-0x37F	1401
	Tx-PDO3	0111	0x381-0x3FF	1802
	Rx-PDO3	1000	0x401-0x47F	1402
	Tx-PDO4	1001	0x481-0x4FF	1803
	Rx-PDO4	1010	0x501-0x57F	1403
	Tx-SDO	1011	0x581-0x5FF	1200
	Rx-SDO	1100	0x601-0x67F	1200
	Node Monitoring	1110	0x701-0x77F	100C,100D 1016,1017

CanOpen services

Node number 0 is reserved for Broadcast transmissions.

3.3 SDO - general description

SDOs are used to establish an acyclical communication. Addressing is made by means of index and sub-index. SDOs are transmitted with acknowledgement. In this way, every message is acknowledged by a corresponding CAN message.
The individual indices can be found in chapter 5. The parameters of the amplifier card are included in the Manufacturer-Specific Area of the CANopen object directory (2000 – 5FFF).

In contrast to the SDO Segmented Domain Protocol, with the SDO Expedited Protocol, only up to 4 bytes of data can be transmitted at a time.

Client → Server Upload Request Protocol

With this telegram, the higher-level control reads values or parameters from the bus stations (e.g. amplifier cards).

Structure

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3
0x600 + node number	Control word value **0x40**	Index low byte	Index high byte	Subindex

Server → Client Upload Response Protocol

The station replies with this telegram to the request of the higher-level control.

Structure

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x580 + node number	Control word value **0xYY**	Index low byte	Index high byte	Subindex	Data bytes 0..3

The control word can take the following values:

Values for the control word

Value 0xYY	Meaning
0x4F	1 data byte valid
0x4B	2 data bytes valid
0x47	3 data bytes valid
0x43	4 data bytes valid
0x80	→ see error codes
Other value	More than 4 data bytes required → non-expedited domain protocol required

Client → Server Download Request Protocol

The higher-level control can use this protocol for transmitting values or parameters to the stations. In the amplifier cards, the parameters are saved in the volatile RAM and are no longer available after a reset or power ON.

Structure

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x600 + node number	Control word value **0x22**	Index low byte	Index high byte	Subindex	Data bytes 0..3

Server → Client Download Response Protocol

This telegram is used for confirming the write access of the control.

Structure

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x580 + node number	Control word value **0x60**	Index low byte	Index high byte	Subindex	Data bytes 0..3

The contents of the data bytes are arbitrary and must be ignored by the control.

Interruption of an SDO transfer

When the integrated valve electronics recognizes an error while utilizing an SDO telegram, an SDO interruption telegram is sent.

The possible error codes are listed in the table below:

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4 + 5	Byte 6	Byte 7
0x580 + node number	Control word value **0x80**	Index low byte	Index high byte	Subindex	Additional code	Error code	Error class

Error code table for SDO interruption

Not all of the error messages are implemented in every software version.

Additional code		Error code	Error class	Error description
0x11	0x0	0x9	0x6	No subindex
0x0	0x0	0x1	0x6	Only reading or writing possible
0x31	0x0	0x9	0x6	Default value too great
0x32	0x0	0x9	0x6	Default value too small
0x10	0x0	0x7	0x6	Data type not known
0x12	0x0	0x7	0x6	Data length too great
0x13	0x0	0x7	0x6	Data length too short
0x41	0x0	0x4	0x6	Datum cannot be mapped
0x42	0x0	0x4	0x6	PDO too long
0x43	0x0	0x4	0x6	Invalid value
0x0	0x0	0x3	0x5	Incorrect toggle bit
0x0	0x0	0x2	0x6	Object not available
0x21	0x0	0x0	0x8	Internal error
0x22	0x0	0x0	0x8	Service error
0x1	0x0	0x4	0x5	Unknown service request
0x47	0x0	0x4	0x6	Initialization error

Parameter conversion

The data are transmitted in the internal data format of the amplifier card. For this reason, all data transmitted to and from the amplifier must be converted on the PLC side. For the conversion, 2 values (scale and offset) are required for each parameter. These can be different for each parameter and can be found in the table.

