PROFIBUS-DP Link for:

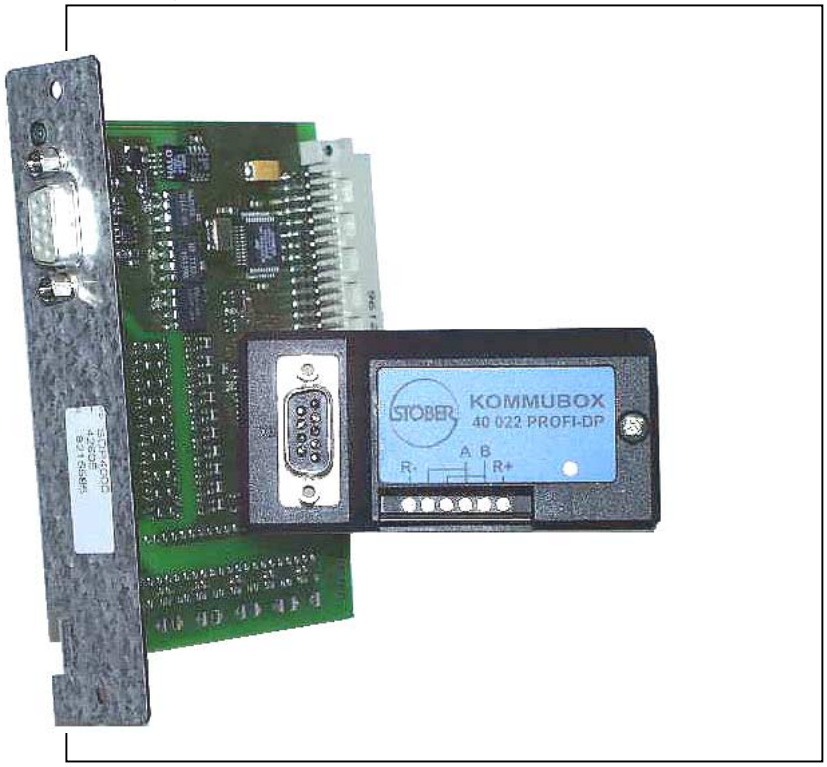
- POSIDRIVE® FAS 4000
- POSIDRIVE® FDS 4000
- POSIDYN® SDS 4000

Documentation

Before commissioning, it is essential to read and adhere to this documentation and the installation and commissioning instructions for
- **POSIDRIVE® FAS 4000 (no. 441581) and**
- **POSIDRIVE® FDS 4000 (no. 441408) and**
- **POSIDYN® SDS 4000 (no. 441449)**

MANAGEMENTSYSTEM

certified by DQS according to
ISO 9001, ISO 14001
Reg-No. 25780



SV. 4.5

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Profibus-DP link

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1 INTRODUCTION

To prevent problems during commissioning and/or operation, it is essential to read the complete installation and commissioning instructions of POSIDRIVE® FAS 4000 / FDS 4000 or POSIDYN® SDS 4000 and also this documentation prior to installation and commissioning.

1.1 PROFIBUS

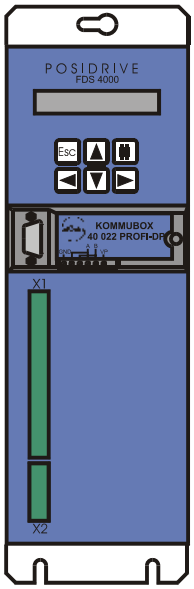
PROFIBUS is an open, vendor-independent fieldbus standard for a wide variety of applications in production, process and building automation. International standards IEC 61158 (part 3) and EN 50170 ensure vendor-independence and openness. During the past few years this standard has become the most important fieldbus system on the international market.

1.2 PROFILE FOR VARIABLE-SPEED DRIVES: PROFIDRIVE

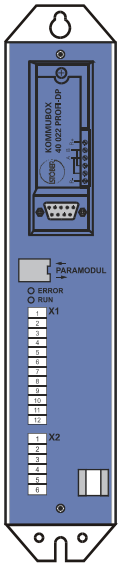
Working together, the leading manufacturers of drive technology have prepared the PROFIDRIVE profile. This profile specifies how the drives are to be parameterized and how the reference and actual values are to be transmitted.
STÖBER Antriebstechnik offers a link to PROFIBUS-DP (Distributed Periphery) via the PROFIDRIVE profile for all inverters of the **POSIDRIVE®** FAS/FDS 4000 and **POSIDYN®** SDS 4000 series. This turns these devices into intelligent DP slaves run by a PROFIBUS master (controller, PLC, PC).
Installed on the outside of the housing, Kommubox provides the FAS/FDS with PROFIBUS capability. The SDP 4000 option board opens the door to PROFIBUS for the SDS. Bus operation offers speeds of up to 12 Mbit/sec. An LED indicates the function of the accessory portion, the data transmission over the bus, and any malfunctions. The supplement to this coupling ensures unrestricted functionality and operator control. The inverters can continue to be controlled via display/keys, Controlbox, and FDS Tool.
When a PROFIBUS system is commissioned, the manuals/commissioning instructions of all involved components (DP master/controller, additional slaves, etc.) must be adhered to. If additional information on the PROFIBUS or PROFIDRIVE profile is required, extensive literature can be accessed at or ordered from the PROFIBUS user organizations under *www.profibus.com*.

2 INSTALLATION OF KOMMUBOX / OPTION BOARD

2.1 INSTALLATION FOR FAS/FDS



POSIDRIVE®
FDS 4000

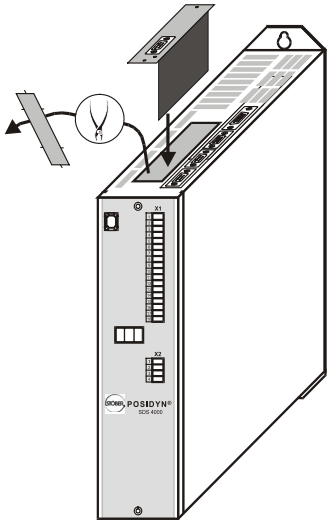


POSIDRIVE®
FAS 4000

Only use special STÖBER cable here. Failure to do so may destroy the FAS/FDS.
See chap. 9.9 of the documentations for:
- **POSIDRIVE®** FDS 4000 (pupl. no. 441408)
- **POSIDRIVE®** FAS 4000 (pupl. no. 441581)

1. Turn off the 400 V and the 24 V power supply via the option board.
   Insert Kommubox on plug connector X3 (9-pin sub D) on the front of the FAS/FDS. To secure, tighten the screw on the top (FAS) or right-hand (FDS) side of Kommubox.
2. Kommubox requires no separate voltage supply. It is powered by the sub D plug connector of the FAS/FDS.

2.2 INSTALLATION FOR SDS



1. **Turn off** both the 400 V and the 24 V power supply of the SDS.
2. **Remove** the housing cover by pinching out the 6 metal cutouts.
   Do not saw! Do not allow metal shavings to penetrate the device!
3. Carefully slide the **SDP 4000** option board into the housing of the SDS until the three-row plug connector of the board is securely connected to the device. Caution! **Adhere to ESD regulations.** Avoid overvoltage when touching the board!
   First touch PE and the metallic housing of the SDS, and then the board!
4. Secure metal cover of the option board to the housing of the SDS with two **M3 screws**.
5. The option board does **not** require an additional voltage supply.

3 ELECTRICAL INSTALLATION

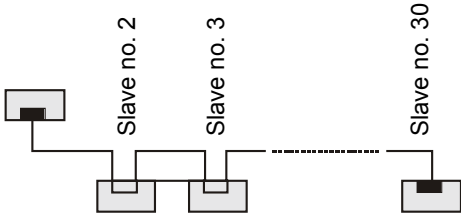
3.1 GENERAL LAYOUT OF A PROFIBUS SYSTEM

PROFIBUS is the bus system for communication in a wide variety of applications in production, process and building automation. This system is available in three versions - PROFIBUS-FMS, PROFIBUS-DP and PROFIBUS-PA. PROFIBUS-DP offers high-speed cyclic communication of small amounts of data. This system usually has one or two masters and up to 124 slaves. The master is the active station on PROFIBUS. It can send or request data to/from other stations. The slaves are the passive stations on PROFIBUS. They only exchange data when the master requests. This bus system is normally designed with shielded, two-wire cables (RS 485). It can also be designed with fiber-optic conductors for special applications. STÖBER Antriebstechnik offers the link to the two-wire cable. This covers a maximum distance of 10,000 m. If suitable measures are provided on the master side, slaves can be added or removed during operation without interrupting data communication on the bus.

3.2 POSSIBLE LAYOUTS

PROFIBUS-DP consists of at least one bus segment. A segment is comprised of at least two stations which are all physically connected with a bus cable. One of these stations is the master. A bus segment consists of up to 32 stations. The beginning and end of the bus must be equipped with terminating resistors.

Layout of a bus system with one segment:

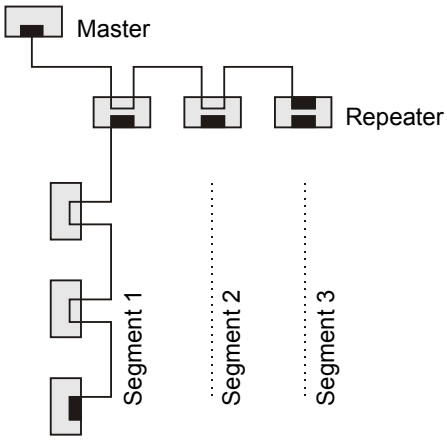


Station (master or slave)

Station with terminating resistance

Layout of a bus system with several segments:

If more than 32 stations are to be operated on one bus or the maximum line lengths of a bus segment are exceeded, several bus segments must be coupled with RS 485 repeaters.
With each repeater, the maximum number of masters and slaves within a bus segment must be reduced by one. However, the number of masters and slaves in the total bus system remains 126.



The maximum line length depends on the baud rate used. The table shows the maximum lengths for one segment and for all segments.

Baud Rate	One Segment	Over All Segments
9.6 to 187.5 kBaud	1000 m	10000 m
500 kBaud	400 m	4000 m
1.5 Mbaud	200 m	2000 m
3 to 12 Mbaud	100 m	1000 m

The length informations only apply when a suitable bus cable is used.

3.3 SUITABLE BUS CABLE

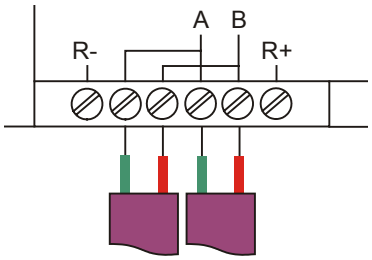
To achieve the above baud rates and distance without interference or faults, we recommend the type A cable described in PROFIBUS literature.
Cable specifications for type A cables for PROFIBUS-FMS and PROFIBUS-DP

Wave resistance:	135 to 165 Ohm, at a meas. frequency of 3 to 20 MHz
Cable capacity:	< 30 pF per meter
Core cross section:	> 0.34 mm²
Cable type:	Twisted pair
Loop resistance:	< 110 Ohm per km
Signal attenuation:	Max. of 9 dB over entire length of the cable section
Shielding:	Braided copper shield or braided shield and foil shield

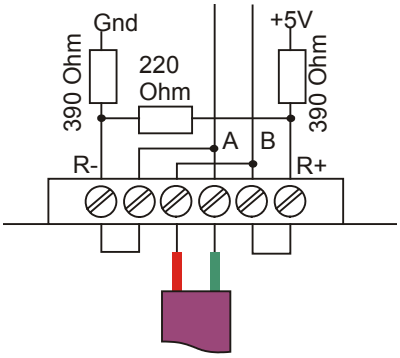
Use of other types of cables is not recommended since this might lower baud rates and reduce distances.

3.4 CONNECTION OF BUS CABLE TO KOMMUBOX FAS/FDS

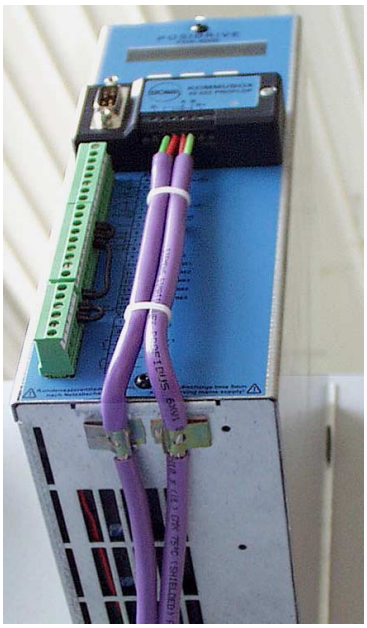
With **POSIDRIVE**® FDS 4000, the bus cables are screwed to the terminal strip of Kommubox. With devices located within the bus branch, the incoming and outgoing lines are connected to contacts A and B. A separate screw terminal can be used for each core. The terminals are jumpered internally. Contacts R- and R+ are not required here!



With devices which are located at the beginning or end of the bus branch, only one bus cable is connected. In this case, the terminating resistors must be circuited.
Kommubox is already equipped internally with the resistor combination 390/220/390 Ohm. It must only still be contacted with two wire jumpers on R+ and R-.



Two (2) centimeters of the bus cable insulation is bared about 12 cm (FDS) or 22 cm (FAS) before the end of the cable. The now visible shield is clamped under the EMC clip on the bottom of the FDS's housing. This ensures a large-surface connection between shield and PE.

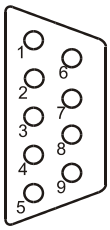


☞ Kommubox is powered from the FAS/FDS. If the power network is turned off on the FAS/FDS and there is no option board with external 24 V power, this Kommubox is no longer part of PROFIBUS-DP (however, this does not interfere with the rest of the bus).

Tip: Option boards with external 24 V power (FDS: *GB4001*, *EA4001*, 24 V supply / FAS: 24 V-LC) allow full fieldbus access even when the network voltage is missing! We recommend externally powering inverters with activated terminating resistance. See also note at the end of chap. 3.5.

3.5 CONNECTION OF BUS CABLE TO SDS

For connection of PROFIBUS-DP, the **SDP 4000** option board is equipped with a 9-pin sub D socket connector with the pin allocation specified in the PROFIBUS standard.



Plug conn. allocation PROFIBUS-DP

3: TxD/RxD (P) = B
4: RTS
5: DGND
6: VP
8: TxD/RxD (N) = A

To connect the bus cable(s), we recommend using suitable bus connection plugs offered by various vendors especially for PROFIBUS-DP.
The incoming **and** outgoing bus cable can be inserted and screwed down in this plug connector. There is no outgoing bus cable for the last station. In this case, the sliding switch on the plug connector is set to *"on"* thus circuiting the bus terminating resistors.

Note: To ensure that this bus connection functions correctly, the supply voltage may not fail on the stations with circuited terminating resistors!
To circumvent the risk of a total bus failure when the last station fails, active bus terminating components can also be used.

4 CONFIGURATION OF THE BUS SYSTEM

4.1 GSD FILES

When commissioning PROFIBUS-DP, it is not sufficient to just wire all bus stations. The following additional measures are also required.

- Different bus addresses must be set on the master and on all slaves.
- With older slaves which are unable to find the baud rate automatically, the same baud rate must be set as on the master. (Kommubox PROFIBUS-DP and option board PROFIBUS-DP are able to find the baud rate automatically.)
- In addition, the master must be informed of the number of slaves (with characteristics and bus addresses) which are connected.

The baud rate must be set on the master, based on the segment lengths and the total distance of the bus.
On the master side, this is done with configuration software. The device master files (GSD files) of all stations must be read in by this software. The GSD files are electronic data sheets containing information on PROFIBUS characteristics such as supported baud rates, supported modules, and so on. They are provided by the manufacturer of each PROFIBUS device.
The GSD file for the **POSIDRIVE**® FAS 4000 / FDS 4000 with Kommubox DP is called *STOE4000.GSD*. The GSD file for the **POSIDYN**® SDS 4000 with option **SDP-4000** is called *STOE4001.GSD*. These files can be downloaded from the Internet under www.stoeber.de.

4.2 PROCESS DATA OBJECT PARAMETER (PPO)

When user data are transferred over PROFIBUS-DP, the FAS/FDS with Kommubox and the SDS with option board adhere to the specifications of the profile for variable-speed drives - PROFIDRIVE. There the user data are divided into process data (PZD) which are used for process management and, if necessary, requested data which are used for parameter communication (PWK = parameter identifier value). The profile offers five different types for the organization of this user data structure. They are known as PPO types 1 to 5 (PPO = parameter process data object). The FAS/FDS with Kommubox and the SDS with option SDP/SEA + DP 4000 support PPO types 1 to 4, starting with SW version 4.5. All earlier versions only support types 1 + 3.

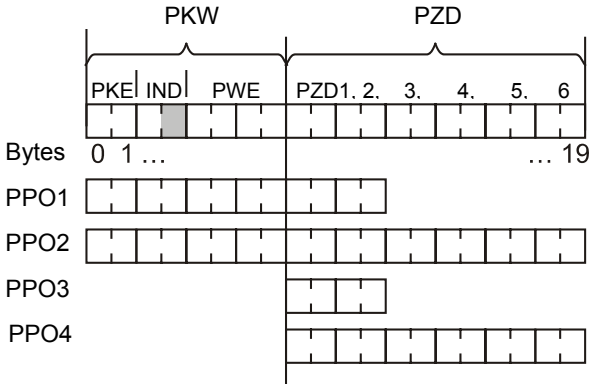
The following valid configurations are available.

Configuration
Modules="PPO 1: 4 PKW | 2 PZD“
Modules="PPO 2: 4 PKW | 6 PZD“
Modules="PPO 3: 2 PZD“
Modules="PPO 4: 6 PZD“
Modules="PPO 2: 4 PKW | 6 PZD consistency 2 words“
Modules= "PPO 4: 6 PZD consistency 2 words“

The same PKW area must be used for all types. Only the PZD area has differences.
For improved adaptation to different controllers, two additional modules were set up for PPO 2 + 4 in which the data consistency covers only 2 words instead of 6 words. This means that 3 double words are available for the PZD. This makes it possible to address PZD data directly in the I/O area of the controller if its address scope permits (S7-400 or similar).

When setting the process data assignment **A110**, ... (see chap. 7.1) of the data to be transferred, make sure that the data are selected with double-word lengths first and then these with single-word length. If not, inconsistent data will cause malfunctions.

The above information can be disregarded if you are using data consistency with 6 words. If you are using SIMATIK controllers or similar, make sure that the data are transferred in blocks. The data must be transferred to a data area in whole blocks and cannot be accessed by bit/word.



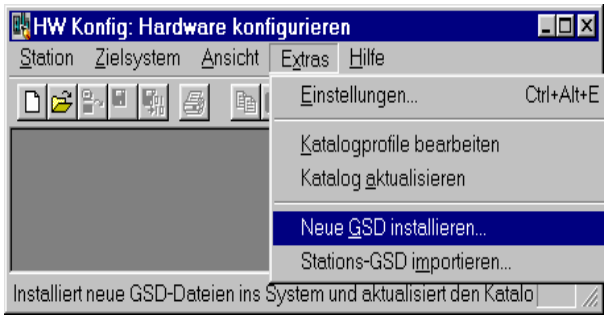
PKW: Parameter identifier value
PZD: Process data
PKE: Parameter identifier
IND: Subindex in byte 2; byte 3 is reserved.
PWE: Parameter value

4.3 CONFIGURATION WITH SIMATIC MANAGER

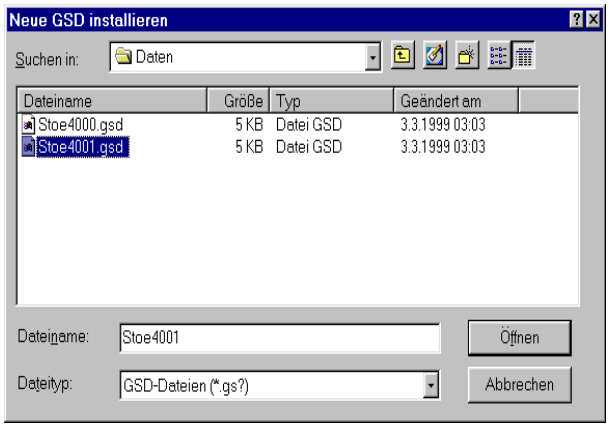
Since different configuration software tools are used for different PROFIBUS masters, an example of the SIMATIC Manager for the S7 (version 5) is explained here. Other tools require other procedures.

In all cases, read and adhere to the appropriate documentation of your master and the configuration software.