The calculation rule for the conversion of the numerical format is as follows:

PLC -> amplifier card:
(EU_value – offset) * scale = internal_transmission value

Amplifier card -> PLC
(internal_transmission value / scale) + offset = EU_value

EU value = engineering unit

internal_transmission value = internal numerical format of the amplifier card

If you wish to transmit, for example, command value “Power CMD (Bus)” to the VPCD, you can take the following values from the table:

Name		Power CMD (BUS)	
Index		0x2C76	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

(4.0 – 0) * 327.67 = 1310.68 (decimal)

This value is then arithmetically rounded (= 1311) and converted into a hexadecimal value (= 0x051F). The value can now be transmitted.

The PLC must also check the entries for compliance with limits (min/max values).

If the values fall below the lower or exceed the upper limits, incorrect values may be obtained on the amplifier card (among others, negative instead of positive value due to overflows).

3.4 PDO - general description

For the transmission of process data, PDOs are available in CANopen. A PDO can be used for transmitting a maximum of 8 bytes of user data. PDOs are cyclically transmitted. The parameters are mapped in the Bus Manager of BODAC.

PDOs are generally not acknowledged in contrast to SDOs and some NMT services. They can be sent and received by several stations – depending on their configuration.

The identifiers are assigned for all amplifier cards according to the Predefined Connection Set of the CANopen protocol. For communication with the amplifier card, four send and four receive PDOs are available (from the amplifier card's point of view). After power on, the PDOs are initialized according to the Predefined Connection Set.

At present, only cyclical, synchronous PDO transmission is supported. This means that the transmission of a PDO is controlled by an adjustable timer (event timer).

Send PDO (TX-PDO)

PDO structure

COB-ID	Data (bytes 0 to 7)

As usual with CANopen, first the LSB and then the MSB is transmitted for data.

Receive PDO (RX-PDO)

PDO structure

COB-ID	Data (bytes 0 and 7)

As usual with CANopen, first the LSB and then the MSB is transmitted for data.

Example of a PDO configuration

The parameters to be transmitted must be configured on the VPCD. This can be explained with the help of an example.

The following parameters are to be transferred:

Transmission to the VPCD:
4 bytes Trigger
4 bytes Pressure CMD (BUS)

4 bytes Angle CMD (BUS)
4 bytes Power CMD binary 1

Transmission from the VPCD:
4 bytes act. Pressure B
4 bytes Discrete Outputs

4 bytes act. Valve

The parameters are saved in memory areas for send and receive data (of 32 bytes each) in the Bus Manager of the VPCD in the order, in which they have to be transmitted.

Definition of data from the VPCD:

The following table contains all parameters that can be transmitted from the VT-VPCD to the master. 2-byte or 4-byte values can be selected. The configuration shown here refers to our example:

CanOpen services

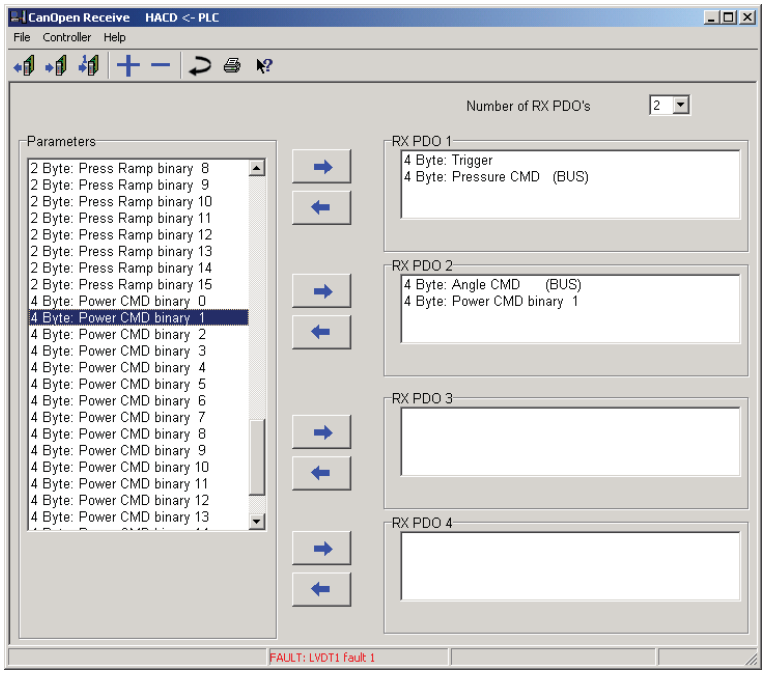

Fig. 2 Bus Manager window "Receive"

Definition of data from the VPCD

The data to be received by the VPCD must also be entered in the Bus Manager. Again, the graphic shows the configuration for our example:

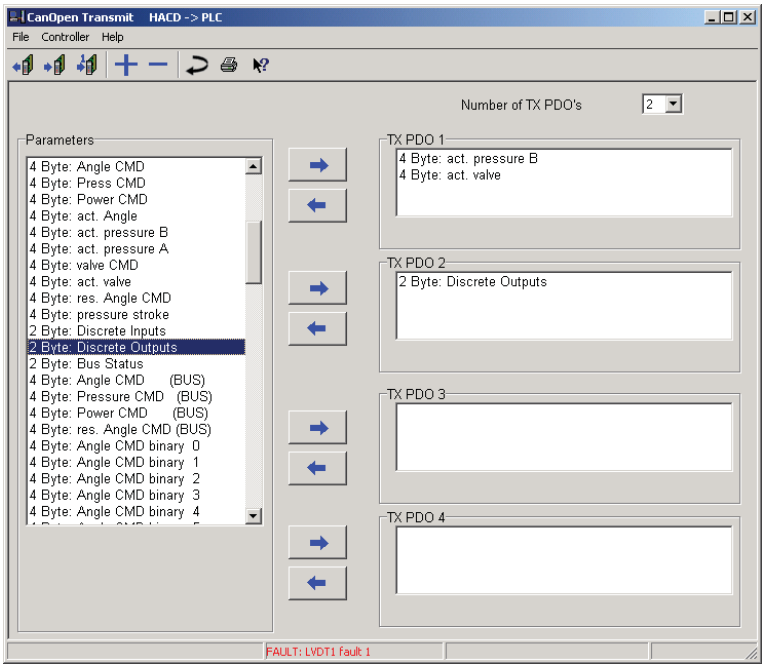

Fig. 3 Bus Manager window "Transmit"

After the mapping parameters were selected, the data must be permanently saved on the VPCD (Flash memory).

Parameter conversion

The data are transmitted in the internal data format of the amplifier card. For this reason, all data transmitted to and from the amplifier must be converted on the PLC side. For the conversion, 2 values (scale and offset) are required for each parameter. These can be different for each parameter and can be found in the table.

The calculation rule of for the conversion of the numerical format is as follows:

PLC -> amplifier card:
(EU_value – offset) * scale = internal_transmission value

Amplifier card -> PLC
(internal_transmission value / scale) + offset = EU_value

EU value = engineering unit

internal_transmission value = internal numerical format of the amplifier card

If you wish to transmit, for example, command value “Power CMD (BUS)” to the VPCD, you can take the following values from the table:

Name		Power CMD (BUS)	
Index		0x2C76	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

(4.0 – 0) * 327 67 = 1310,68 (decimal)

This value is then arithmetically rounded (= 1311) and converted into a hexadecimal value (= 0x051F). The value can now be transmitted.

The PLC must also check the entries for compliance with limits (min/max values).

If the values fall below the lower or exceed the upper limits, incorrect values may be obtained on the amplifier card (among others, negative instead of positive value due to overflows).

Starting the PDO transmission

To start the transmission of PDOs, the Event Timers must be set according to the PDOs.
As an example, the 1st Transmit PDO is to send data every 100 ms, with the node number being 5. To this end, the value of 0x64 must be written to index 0x1800 subindex 0x05.

Message to node 5 to set the Event Timer to 100 ms (= 0x64 as data bytes):

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x600 + node no. **0x605**	Control word value **0x2B**	Index low byte **0x00**	Index high byte **0x18**	Subindex **0x05**	Data bytes 0..3 **0x64 00 00 00**

Automatic reply by node 5:

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x580 + node no. **0x585**	Control word value **0x60**	Index low byte **0x00**	Index high byte **0x18**	Subindex **0x05**	Data bytes 0..3 **0x00 00 00 00**

Message to node 5 for verification of the content:

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x600 + node no. **x605**	Control word value **0x42**	Index low byte **0x00**	Index high byte **0x18**	Subindex **0x05**	Data bytes 0..3 **0x00 00 00 00**

Automatic reply by node 5 with the correct value:

COB-ID	Byte 0	Byte 1	Byte 2	Byte 3	Bytes 4...7
0x580 + node no. **0x585**	Control word value **0x4B**	Index low byte **0x00**	Index high byte **0x18**	Subindex **0x05**	Data bytes 0..3 **0x64 00**

Now, the amplifier must be set to the OPERATIONAL state in order that the PDO can be started:

COB-ID	Byte 0	Byte 1
0x000 (NMT)	Command **0x01**	Node address **0x05**

Start of PDO transmission every 100 ms:

COB-ID	Data (bytes 0 and 7)
0x185	**0x00 0x12 0x23 0x11 (data from the example)**

3.5 Emergency telegram

COB-ID	Byte 0...1	Byte 2	Byte 3...7
0x80 + node number	Error code	Error register	Manufacturer-specific error register (not yet used at present)

If a serious error occurs, the amplifier card sends an Emergency telegram of a data length of 8 data bytes. This telegram is sent with highest priority. When a new error is recognized, a telegram is triggered, which is specifically provided for this purpose. Any existing errors are not signaled repeatedly.

When all errors were rectified, a "no-error telegram“ is sent.

Error register

As long as an error is present, the contents of error register 0x1001 can be read in the object directory. The error registers of all Emergency Telegrams are grouped in an error register content (OR operation).

Structure

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Manu-facturer-specific error	Res.	Error in device profile	Communi-cation error	Tempera-ture error	Voltage error	Current error	Gen-eral error

Error code

Every error that can occur in the amplifier and is signaled via the CAN bus has its own error code. The number of the errors currently present is saved in the object directory under index 1003 and subindex 0. From subindex 1 + (number of errors) on, the error code of the errors occurred can be read in the time-related order of their occurrence. The error that occurred last is assigned to subindex 1. A maximum of 4 errors are saved.

The following table shows the error codes (not all of the codes are implemented in every software). They are represented in hex figures.

fault	Meaning
0000	No error
1000	General error
3400	Cable break, current inputs
3422	Control voltage Undervoltage
5230	Sensors in general
5235	External sensor
5236	Position sensor
6000	Software
6010	Software reset (watchdog)
6100	Internal software
6200	User software
6300	Data set
6310	Parameter lost / overwritten
6320	Parameter error
8100	Communication error
8300	Closed loop governor monitoring
8301	Position monitor error
8302	Pressure monitor error

4 Busparameter

4.1 act. Angle

Name		act. Angle	
Index		0x2F07	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.2 act. pressure A

Name		act. pressure A	
Index		0x2F10	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		1	600
Scale	Offset	327,67	0

4.3 act. pressure B

Name		act. pressure B	
Index		0x2F0F	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		1	600
Scale	Offset	327,67	0

4.4 act. valve

Name		act. valve	
Index		0x2F19	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,7	0

4.5 Angle CMD

Name		Angle CMD	
Index		0x2F33	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.6 Angle CMD (BUS)

Name		Angle CMD (BUS)	
Index		0x2C72	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.7 Angle CMD (b14/b16)

Name		Angle CMD (b14/b16)	
Index		0x2F03	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.8 Angle CMD (b2/b4)

Name		Angle CMD (b2/b4)	
Index		0x2F1A	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.9 Angle CMD binary

Name		Angle CMD binary	
Index		0x2F2F	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.10 Angle CMD binary 0

Name		Angle CMD binary 0	
Index		0x2001	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.11 Angle CMD binary 1

Name		Angle CMD binary 1	
Index		0x2002	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.12 Angle CMD binary 2

Name		Angle CMD binary 2	
Index		0x2003	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.13 Angle CMD binary 3

Name		Angle CMD binary 3	
Index		0x2004	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.14 Angle CMD binary 4

Name		Angle CMD binary 4	
Index		0x2005	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.15 Angle CMD binary 5

Name		Angle CMD binary 5	
Index		0x2006	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.16 Angle CMD binary 6

Name		Angle CMD binary 6	
Index		0x2007	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.17 Angle CMD binary 7

Name		Angle CMD binary 7	
Index		0x2008	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.18 Angle CMD binary 8

Name		Angle CMD binary 8	
Index		0x2009	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.19 Angle CMD binary 9

Name		Angle CMD binary 9	
Index		0x200A	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.20 Angle CMD binary 10

Name		Angle CMD binary 10	
Index		0x200B	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.21 Angle CMD binary 11

Name		Angle CMD binary 11	
Index		0x200C	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.22 Angle CMD binary 12

Name		Angle CMD binary 12	
Index		0x200D	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.23 Angle CMD binary 13

Name		Angle CMD binary 13	
Index		0x200E	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.24 Angle CMD binary 14

Name		Angle CMD binary 14	
Index		0x200F	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.25 Angle CMD binary 15