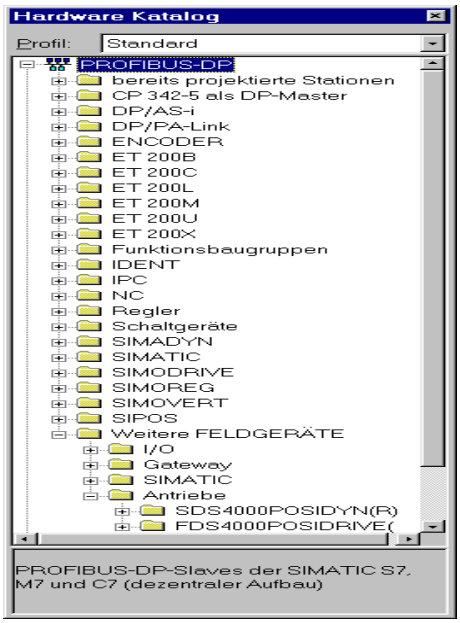
Download the GSD files from the Internet, and store them locally. Starting with the SIMATIC Manager, change to the hardware configuration, and then call the menu item "*Extras/Neue GSD installieren.*"



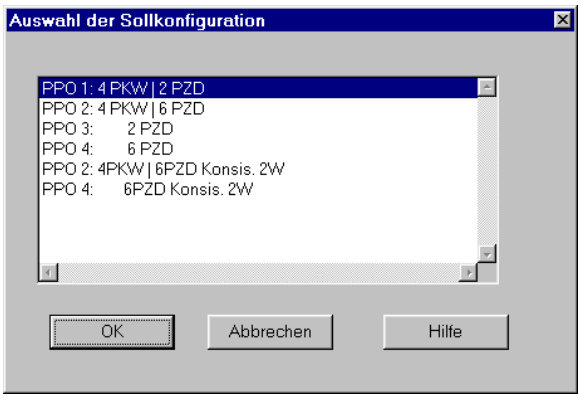
In the dialog screen which appears, specify the directory from which the GSD file is to be installed.



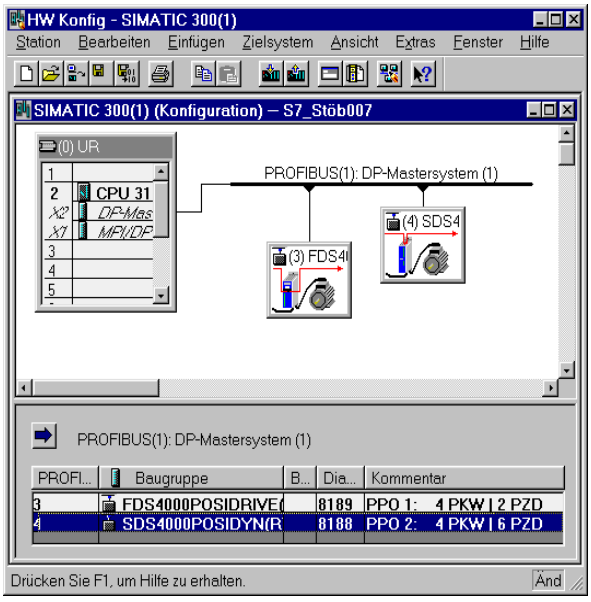
After this installation procedure, the appropriate slave can be linked to an S7 project. After a project has been opened or a new one has been created, the new slave(s) can be added to the project. To do this, click the device (FAS, FDS or SDS) in the folder "*weitere Feldgeräte\Antriebe*" of the hardware catalog, and drag and drop it to the PROFIBUS line in the project screen.



The dialog screen for selecting the desired configuration now appears. Four different PPO types are available, from which you can select a configuration.

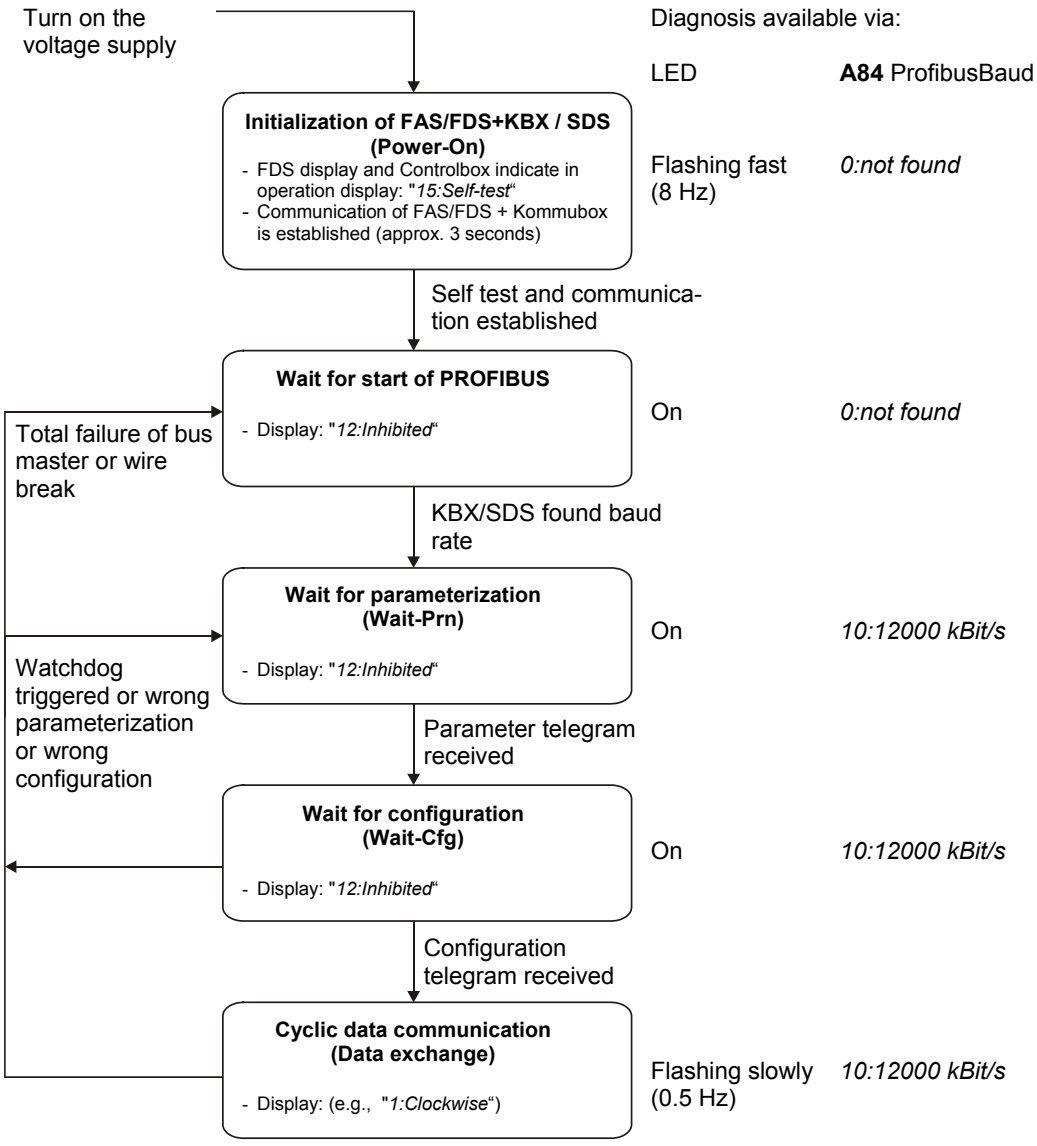


The PROFIBUS address of the slave must then be specified. The system automatically specifies the I/O addresses under which the slave is addressed from the S7 program.
The following figure shows an example of how a configuration might look.



4.4 DIAGNOSIS OF PROFIBUS-DP ON THE DEVICE

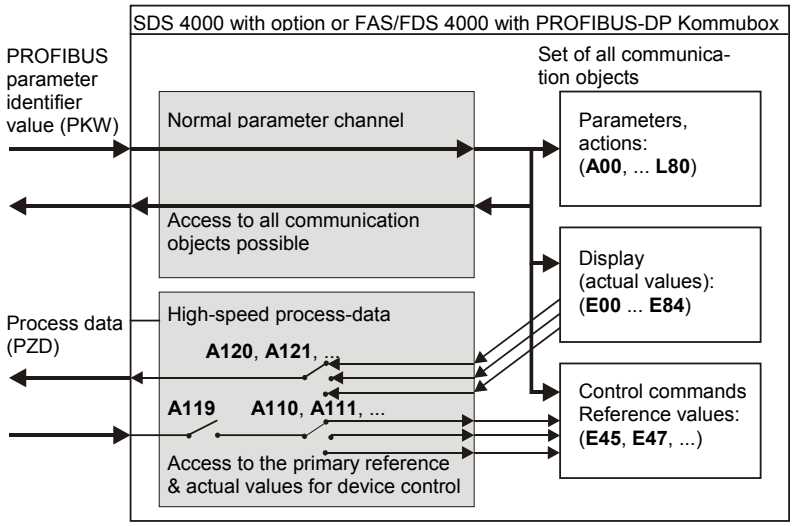
Commissioning of the bus is supported by an LED on the Kommubox/option board and by the menu display **A84** (PROFIBUS baud). No matter which baud rate is selected by the PROFIBUS master, Kommubox and the SDP 4000 option support all baud rates up to 12 Mbaud and are able to automatically detect the baud rate and indicate on the display and in FDS-Tool (Kommubox, 12 Mbaud).
The following flowchart shows the state machine of the PROFIBUS slave on the Kommubox/option board during startup and operation on the bus.



Using Controlbox and FDS Tool, you can now monitor on the FDS's display whether the parameters or process data sent to the device have actually arrived. (With the default setting, the process data reference values in **E45** (control word) and **E47** (n-field-bus) arrive). Using this method, errors (e.g., wrong slave addresses or I/O memory areas on the master) can be found quickly.

5 DATA TRANSMISSION VIA PROFIBUS-DP

Two different methods of transmission are available to exchange data between master and inverter.
The display values of the slave can be read with the parameter channel, and all parameters can be read and changed. The PKW routine specified by PROFIDRIVE is used for this.



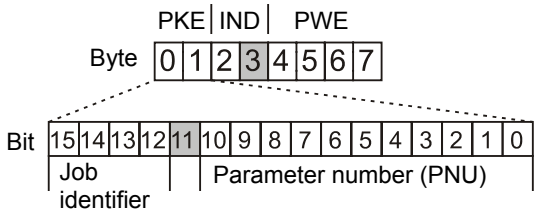
The process data channel quickly transmits data which are used to control and monitor the running process and which require particularly short transmission times. When the bus system is configured, selection of the PPO type (→ see chap. 4.2) specifies whether the parameter channel will be used and how many bytes the process data channel will contain.

The following **transmission times** show the throughput times via the PROFIBUS interface and of the inverter.

Transmission Channel	FAS/FDS with PROFIBUS Kommubox	SDS with SDP-4000 Option
Process data ref. val. - from the bus to processing on the device	Approx. 2 to 10 msec	Approx. 1 to 4 msec (normal reference value) for **A100**=1 AND **D99**=1 fast ref. val. ≤ 1 msec
Complete processing of a PKW service	Approx. 50 to 75 msec **Exceptions:** • Writing process block 1 and changes of **C60** can take much longer • Reading **E30**, **E31** - approx. 150 msec	Approx. 20 to 40 msec **Exceptions:** Writing process block 1 and changes of **C60** can take much longer

6 PARAMETER COMMUNICATION WITH PKW ROUTINE

If PPO type 1 or 2 is selected when PROFIBUS-DP is configured, the parameter identifier value (PKW) routine defined by PROFIDRIVE is available for parameter communication. All parameters, displays, and inverter actions can be accessed. The parameter is selected with the parameter number and subindex. The values for parameter number and subindex are listed for each parameter in chapter 9.