Name		Angle CMD binary 15	
Index		0x2010	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.26 Angle Ramp binary 0

Name		Angle Ramp binary 0	
Index		0x2101	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.27 Angle Ramp binary 1

Name		Angle Ramp binary 1	
Index		0x2102	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.28 Angle Ramp binary 2

Name		Angle Ramp binary 2	
Index		0x2103	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.29 Angle Ramp binary 3

Name		Angle Ramp binary 3	
Index		0x2104	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.30 Angle Ramp binary 4

Name		Angle Ramp binary 4	
Index		0x2105	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.31 Angle Ramp binary 5

Name		Angle Ramp binary 5	
Index		0x2106	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.32 Angle Ramp binary 6

Name		Angle Ramp binary 6	
Index		0x2107	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.33 Angle Ramp binary 7

Name		Angle Ramp binary 7	
Index		0x2108	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.34 Angle Ramp binary 8

Name		Angle Ramp binary 8	
Index		0x2109	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.35 Angle Ramp binary 9

Name		Angle Ramp binary 9	
Index		0x210A	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.36 Angle Ramp binary 10

Name		Angle Ramp binary 10	
Index		0x210B	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.37 Angle Ramp binary 11

Name		Angle Ramp binary 11	
Index		0x210C	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.38 Angle Ramp binary 12

Name		Angle Ramp binary 12	
Index		0x210D	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.39 Angle Ramp binary 13

Name		Angle Ramp binary 13	
Index		0x210E	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.40 Angle Ramp binary 14

Name		Angle Ramp binary 14	
Index		0x210F	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.41 Angle Ramp binary 15

Name		Angle Ramp binary 15	
Index		0x2110	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.42 Bus Status

Name		Bus Status	
Index		0x2C68	
Bytes	Units	2	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	1	0
Description		Highbyte = Errorflags Bits 15 = Error|Error 8 Bits 14 = Error|Error 7 Bits 13 = Error|Error 6 Bits 12 = Error|Error 5 Bits 11 = Error|Error 4 Bits 10 = Error|Error 3 Bits 09 = Error|Error 2 Bits 08 = Error|Error 1 Lowbyte =Nummber of Fault Angle Cmd Stopp = 0 Pressure CMD Stopp = 1 Power CMD Stopp = 2 act.Pressure B Stopp = 3 act.Pressure A Stopp = 4 res.Angle CMD Stopp = 5 MCP-40/4742 Stopp = 6 Timeout Stopp = 16 Trigger Stopp = 18 Loop Fault Stopp = 19 Checksum = 22 Checksum = 23 Voltage Ub = 24 Reference Voltage = 25 DO1 Short = 26 DO1 Short = 27 DO1 Short = 28 DO1 Short = 29 DO1 Short = 30 DO1 Short = 31 DO1 Short = 32 DO1 Short = 33	

4.43 Contr I binary 0~ 3

Name		Contr I binary 0~ 3	
Index		0x2423	
Bytes	Units	2	ms
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		2	30000
Scale	Offset	1	0

4.44 Contr I binary 4~ 7

Name		Contr I binary 4~ 7	
Index		0x2427	
Bytes	Units	2	ms
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		2	30000
Scale	Offset	1	0

4.45 Contr I binary 8~11

Name		Contr I binary 8~11	
Index		0x242B	
Bytes	Units	2	ms
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		2	30000
Scale	Offset	1	0

4.46 Contr I binary 12~15

Name		Contr I binary 12~15	
Index		0x242F	
Bytes	Units	2	ms
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		2	30000
Scale	Offset	1	0

4.47 Contr P binary 0~ 3

Name		Contr P binary 0~ 3	
Index		0x2323	
Bytes	Units	2	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	255
Scale	Offset	128	0

4.48 Contr P binary 4~ 7

Name		Contr P binary 4~ 7	
Index		0x2327	
Bytes	Units	2	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	255
Scale	Offset	128	0

4.49 Contr P binary 8~11

Name		Contr P binary 8~11	
Index		0x232B	
Bytes	Units	2	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	255
Scale	Offset	128	0

4.50 Contr P binary 12~15

Name		Contr P binary 12~15	
Index		0x232F	
Bytes	Units	2	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	255
Scale	Offset	128	0

4.51 Discrete Inputs

Name		Discrete Inputs	
Index		0x2F27	
Bytes	Units	2	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	511
Scale	Offset	1	0
Description		bit 1 = binary 1 (DI1) bit 2 = binary 2 (DI2) bit 3 = binary 4 (DI3) bit 4 = binary 8 (DI4) bit 5 = Master (DI5) bit 6 = binary enable (DI6) bit 7 = n.c. bit 8 = n.c. bit 9 = Enable	

4.52 Discrete Outputs

Name		Discrete Outputs	
Index		0x2F26	
Bytes	Units	2	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	255
Scale	Offset	1	0
Description		Bit 1 = DO1 Bit 2 = OK Bit 3 = DO2 Bit 4 = DO3 Bit 5 = DO4 Bit 6 = DO5 Bit 7 = DO6 Bit 8 = DO7	

4.53 Gain LVDT pump

Name		Gain LVDT pump	
Index		0x2F2C	
Bytes	Units	2	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	200
Scale	Offset	12,6	0

4.54 Power CMD

Name		Power CMD	
Index		0x2F18	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,67	0

4.55 Power CMD (BUS)

Name		Power CMD (BUS)	
Index		0x2C76	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,67	0

4.56 Power CMD (f8/f10)

Name		Power CMD (f8/f10)	
Index		0x2F17	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,67	0

4.57 Power CMD binary

Name		Power CMD binary	
Index		0x2F31	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.58 Power CMD binary 0

Name		Power CMD binary 0	
Index		0x2045	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.59 Power CMD binary 1

Name		Power CMD binary 1	
Index		0x2046	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.60 Power CMD binary 2

Name		Power CMD binary 2	
Index		0x2047	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.61 Power CMD binary 3

Name		Power CMD binary 3	
Index		0x2048	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.62 Power CMD binary 4

Name		Power CMD binary 4	
Index		0x2049	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.63 Power CMD binary 5

Name		Power CMD binary 5	
Index		0x204A	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.64 Power CMD binary 6

Name		Power CMD binary 6	
Index		0x204B	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.65 Power CMD binary 7

Name		Power CMD binary 7	
Index		0x204C	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.66 Power CMD binary 8

Name		Power CMD binary 8	
Index		0x204D	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.67 Power CMD binary 9

Name		Power CMD binary 9	
Index		0x204E	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.68 Power CMD binary 10

Name		Power CMD binary 10	
Index		0x204F	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.69 Power CMD binary 11

Name		Power CMD binary 11	
Index		0x2050	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.70 Power CMD binary 12

Name		Power CMD binary 12	
Index		0x2051	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.71 Power CMD binary 13

Name		Power CMD binary 13	
Index		0x2052	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.72 Power CMD binary 14

Name		Power CMD binary 14	
Index		0x2053	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.73 Power CMD binary 15

Name		Power CMD binary 15	
Index		0x2054	
Bytes	Units	4	%
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	100
Scale	Offset	327,7	0

4.74 Press CMD

Name		Press CMD	
Index		0x2F0E	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		1	600
Scale	Offset	324,7	0

4.75 Press CMD (b18/b20)

Name		Press CMD (b18/b20)	
Index		0x2F0D	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		1	600
Scale	Offset	327,67	0

4.76 Press CMD binary

Name		Press CMD binary	
Index		0x2F30	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

4.77 Press Ramp binary 0

Name		Press Ramp binary 0	
Index		0x2123	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.78 Press Ramp binary 1

Name		Press Ramp binary 1	
Index		0x2124	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.79 Press Ramp binary 2

Name		Press Ramp binary 2	
Index		0x2125	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.80 Press Ramp binary 3

Name		Press Ramp binary 3	
Index		0x2126	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.81 Press Ramp binary 4

Name		Press Ramp binary 4	
Index		0x2127	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.82 Press Ramp binary 5

Name		Press Ramp binary 5	
Index		0x2128	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.83 Press Ramp binary 6

Name		Press Ramp binary 6	
Index		0x2129	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.84 Press Ramp binary 7

Name		Press Ramp binary 7	
Index		0x212A	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.85 Press Ramp binary 8

Name		Press Ramp binary 8	
Index		0x212B	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.86 Press Ramp binary 9

Name		Press Ramp binary 9	
Index		0x212C	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.87 Press Ramp binary 10

Name		Press Ramp binary 10	
Index		0x212D	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.88 Press Ramp binary 11

Name		Press Ramp binary 11	
Index		0x212E	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.89 Press Ramp binary 12