PKE: Parameter identifier, Bit 11 is reserved.
IND: Subindex in byte 2; byte 3 is reserved.
PWE: Parameter value

The two-byte parameter identifier contains the bits for the parameter number, and the job and response identifier (the SPM bit for spontaneous message processing is not supported).
The master sends the job identifier, the parameter number, the subindex and, for write-accesses, the new value to the inverter. The inverter then responds with the response identifier, parameter number, subindex and, for read-accesses, the current value. All values are shown on the PROFIBUS as double words (4 bytes in length). This means that the master no longer has to detect and distinguish between bytes, words and double words.

The job identifier is used to distinguish between reset, write and read jobs. The master (PLC) must repeat the same job at least until the appropriate response arrives from the slave.

Job Identifier	Meaning
0	No job (reset job)
1	Request parameter value (read)
3	Change parameter value (write)
Rest	Do not use!

The inverter replies to the same bit positions with the response identifier. The response identifier remains unchanged until the current job is finished. The response identifier must be kept constant during this time.

Response ID	Meaning
0	No response or also: OK for job identifier "*kein Auftrag*"
2	Parameter value transferred (sent to master)
7	Job cannot be executed.

The inverter deletes all response bytes together with response identifier 0. With job identifier 2, the parameter number and the subindex from the job are echoed in the response. The slave continues to send the complete response until the master formulates a new job. When the display values of the slave are read-accessed, the slave cyclically sends new current values until the master formulates a new job.

If the slave responds with 7: Auftrag nicht ausführbar, the least significant byte of the parameter value (PWE) (i.e., byte 7) contains the appropriate error number.

Error Number	Meaning
0	Illegal parameter number
1	Parameter value cannot be changed.
2	Upper or lower limit exceeded
3	Illegal subindex
17	Write-access not permitted in current operating state (enable is off!)
101	Wrong job identifier (vendor-specific)
102	Internal communication with inverter faulty (vendor-specific)
103	Read-access not permitted (vendor-specific)

Other rules for job/response processing:

- The job identifier "*kein Auftrag*" must be sent for a short time to ensure that the inverter with the PROFIBUS interface always stops responding to the last job and is available for the next job.
- Transmission on the bus is in Motorola format (Big-endian). The high parameter value is sent first, both within one word and as the words within one double word.
- If no information is required from the PKW interface during cyclic operation, the job identifier should be set to "*kein Auftrag.*"

6.1 CONSISTENCY

Since PROFIBUS-DP sends all bytes from the address area of the PLC to the stations cyclically and asynchronously to the PLC cycle, the PLC program must also ensure that data are consistent. All 8 PKW bytes must be consistent for parameter communication with the slave. STEP7 from Siemens offers the system functions SFC13, 14 and 15 for this job. If such functions cannot be utilized, a special time sequence must be adhered to when writing the bytes.

6.2 TIME SEQUENCE FOR A PKW ROUTINE

The following example shows how to change the parameter **D00** (reference value accel) from parameter set 1 to the value 300 msec/3000 rpm with a controller which supports transfer commands for the 16-bit format.

Look up values from the parameter list: PNU = $1060_{dec} = 424_{hex}$, subindex = 0 (→ see chapter 9).
Parameter value $300_{dec} = 12C_{hex}$.

Step	Set PLC Output Bytes (xx = Old Contents)	Explanation
1	`Byte:  0  1  2  3  4  5  6  7` `Hex val: 00 00 00 00 xx xx xx xx`	**Delete** job identifier and reserved byte 3.
2	`Byte:  0  1  2  3  4  5  6  7` `Hex val: 00 00 00 00 xx xx xx xx`	**Wait** until the input bytes of the slave contain the response identifier 0. Mask out bits 4 to 7, and check for 0. The PNU of the last job may still be in byte 1 and the other bits. Wait time depends on the bus rotation time (number of stations).
3	`Byte:  0  1  2  3  4  5  6  7` `Hex val: 00 00 00 00 00 00 01 2C`	Expand parameter value $12C_{hex}$ to 4 bytes and enter in **bytes 4 to 7**.

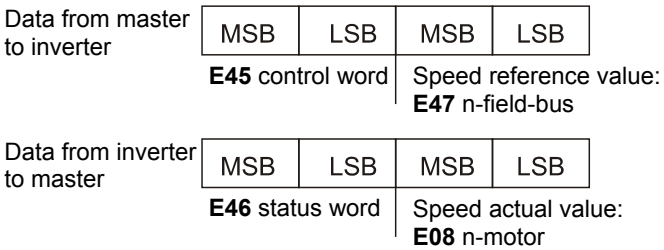
Step	Set PLC Output Bytes (xx = Old Contents)	Explanation
4	Byte: 0 1 2 3 4 5 6 7 Hex val: 00 00 01 00 00 00 01 2C	Enter subindex 1 in byte 2.
6	Byte: 0 1 2 3 4 5 6 7 Hex val: 34 24 00 00 00 00 01 2C	Enter **parameter number** 424_{hex} in bits 0 to 10 of the PKE. Enter **job identifier** in bits 12 to 15. Bit 11 remains 0.
7	Byte: 0 1 2 3 4 5 6 7 Hex val: 34 24 00 00 00 00 01 2C	**Wait** until a response arrives in input byte. Example: Byte: 0 1 2 3 4 5 6 7 Hex val: 24 24 00 00 00 00 00 00 The 2 in byte 0 marks the **response identifier**. "Transfer parameter value" and the new value is accepted correctly by the slave.
8	Byte: 0 1 2 3 4 5 6 7 Hex value: 00 00 00 00 00 00 xx xx	**Delete job identifier** again to shorten the wait time for the next PKW service.

7 PROCESS DATA ASSIGNMENT

The master sends the reference values with the process output data to the slaves (FAS, FDS or SDS) on the process data channel (PZD). The slaves respond with the actual values of the process input data.

Example:

Layout of process data (PZD)



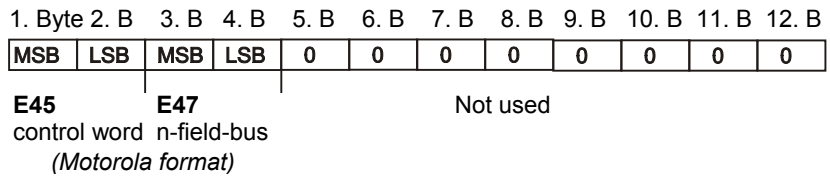
The definition of the data which are transferred by the process data channel (PZD) is called process data assignment. The FAS/FDS with PROFIBUS Kommubox and the SDS with the **SDP-4000** option support flexible assignment of communication objects (parameter and display values) to the process data. If the drive is to be exclusively controlled via PROFIBUS in speed mode, the controller offers control words/status words and speed reference values/actual values. These communication objects are assigned to the process data (default setting). If this is the case, the assignment does not need to be changed, and you can skip this chapter.
If the drive uses posi mode or the controller of the inverter uses both PROFIBUS-DP and terminals, the inverter can be controlled in a wide variety of ways with the parameters and indications **E100** to **E128**. If this is the case, we recommend transmitting these communication objects via the high-speed process data channel and not via the PKW routine, and then adjusting the assignment accordingly.

7.1 PROCESS OUTPUT DATA ASSIGNMENT

The length of the process output data is 4 bytes or 12 bytes. The number of process data bytes is selected when PROFIBUS is configured. After the new GSD file is read in, one of the four possible PPO types can be selected as the configuration (e.g., PPO type 1 has 4 bytes of PZD and PPO type 2 has 12 bytes of PZD). The data to be transferred are specified with the parameters **A110** to **A113** in FDS Tool.
Any communication object which can be assigned to process data (see list below) can be assigned to the process data with one of the parameters **A110** to **A113**. All combinations and sequences are permitted. When a parameter is not to be used, it can be set to *"inactive"* with the values 0 or $FFFFFFFF_{hex}$.

⚠ The parameters for the process data assignment can only be set on a PC with FDS Tool or via PROFIBUS-DP.

Default setting of the assignment of the process output data:



Parameters for the process output data assignment:

Name	PNU	Subindex	Use
A110 process output data 0	1000	110	Describes the communication object assigned to the first few bytes of the process output data
A111 process output data 1	1000	111	Describes the communication object assigned to the next bytes. The location of this object within the process data varies depending on the length of the object described by **A110**.
A112 process output data 2	1000	112	Describes the communication object assigned to the next bytes. The location of this object within the process data varies depending on the length of the previous objects.
A113 process output data 3	1000	113	Describes the communication object assigned to the next bytes. The location of this object within the process data varies depending on the length of the previous objects.
A119 proc.output data enable	1000	119	This value must be set to 1 (default setting) before the process output data can be transferred to the inverter. The data must be disabled briefly (set value = 0) so that parameters **A110** to **A113** can be changed.
A130 proc. out length	1000	130	Display value which may only be read. Specifies how many bytes are required for the process output data in the current parameterization. This can be used to check the selection of the PPO type.

Remarks: When the parameters are changed (e.g., with FDS Tool), the inverter contains the new parameters. However, Kommubox must also be "informed" of these changes. This is done by reading at least one process output data parameter or by using **A00** “save parameters" and subsequently turning the inverter off and on.

List of the parameters which can be assigned to process output data (communication objects):

Name	Length in Bytes	Value to be set via PROFIBUS	Value composed of PNU	Value composed of Subindex	Use
inactive	0	$FFFFFFFF_{hex}$ or 0	-	-	Valid selection ! (e.g., for **A112** and **A113** with PPO type 1)
D12 fix reference value 1	2	$04240C00_{hex}$ / 69471232_{dec}	1060	12	Reference value specified via fieldbus and via terminal strip (fixed ref. value 1 from parameter set 1)
E45 control word	2	$04382D00_{hex}$ / 70790400_{dec}	1080	45	Control commands in acc. w. CiA/DS-402 / DRIVECOM
E47 n-field-bus	2	$04382F00_{hex}$ / 70790912_{dec}	1080	47	Speed reference value in acc. w. CiA/DS-402 / DRIVECOM
E101 control bits	4	04386500_{hex} / 70804736_{dec}	1080	101	32 control bits for mixed operation
E102 torque-limit	2	04386600_{hex} / 70804992_{dec}	1080	102	Torque limit
E103 power-limit	2	04386700_{hex} / 70805248_{dec}	1080	103	Power limit
E104 additional RV	2	04386800_{hex} / 70805504_{dec}	1080	104	Additive offset reference value
E105 RV-factor	2	04386900_{hex} / 70804760_{dec}	1080	105	Multiplicative offset value
E106 posi.override	2	$04386A00_{hex}$ / 70806016_{dec}	1080	106	Factor for posi speed
E107 posi.offset	4	$04386B00_{hex}$ / 70806272_{dec}	1080	107	Offset for reference position. Scaling as w. every target position in **I05** * 10^{I06}
E108[1] wind. diameter	2	$04386C00_{hex}$ / 70806528_{dec}	1080	108	Measured value for winding diameter
E109[1] M-rot.magnet	2	$04386D00_{hex}$ / 70806784_{dec}	1080	109	Torque setting / rotation field magnet (not with FAS)
E110[1] analog output 1	2	$04386E00_{hex}$ / 70807040_{dec}	1080	110	Output of analog voltage 1 for **F40**=0. Is affected by **F41**, **F42** and **F43**.
E111 BA2	1	$04386F00_{hex}$ / 70807296_{dec}	1080	111	Direct switching of relay 2/BA2 and other BA when applicable parameters for BA function (**F80** to **F86**) are set to *0:inactive*
E112[1] BA1	1	04387000_{hex} / 70807552_{dec}	1080	112	
E113[1] BA3	1	04387100_{hex} / 70807808_{dec}	1080	113	
E114[1] BA4	1	04387200_{hex} / 70808064_{dec}	1080	114	
E115[1] BA5	1	04387300_{hex} / 70808320_{dec}	1080	115	
E116[1;2] BA6	1	04387400_{hex} / 70808576_{dec}	1080	116	
E117[1;2] BA7	1	04387500_{hex} / 70808832_{dec}	1080	117	
E118[1;2] analog output 2	2	04387600_{hex} / 70809088_{dec}	1080	119	Output of analog voltage 2 (only with SDS) for **F45**=0. Is affected by **F46** and **F47**.

Name	Length in Bytes	Value to be set via PROFIBUS	Value composed of PNU	Subindex	Use
E119 reference value	2	04387700_{hex} / 70809344_{dec}	1080	119	Speed/torque reference value on input of ref. val. characteristic curve Use depends on **C60**.
E120[1] tension reduction	2	04387800_{hex} / 70809600_{dec}	1080	120	Tension drop (dependent on diameter) for winder software
E121[1] PID-reference	2	04387900_{hex} / 70809856_{dec}	1080	121	Reference value for PID controller
E122[1] winder-roller	2	$04387A00_{hex}$ / 70810112_{dec}	1080	122	Roller position for winder software
E123[1] sync.offset	4	$04387B00_{hex}$ / 70810368_{dec}	1080	123	Winding offset of slave axis in relation to master
E125[1] synchron n-RV	2	$04387D00_{hex}$ / 70810880_{dec}	1080	125	Speed pre-control for winding synchronous run in rpm (**A100**=0)
E126 n-Max	2	$04387E00_{hex}$ / 70811136_{dec}	1080	126	Limitation of the max. speed
P1.G14[1] begin.winding diameter	2	$04600E00_{hex}$ / 73403904_{dec}	1120	14	**G14** in parameter set 1
P2.G14[1]	2	$06540E00_{hex}$ / 106171904_{dec}	1620	14	**G14** in parameter set 2

[1] not available with FAS [2] not available with FDS

All parameters listed here can also be accessed with the PKW routine.
Please remember: When a parameter is transferred with PZD and PKW, the cyclic PZD overwrites the PKW value of the parameter.

E45 control word and **E47** n-field-bus (default setting) are only effective when **A30** operation input is set to "*2:field-bus*."
If you are using **E100** and **E101** via PROFIBUS, we recommend setting **A30** to "*0:ctrl.inter."*

7.2 PROCESS INPUT DATA ASSIGNMENT

The length of the process input data is also 4 bytes or 12 bytes. The number of process data bytes is selected during configuration of PROFIBUS. After the new GSD file has been read in, one of the four possible PPO types can be selected as the configuration (e.g., PPO type 1 has 4 bytes of PZD and PPO type 2 has 12 bytes of PZD). The data to be transferred are specified with the parameters **A120** to **A123**.
Any communication object which can be assigned to process data (see list below) can be assigned to the process data with one of the parameters **A120** to **A123**. All combinations and sequences are permitted. When a parameter is not to be used, it can be set to *"inactive"* with the values 0 or $FFFFFFFF_{hex}$.

The parameters for the process data assignment can only be set on a PC with FDS Tool or via PROFIBUS-DP.

Default setting of the assignment of the process input data:

1. Byte	2. B	3. B	4. B	5. B	6. B	7. B	8. B	9. B	10. B	11. B	12. B
MSB	LSB	MSB	LSB	0	0	0	0	0	0	0	0
E46 Status word		**E08** Actual speed		Not used							

(Motorola format)

Parameters for the process input data assignment:

Name	PNU	Subindex	Use
A120 process input data 0	1000	120	Describes the communication object assigned to the first few bytes of the process input data
A121 process input data 1	1000	121	Describes the communication object assigned to the next bytes. The location of this object within the process data varies depending on the length of the object described by **A120**.
A122 process input data 2	1000	122	Describes the communication object assigned to the next bytes. The location of this object within the process data varies depending on the length of the previous objects.
A123 process input data 3	1000	123	Describes the communication object assigned to the next bytes. The location of this object within the process data varies depending on the length of the previous objects.
A132 proc. in. length	1000	132	Display value which may only be read. Specifies how many bytes are required for the process input data in the current parameterization. This can be used to check the selection of the PPO type.

The coding of these parameters is the same as that of the parameters for the process output data assignment except that no switch is required for the process data enable.

List of the parameters which can be assigned to process input data (communication objects):

Name	Length in Bytes	Value to be set via PROFIBUS	Value composed of: PNU	Subindex	Use
inactive	0	$FFFFFFFF_{hex}$ or 0	-	-	Valid selection ! (e.g., for **A112** and **A113** with PPO type 1)
E02 M-motor	2	04380200_{hex} / 70779392_{dec}	1080	2	Current motor torque
E08 **n-motor**	2	04380800_{hex} / 70780928_{dec}	1080	8	Actual speed value in acc. w. CiA/DS-402 / DRIVECOM
E08 n-motor smoothed	2	$062C0800_{hex}$ / 103548928_{dec}	1580	8	Actual speed value smoothed
E10 analog input 1	2	$04380A00_{hex}$ / 70781440_{dec}	1080	10	Level on analog input 1/2 without effects of **F21**-F24 / **F26- F27**. ±10V = ±100%=±8192
E11[1] analog input 2	2	$04380B00_{hex}$ / 70781696_{dec}	1080	11	
E16[1] analog output 1	2	04381000_{hex} / 70782976_{dec}	1080	16	Level on analog output 1 after inclusion of **F41**, **F42, F43**
E19 BE15...BE1 & enable	2	04381300_{hex} / 70783744_{dec}	1080	19	Level of all binary inputs
E27 BA15..BA1 & Relais 1	2	$04381B00_{hex}$ / 70785792_{dec}	1080	27	Level of all binary outputs
E28[1;2] analog output 2	2	$04381C00_{hex}$ / 70786048_{dec}	1080	28	Level on analog output 2 (only SDS) after inclusion of **F46**, **F47**
E46 **status word**	2	$04382E00_{hex}$ / 70790656_{dec}	1080	46	Status word in acc. w. CiA/DS-402 / DRIVECOM
E100 status bits	4	04386400_{hex} / 70804480_{dec}	1080	100	Summary of internal status signals
E127 BE-encoder-position	2	$04387F00_{hex}$ / 70811392_{dec}	1080	127	Increment number of encoder on BEs
E128[1] X20-encoder-position	2	04388000_{hex} / 70811648_{dec}	1080	128	Increment number of encoder on X20.
E131 Posi next latched	4	04388300_{hex} / 70812416_{dec}	1080	131	Actual position for rising posi-next edge within one process block chain. Only takes effect for limited traversing range. Only with FAS (starting SV 4.5 E).
E132[1] SSI raw value	4	04388400_{hex} / 70812672_{dec}	1080	132	Raw value of SSI encoder in 1/4096 r.
G19[1] act. winding diameter	2	04601300_{hex} / 73405184_{dec}	1120	19	Actual winding diameter
I80 actual position	4	04885000_{hex} / 76042240_{dec}	1160	80	Actual position
I84 following error	4	04885400_{hex} / 76043264_{dec}	1160	84	Following error
I88 posi speed	4	04885800_{hex} / 76044288_{dec}	1160	88	Speed during positioning

[1] not available with FAS [2] not available with FDS

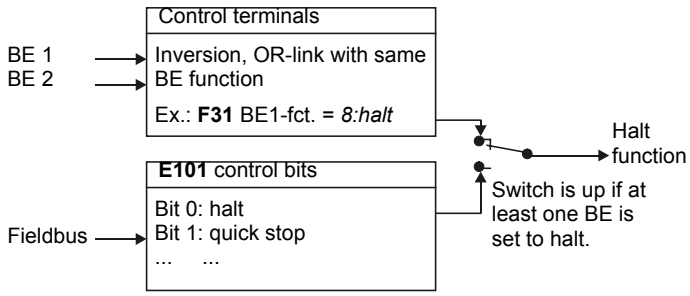
8 CONTROL WITH CONTROL- AND STATUS BITS

Controlling the inverter with **E101** control bits and **E100** status bits makes possible the flexible utilization of the wide range of capabilities offered by the inverter (FAS, FDS and SDS) such as positioning mode, synchronous operation, winder control and even simple speed control with fixed reference values.
Tip: The following setting is recommended for this: **A110**=**E101**, **A120**=**E100**, **A30**=0.
The parameters **A30** (operation input), the process output data assignment parameters **A110, A111, A112, A113**, and the functions of the binary and analog inputs (e.g., **F31** BE1-function) determine which signals are used to control the inverter. These parameters can be used to specify whether a control signal of an input is sent from the terminal strip or the fieldbus.

We recommend using the **E101** control bits to set parameter **A30** (operation input) to *"0:ctrl.inter."* This provides an easy way to control the device's state using the additional enable (bit 6 in **E101**) and the acknowledgment (bit 3 in **E101**).
Assignment of the control and status bits to the process input and output data requires that one of the process output data parameters **A110, A111, A112, A113** be set to **E101** (control bits) and one of the process input data parameters **A120, A121, A122, A123** be set to **E100** (status bits).