Name		Press Ramp binary 12	
Index		0x212F	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.90 Press Ramp binary 13

Name		Press Ramp binary 13	
Index		0x2130	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.91 Press Ramp binary 14

Name		Press Ramp binary 14	
Index		0x2131	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.92 Press Ramp binary 15

Name		Press Ramp binary 15	
Index		0x2132	
Bytes	Units	2	s
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	300
Scale	Offset	125	0

4.93 Press. CMD binary 0

Name		Press. CMD binary 0	
Index		0x2023	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.94 Press. CMD binary 1

Name		Press. CMD binary 1	
Index		0x2024	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.95 Press. CMD binary 2

Name		Press. CMD binary 2	
Index		0x2025	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.96 Press. CMD binary 3

Name		Press. CMD binary 3	
Index		0x2026	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.97 Press. CMD binary 4

Name		Press. CMD binary 4	
Index		0x2027	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.98 Press. CMD binary 5

Name		Press. CMD binary 5	
Index		0x2028	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.99 Press. CMD binary 6

Name		Press. CMD binary 6	
Index		0x2029	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.100 Press. CMD binary 7

Name		Press. CMD binary 7	
Index		0x202A	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.101 Press. CMD binary 8

Name		Press. CMD binary 8	
Index		0x202B	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.102 Press. CMD binary 9

Name		Press. CMD binary 9	
Index		0x202C	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.103 Press. CMD binary 10

Name		Press. CMD binary 10	
Index		0x202D	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.104 Press. CMD binary 11

Name		Press. CMD binary 11	
Index		0x202E	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.105 Press. CMD binary 12

Name		Press. CMD binary 12	
Index		0x202F	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.106 Press. CMD binary 13

Name		Press. CMD binary 13	
Index		0x2030	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.107 Press. CMD binary 14

Name		Press. CMD binary 14	
Index		0x2031	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.108 Press. CMD binary 15

Name		Press. CMD binary 15	
Index		0x2032	
Bytes	Units	4	bar
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	600
Scale	Offset	327,7	0

4.109 Pressure CMD (BUS)

Name		Pressure CMD (BUS)	
Index		0x2C74	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,67	0

Busparameter

4.110 pressure stroke

Name		pressure stroke	
Index		0x2F32	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,7	0

4.111 res. Angle CMD

Name		res. Angle CMD	
Index		0x2F20	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,7	0

4.112 res. Angle CMD (BUS)

Name		res. Angle CMD (BUS)	
Index		0x2C99	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		1	600
Scale	Offset	327,67	0

4.113 Trigger

Name		Trigger	
Index		0x2C67	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		0	32
Scale	Offset	1	0
Description		Bit 0 = binary 0 Bit 1 = binary 1 Bit 2 = binary 2 Bit 3 = binary 3 Bit 4 = binary 4 Bit 5 = binary 5 Bit 6 = binary 6 Bit 7 = binary 7 Bit 8 = binary 8 Bit 9 = binary 9 Bit 10 = binary 10 Bit 11 = binary 11 Bit 12 = binary 12 Bit 13 = binary 13 Bit 14 = binary 14 Bit 15 = binary 15 Bit 16 = Slave	

4.114 valve CMD

Name		valve CMD	
Index		0x2F1F	
Bytes	Units	4	
Access		Read Only	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-100	100
Scale	Offset	327,7	0

4.115 Zeropoint pump

Name		Zeropoint pump	
Index		0x2C69	
Bytes	Units	4	
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-20	20
Scale	Offset	327,7	0

4.116 Zeropoint valve

Name		Zeropoint valve	
Index		0x2F2A	
Bytes	Units	2	[%]
Access		Read/Write	
Value Acceptance		also with active enabling	
Busmanager		available	
Min./Max. Value		-12	12
Scale	Offset	150	0

5 Glossary of Terms

CAN	Controller Area Network
CiA	CAN in Automation Group
COB	Communication Object (CAN telegram with up to 8 data bytes)
COB-ID	Communication Object Identifier (telegram address with 11 bits)
DLC	Data Length Code (0..8 bytes)
EMCY	Emergency telegram
NMT	Network Management
PDO	Process Data Object
RTR	Remote Transmission Request
RxPDO	Receive PDO (viewed from the relevant node)
SDO	Service Data Object
TxPDO	Transmit PDO (viewed from the relevant node)

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Printed in Germany
RE 30028-02-Z/08.06