8.1 SPECIFICATION OF THE SOURCE FOR CONTROL SIGNALS

One of the 32 functions (e.g., halt, posi start) can be assigned to each binary input of the control terminal strip (see parameter **F31**, **F32** and so on, FAS documentation, publ. no. 441581, FDS documenation, publ. no. 441408 and SDS documentation, publ. no. 441449).
Each control signal which was not assigned to a binary input can be addressed via fieldbus (**E101** control bits). One of the 14 functions can be assigned to the analog inputs.
(See parameter **F20** and **F25** in the above documentation.)
The missing functions can be specified via fieldbus (e.g., **E102** torque limit,...).



8. Control with control- and status bits

The binary and analog signals from the terminal strip have priority over specification via fieldbus!

Meaning of the bits in E101 control bits:			
Bit	Name	Meaning for Bit = 1	**F31***
0	halt	Drive is decelerated to standstill on selected ramp. Then brake is applied if activated by **F00** or **F08**. Manual traversing (tip) is now possible. (Allow min. of 4 msec pause until manual traversing, *posi-start, ...*).	*8*
1	quick stop	At change from 0→1, drive is decelerated at **D81** (decel-quick). Then brake is applied if activated by **F00** or **F08**. Short pulse (≥ 4 msec) is sufficient to trigger brake. Quick stop can be terminated with **F19**=1.	*9*
2	ext.fault	At rising edge, inverter assumes fault *"44:ext.fault."*	*12*
3	fault reset	Rising edge acknowledges fault if cause no longer exists.	*13*
4	wind.setD-ini	The current value of the winding diameter is set to **G14** (wind.setD-ini).	*29*
5	parameter set-select	0 selects parameter set 1. 1 selects parameter set 2. Parameter set can only be selected if **A41**=0. Selected set does not become active until enable is removed.	*11*
6	additional enable	Additional enable (must be on together with enable X1.x) to enable inverter. (Allow pause of at least 4 msec until manual traversing (tip), **posi-start, ...**).	*7*
7	torque select	Switching of torque limit from **C03** M-max 1 to **C04** M-max 2	*10*
8	RV-select 0	Used together with bit 19 (only SDS) to select process blocks or fixed reference values. The bits on RV-select 0 to 4 are interpreted as binary coded numbers. See chapter 10.3 of FAS/FDS/SDS documentation[1] and chapter 4.3 of FAS-Posi-Upgrade documentation (publ. no. 441587).	*1*
9	RV-select 1		*2*
10	RV-select 2		*3*
11	RV-select 3		*30*
12	disable PID-controller	PID controller is disabled, and integrator is reset.	*26*
13	direction of rotation	Negation of the current speed reference value during speed mode	*6*
14	motorpoti up	With **D90**=1, motor potentiometer can be simulated. **D00** and **D01** are used as ramps.	*4*
15	motorpoti down		*5*
16	posi.start	Starts movement (the process block selected with RV-select 0 to 4). Any positioning procedure in progress is terminated, and the new target is approached (changing targets on the fly).	*19*
17	posi.step	Starts movement (same as above but the running positioning procedure is not interrupted). Used primarily for manual block stepping with a process block sequence (cf. **J17**=0).	*16*
18	posi.next	With chained process blocks, the running block is interrupted, and a jump is made to the next block. Important: A braking path may be defined there, for example. The *posi.next* evaluation must be programmed for the specific process block (cf. **J17**=*3:posi.next*.). Otherwise the drive does not react to *posi.next.*	*20*
19	RV-select 4	See bits 8 to 11.	*31*
20	start reference	Change in edge from low to high starts reference traversing.	*24*
21	tip +	Manual traversing (tip) in positive direction. Halt function must be active.	*17*
22	tip -	Manual traversing (tip) in negative direction. Halt function must be active.	*18*
23	brake release	Manual releasing of the brake. Has priority over internal braking function.	*32*
24	stop +	"Stop input" at positive end of the traversing area. In position mode (**C60**=2), "stop input" causes malfunctions. In speed and torque mode, the direction of rotation is disabled.	*21*
25	stop -	"Stop input" at negative end of the traversing area	*22*
26	reference input	Defines the reference position for **I30**=0	*23*
27	synchron free-run	The ref. value for synchronous free run is decoupled. For example, the drive can be handled as desired via **E46**. Speed is adjusted on the current ref. value ramp (e.g., **D00**).	*27*
28	synchron reset	The angle of deviation of synchronous running control is reset.	*28*
29 ... 31	In reserve		-

* This column shows the available selections with the same function for the BE functions (**F31**, ...).

[1] FAS standard documentation (publ. no: 441581)
FDS documentation (publ. no.: 441408)
SDS documenation (publ. no.: 441449)

Meaning of the bits in E100 (status bits):			
Bit	Name	Meaning for Bit = 1	**F00**
0	standstill	Amount of **E08** n-motor < **C40** n-window	*2*
1	refVal-reached	With **C60**=*0:torque:* Operation is enabled. With **C60**=*1:speed*: Amount of (**E06** n-reference value – **E08** n-motor) < **C40** n-window. With **C60**=*2:position*: Changes to 1 when posi controller reaches target position and amount of (**I80** – **I81**) < **I22** is reached. During pauses, bit remains = 1. Changes to 0 when process block or reference traversing was started or axis was shifted out of window **I22** (only if enable=0).	*3*
2	acceleration	Drive is accelerated or delayed.	-
3	standstill ramp reached	Only with **C60**=1: Ramp generator is at zero (±0.5 Hz for FAS/FDS).	-
4	ref. value ramp reached	Only with **C60**=1: Ramp generator has reached reference value.	-
5	ramp diff. > 0	Only with **C60**=1: Ramp generator accelerates.	-
6	torque limit	Drive is at current torque limit during static operation.	*4*
7	Accel. overload	Drive is at torque limit during an acceleration procedure.	-
8	Decel overload	Drive is at the tension limit during a braking procedure.	-
9	relay 1	Relay 1 (ready relay) is closed (no fault, warning, message).	-
10	clockwise (n-motor>0)	**E08** n-motor is positive. During zero crossing, hysteresis with **C40**.	*14*
11	capturing active	Only for FAS/FDS with **C60**=1: FAS/FDS captures running motor.	-
12	skip speed active	Only for FAS/FDS with **C60**=1: Reference value in skip speed range	-
13	load start active	Only for FAS/FDS with **C60**=1: Load start (breakaway) is active.	-
14	active parameter set	0 = parameter set 1 is active. 1 = parameter set 2 is active. The bit changes at the beginning of the parameter-set switch-over. Bit 15 indicates the end of the switchover.	*7*
15	parameters active	0 = not all parameters are available internally. 1 = parameter assignment after write-access with PKW service or change via device menu, parameter set switch-over. Actions are completely executed and active.	*32*
16	referenced	Indicates that the drive is referenced (reference traversing concluded). Only applies when **C60**=2.	*13*
17	electronic cam 1	Actual axis position is between **I60** and **I61**. Only valid when **C60**=2.	*8*
18	operation range	Drive is within the defined operation range (**C41** to **C46**).	*6*
19	posi traversing	Indicates when **E80** operating condition = *"18:moving"* (when a process block was started - not with manual traversing)	-
20	M-motor>0	**E02** M-motor is positive (without hysteresis).	-
21	switch-memory 1	Output of switch memory 1, 2 and 3. Each posi switching point defined in group **N**.. can simultaneously address switch memory 1, 2 and 3.	*19*
22	switch-memory 2		*20*
23	switch-memory 3		*21*
24	RV-ackn.0	Only valid for **C60**=*2:position*. If no *posi.start* or *posi.next* signal is queued, the reference-value-select signals are output **inverted**. Otherwise the active **I82** process block is output. See chapter 10.3 of FAS/FDS/SDS documentation[1] and FAS-Posi-Upgrade documentation (publ. no. 441587) chap. 4.3.	*23*
25	RV-ackn.1		*24*
26	RV-ackn.2		*25*
27	RV-ackn.3		*26*
28	RV-ackn.4		*27*
29	In reserve	-	-
30	posi.active	Is 1 when **E80** (operating condition) = *17:posi.active*. This is true when **C60**=2, and power section is on, and a traversing job can be started (no process block or sequence in progress). This permits a concluded sequence to be indicated. Is also 0 when **E80**=*19:delay* or *20:wait* is indicated.	*10*
31	ready for ref. value	The drive is powered, the brakes are released, and, with the FAS/FDS, magnetization is established.	*22*

* This column shows the available selection with the same function for the BA/relay functions (**F00**, ...).

[1] FAS standard documentation (publ.-no.: 441581)
FDS documentation (publ. no.: 441408)
SDS documenation (publ. no.: 441449)

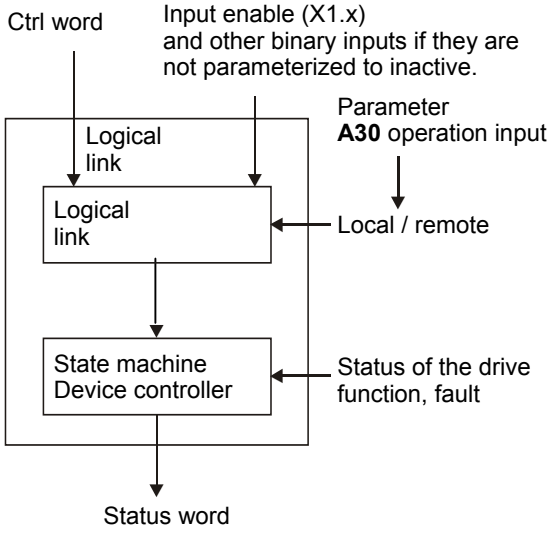
9 CONTROL WITH CONTROL/STATUS WORD AND SPEED REFERENCE/ACTUAL VALUE

Control of the inverter with **E45** control word, **E46** status word, **E47** n-field-bus and **E08** n-motor allows the drive to be controlled with variable speed. This type of control is based on the specifications of DRIVECOM profile 21. It is explained in this chapter.
Tip: The following settings are recommended: **A110**=**E45**, **A111**=**E47**, **A120**=**E46**, **A121**=**E08**, **A30**=*2:field-bus* for FAS/FDS or **A30**=*3:PROFIBUS-DP* for SDS.

Controlling the inverter based on DRIVECOM profile 21 involves specification of the reference value and various control commands for the drive (e.g., turn on, shutdown, and so on).
The "device control" function block processes the control commands. The "speed" function block handles processing of the reference value. The function blocks will now be explained in more detail.
Process data **E45** and **E4**7 of PROFIBUS will not reach the internal memory locations in the device (**E45, E47**) unless **A30**=*3:Profibus DP*.

9.1 DEVICE CONTROL

The "device control" function block controls the entire device function (drive function and power section). A state machine handles the control sequence.
The device control is affected by the "control word" and the following internal signals.
The "local/remote" switch, the status of the drive function and faults.
The device control affects the drive functions. The "status word" is generated from the device state and internal signals and can be read via the fieldbus.



9.2 LOCAL / REMOTE

This internal signal indicates whether the inverter can be controlled by the fieldbus. This signal is set to "remote" when parameter **A30** (operation input) is set to *"3:Profibus-DP"* (SDS) or *"2:Fieldbus"* (FAS/FDS). Other settings set the signal to "local." If the signal is set to "local," the inverter disregards the control commands in the "status word." Regardless of this signal, the inverter can be controlled from terminals and fieldbus (mixed mode).
See chapter 9. This is true when at least one of the parameters for the function of the BEs or **F20** AE2-function is not set to *"0:inactive."*

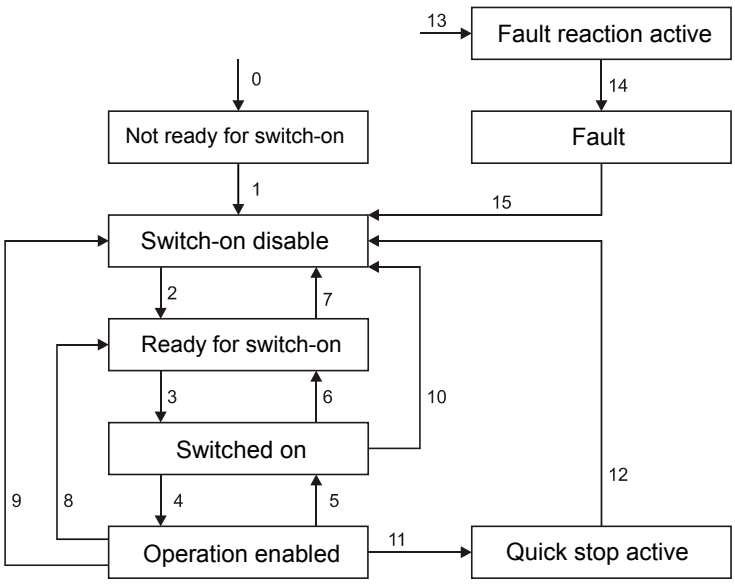
If control is to be exclusively performed via fieldbus, all parameters for the functions of the BEs and for AE2 must be parameterized to *"0:inactive"* in both parameter sets.

9.3 INPUT ENABLE

The binary input enable (X1.x) on the terminals must be addressed with a high level so that the control commands from the "control word" can take effect on the "device control" state machine and the drive can be started. If the input is not high, the drive function is disabled immediately and the power section is turned off. This function can be used to turn off the drive on site.

9.4 "DEVICE CONTROL" STATE MACHINE

The state machine describes the states of the device and the possible control sequence on the drive. A state represents a certain internal and external status. It can only be exited via defined events. Appropriate state transitions are assigned to the events.
The state can be changed with device-control commands and internal events. This can be used to execute a control sequence. The current device state can be read with the "status word."



9.5 STATES OF DEVICE CONTROL

State	Description	Drive Function
Not ready for switch-on	Voltage supply on inverter has just been turned on. Self-test and initialization are running.	Disabled
Switch-on disable	Initialization concluded. Switch-on is disabled.	Disabled
Ready for switch-on	Switch-on is enabled.	Disabled
Switched on	Switch to operation is enabled.	Disabled
Operation enabled	Power section is on. Drive follows the reference value.	Enabled
Quick stop active	Quick stop function. Drive is slowed to standstill.	Disabled
Fault	Power section is off.	Disabled
Fault reaction active	Power section is off.	Disabled

Definitions:

Drive function is disabled: Inverter does not process speed reference value.

Drive function is enabled: Inverter processes speed reference value, and the power section is enabled. (Motor is powered.)

Drive faults: Faults can occur in any state of device control. They always cause a change to the state "fault reaction active." In this state, the inverter turns off the power section immediately and logs the fault in fault memory. After these actions have been executed, a change is made to the "malfunction" state. This state can only be exited with the "fault reset" command. The reason for the fault must have been corrected.

9.6 STATE TRANSITIONS OF DEVICE CONTROL

A change in state only occurs when the actions have been completely performed.
After the actions have been fully processed, the next state is assumed, and new commands are accepted.

State Transition		Event/Commands	Action
0	Input, state machine ➔ Not ready for switch-on	Turn on voltage	Start self-test. Start initialization.
1	Not ready for switch-on ➔ switch-on disable	Self-test okay Initialization okay	None
2	Switch-on disable ➔ ready for switch-on	"Shutdown" command and "enable" input on high	None
3	Ready for switch-on ➔ switched on	"Turn on" command and "enable" input on high	None
4	Switched on ➔ operation enabled	"Enable operation" command and "enable" input on high	Enable drive function
5	Operation enabled ➔ switched on	"Disable operation" command and "enable" input on high	Decelerate drive on the currently selected ramp. Then change to "switched on" state and turn off power section.
6	Switched on ➔ ready for switch-on	"Shutdown" command and "enable" input on high	None
7	Ready for switch-on ➔ switch-on disable	"Quick stop" command or "disable voltage" command or "enable" input on low	None
8	Enable operation ➔ ready for switch-on	"Shutdown" command and "enable" input on high	Disable drive function Turn off power section immediately
9	Enable operation ➔ switch-on disable	"Disable voltage" command or "enable" input on low	Disable drive function Turn off power section immediately
10	Switched on ➔ switch-on disable	"Quick stop" command or "enable" input on low	None
11	Enable operation ➔ quick stop active	"Quick stop" command and "enable" input on high	Drive is decelerated on quick-stop ramp until standstill.
12	Quick stop active ➔ switch-on disable	Quick stop is concluded or "enable" input on low	Disable drive function Turn off power section
13	All states ➔ fault reaction active	Drive fault detected	Turn off power section (motor coasts down). Disable drive function. Store fault on device.
14	Fault reaction active ➔ malfunction	Reaction to fault concluded	None
15	Fault ➔ switch-on disable	"Fault reset" command when fault no longer present	Fault is reset.

9.7 CONTROL WORD

The "control word" and the level of the "enable" binary input use logical links to produce the device-control commands which affect the state machine of the device controller. The control word consists of 16 bits whose meaning is shown below.

Bit Number	Name	Meaning
0	Turn on	Device-control command
1	Disable voltage	Device-control command
2	Quick stop	Device-control command
3	Enable operation	Device-control command
4	Disable HLG (HLG = ramp function generator)	If the bit = 0, the drive is decelerated on the selected ramp (without mixed mode, **D01** RV-Decel). If the bit = 1, the drive is accelerated on the selected ramp (without mixed mode, **D00** RV-Accel).
5	Stop HLG	If the bit = 0, the current output value of the ramp function generator is retained. If the bit = 1, the drive follows the reference value over the ramp function.
6	HLG zero	Same function as bit 4 (disable HLG)
7	Reset fault	Device-control command
8 ... 15	Reserved	

9.8 DEVICE-CONTROL COMMANDS IN THE CONTROL WORD

	Reset fault	HLG zero	HLG stop	HLG disable	Enable operation	Quick stop	Disable voltage	Turn on	
Command \ Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Transitions**
Shut down	X	X	X	X	X	1	1	0	2, 6, 8
Turn on	X	X	X	X	X	1	1	1	3
Disable voltage	X	X	X	X	X	X	0	X	7, 9, 10, 12
Quick stop	X	X	X	X	X	0	1	X	7, 10, 11
Disable operation	X	X	X	X	0	1	1	1	5
Enable operation	X	X	X	X	1	1	1	1	4
Reset fault	0 → 1	X	X	X	X	X	X	X	15

Explanation:
X This bit has no meaning at this location.
0→1 A change from 0 to 1 is expected (rising edge).

9.9 STATUS WORD

Bit Number	Name	Meaning
0	Ready for switch-on	Device state
1	Switched on	Device state
2	Operation enabled	Device state
3	Fault	Device state
4	Voltage disabled	If the bit = 0, the control word contains the request to disable voltage or the "enable" binary input is not high.
5	Quick stop	Device state
6	Switch-on disable	Device state
7	Warning	Inverter has a warning which is indicated on Controlbox and can be read via **E82** (event name). The inverter continues operation until the warning time expires and then changes to the "fault reaction active" state.
8	Message	The inverter cannot fully handle the requested drive task. The type of message is shown on the display and can be read via **E82** (event name).
9	Remote	Is 1 if parameter **A30** is set to" *2:field bus*" (FAS/FDS) or *"3:Profibus-DP"* (SDS). Otherwise 0.
10	Reference value reached	Indicates 1 when the drive has reached the requested reference value (speed or position). The bit only enables this function in the "operation" device state. The HLG bits in the control word must all be set so that this signal is indicated correctly. Otherwise the bit is set to 1.
11	Limit value	Is 1 when the speed limit is active (**C00** n-min, **C01** n-max).
12 ... 15	Reserved	

9.10 INDICATION OF THE DEVICE STATES IN THE STAUTS WORD

	Switch-On Disable	Quick Stop	Voltage Disabled	Fault	Operation Enabled	Switched On	Ready for Switch-On
State/Bit	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Not ready for switch-on	0	X	X	0	0	0	0
Switch-on disable	1	X	X	0	0	0	0
Ready for switch-on	0	1	X	0	0	0	1
Switched on	0	1	X	0	0	1	1
Operation enabled	0	1	X	0	1	1	1
Fault	0	X	X	1	0	0	0
Fault reaction active	0	X	X	1	1	1	1
Quick stop active	0	0	X	0	1	1	1

9.11 EXAMPLE OF CONTROLLING VIA FIELDBUS: START DRIVE WITH SPEED RV 3000 RPM

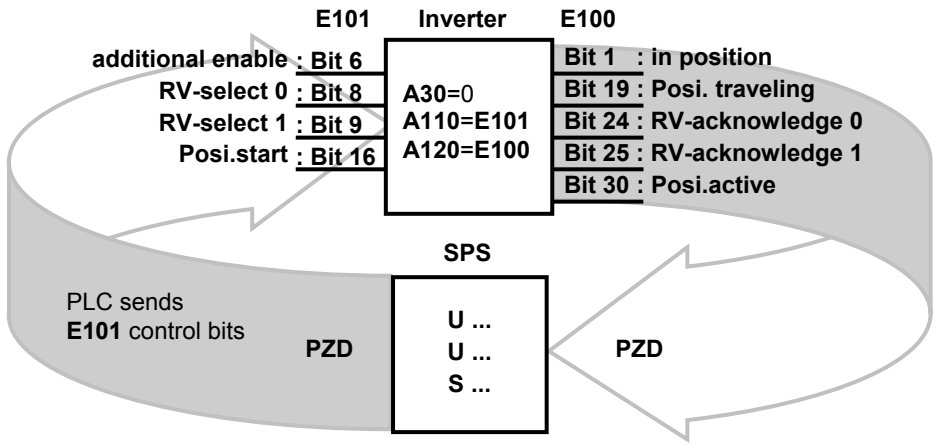
No.	Action	Reaction of the inverter	Indicated on Controlbox, FDS-Tool or FDS display
1	**SDS:** Install SDP+EA 4000 option board, and turn on supply voltage. Set parameter **A30** (operation input) to *"3:Profibus-DP."* Enable H-level	**SDS:** Startup of SDS with SDP option	**SDS:** After startup the LED of the SDP+EA option is on continuously. Line 2 in the display indicates: **`12:Inhibited`**
	FAS/FDS: Fix the Kommubox. Set parameter **A30** (operation input) to *"2:fieldbus."* Apply high level to input "enable" (X1.x).	**FAS/FDS:** Startup of FAS/FDS with Kommubox	**FAS/FDS:** LED of the Kommubox is on continuously. Line 2 in the display indicates: **`12:Inhibited`**
2	Start PROFIBUS-DP: Set entire startup of bus and master to "**Operate**" (turn PLC to RUN).	DP state changes to "**cyclic data communication**." The inverter remains in "switch-on disable" since the process output data = 00.	LED of SDP+EA option flashes slowly at $T_{ein} = T_{aus} = 1$ seconds.
3	Enter the "**shut down**" command in the control word. 15 Control word 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0	Device status on inverter changes to "ready for switch-on." Status word then changes to: 15 Status word 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 0 1 Bit 0 to 3 = 1: Ready for switch-on Bit 4 = 1: "Disable voltage" command is not active. Bit 5 = 1: "Quick stop" command isn`t active. Bit 9 = 1: The inverter is on remote.	Line 2 of the display indicates: **`0:Ready`**
4	Change control command to **switch on**. 15 Control word 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 1	Device state changes to "switched on." Inverter then updates the status word. 15 Status word 0 0 0 0 0 0 0 1 0 0 0 1 1 0 0 1 1 Bit 0 to 3 = 1: Switched on Bit 4 = 1: "Disable voltage" command is not active. Bit 5 = 1: "Quick stop" command isn`t active. Bit 9 = 1: Inverter is on remote.	Line 2 of display indicates: **`14:Enabled`**
5	Specify **enable operation** control command, and set the three HLG bits. 15 Control word 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 And specify reference value as 3000 Rpm. (= $0BB8_{hex}$). 15 Ref. value 0 0 0 0 0 1 0 1 1 1 0 1 1 1 0 0 0	Device states changes immediately to "operation enabled." 15 Status word 0 0 0 0 0 0 1 1 0 0 1 1 0 0 1 1 1 Bit 0 to 3 = 1: Switched on Bit 4 = 1: "Disable voltage" command is not active. Bit 5 = 1: "Quick stop" command isn`t active. Bit 9 = 1: Inverter is on remote. Bit 10 = 1: Reference value reached (Bit 10 = 0: For time for acceleration and deceleration) The drive runs up until the reference value. The actual speed after reaching the reference value is indicated as 2999 rpm (= $0BB7_{hex}$). 15 Actual value 0 0 0 0 0 1 0 1 1 1 0 1 1 0 1 1 1	Line 2 of display indicates: **`1:Clockwise`** (Divergend texts are displayed for other reference values or load states.)

10 POSITIONING WITH THE FIELDBUS

The control/status bits are available for positioning with the fieldbus. To utilize the function, make the following settings. **A30**=*0:ctrl.inter.*; **A110**=***E101*** *control bits*; **A120**=***E100*** *status bits*. For a detailed description of the bits, see chap. 8.1 of this documentation.

Important: For all control bits which are handled by the bus, set the appropriate assignment to inactive in the F parameters (BE functions).

Sample application:



In control, **the drive must be enabled with bit 6 in E101**. When bit 30 in **E100** then becomes high, a process block selected with bit 8/9 in **E101** can be started with edge bit 16 in **E101** (> 10 msec). The active process block is indicated with bits 24/25 in **E100** as long as the start signal is available. Bit 19 in **E100** signals the movement of the axis, and the end of the process block can be evaluated with a positive edge on bit 1 in **E100** (only when block processing > 10 msec).
With the larger PZD is used, additional parameters (e.g., **E106** override, **I80** actual position) can be transferred cyclically from and to the controller. For PPO types, see chapters 4.2 and 4.3.

10.1 PREFERENCE OF PROCESS BLOCK 1

If you only want to use one process block in which you continuously enter a new target, we recommend using process block 1 (**J10** to **J18**, **L10** to **L12**). A PKW service for these parameters receives special handling on the device. The data for process block 1 are immediately imaged on the internal posi controller. The service is not acknowledged until these internal routines have been concluded. The process block can be started immediately after PKW acknowledgment. With all others, the internal imaging takes place in the background after PKW acknowledgment. You can query when the data will become useable on the device via PZD - **E100**:bit 5.

10.2 SPECIAL FUNCTION OF E124 “START POSITION 1”

Writing a value with the PKW service to this parameter has the effect.
1. The value in **J10** position is copied and imaged immediately for internal positioning control.
2. Process block 1 is then started with *posi.start*.
3. The PKW service is not concluded until now.

This saves having to parameterize and start process blocks separately on the controller.

11 EXPANSION OF THE INVERTER TO I/O MODULE FOR FIELDBUS

When the inverter is controlled via fieldbus, the inputs of the terminals may not be needed for operation of the inverter. These inputs can then be read for other purposes via the fieldbus. Communication objects **E10** and **E11** can be used to measure the analog input level. **E12, E13** or **E19** can be used for the binary inputs (several binary inputs are shown here as individual bits). In **E12** and **E13**, bit 5 of the least significant byte contains the current level of "input enable." Bit 4 indicates BE1, ..., and bit 0 shows BE5. In **E19**, these inputs and additional inputs are indicated by the option board in a different order. Bit 0 contains the level of "input enable," bit 1 contains the level of BE1, and so on.

If the inverter does not need the outputs for relay 2, analog output and BA1 to generate signals on the device (e.g., brake or analog speed indication), these outputs can be controlled with the fieldbus for other purposes. The applicable parameters which describe the function of the outputs must then be set to *"0:inactive"* in both parameter sets.
For example, if parameter **F00** (relay 2 function) is set to *"0:inactive,"* the relay can be circuited from the fieldbus with **E111** (1 = make contact). The same procedure can be used with **F20** and **E110** for the analog output and with **F80** and **E112** (BA1) on the *SEA 4000* option board.
Additional binary outputs can be addressed with **E112** (BA1), **E114** (BA4), **E115** (BA5), **E116** (BA6), **E117** (BA7).

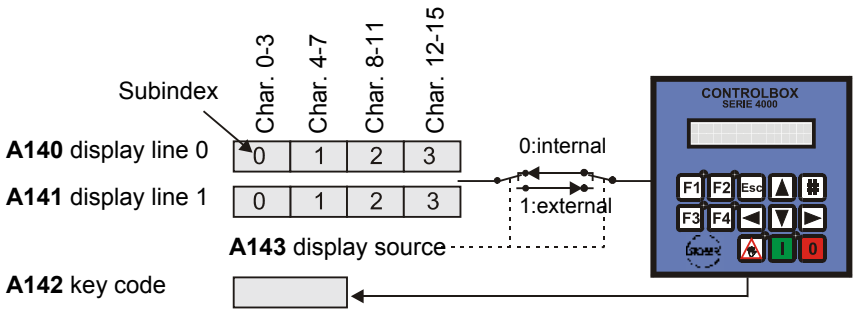
11.1 USING ALL THE AE1/AE2 FUNCTIONS VIA PROFIBUS-DP

F20 and **F25** can be used to execute one of several functions with analog inputs 1 and 2. The fieldbus also permits direct access to all available selections which are not selected under **F20** and **F25**.

Selection of AE1/AE2 Function	Parameter via PROFIBUS-DP	Remarks
0: inactive	-	
1: additional RV	**E104** additional reference value	For meaning, see **F20** or **F25** in the documentation of: - the frequency inverters **POSIDRIVE®** FAS 4000 (publ. no 441581) **POSIDRIVE®** FDS 4000 (publ. no. 441408) - the servo inverter **POSIDYN®** SDS 4000 (publ. no. 441449)
2: torque-limit	**E102** torque limit	
3: power-limit (for FDS) *3: inactive (for SDS)*	**E103** power limit	
4: RV-factor	**E105** multiplication ref. value	
5: Override	**E106** Posi.override	
6: Posi.offset	**E107** Posi. offset	
7: mind.diameter	**E108** Winding meas. diameter	
8: M-rot. magnet (for FDS) *8:inactive (for SDS)*	**E109** M-max. rotating magnet	
9: n-Max	**E126** n-Max	
10: reference value	**E119** reference value	
11: PID-reference	**E121** PID reference	
12: winder-roller	**E122** winder roller	
13: sync.offset	**E123** sync. offset	
14: sync. n-RV	**E125** synchronous n-ref. value	
-	**E110** analog output	When **F40/F45** = *"0:inactive,"* the level of analog outputs 1 and 2 can be specified directly via the bus. ±10 V = ±100% = $\pm 8192_{dec} = 2000_{hex}$
-	**E118** analog output 2	
-	**E120** tension reduction	

☞ While only up to two variables can be controlled with the analog inputs, all variables (**E104** to **F120** are available simultaneously with the fieldbus.

11.2 USING THE KEYS AND DISPLAY VIA PROFIBUS-DP



When parameterization, control and diagnosis are completely handled via the fieldbus, the keys and the display of the FDS and Controlbox are no longer needed. In such cases, these resources can be used with the fieldbus like an operator panel. The currently pressed key can be read with parameter **A142** (key code). The text on the display can be read from the device as ASCII characters (one character in each byte) with parameters **A140** and **A141** and then written from the fieldbus to the display when **A143** (display source) changes to *"1:external."*

⚠ If **A143** (display source) was changed to *"1:external,"* faults, warnings and messages can no longer be indicated. This task must then be handled by the controller! The device only sets parameter **A143** to *"0:internal"* when the device is turned on.

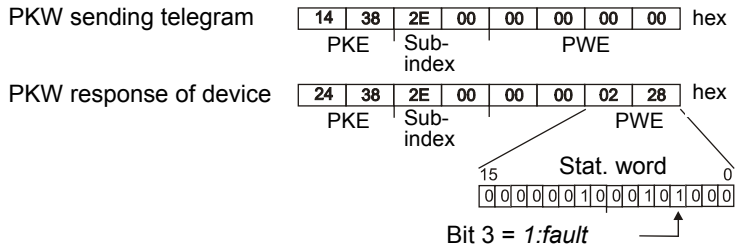
A142 (key code) can only recognize one pressed key (approx. 100 msec). The relationship between pressed key and read number is: 0 = no key, 1 = [◄], 2 = [►], 3 = [▼], 4 = [▲], 5 = [#], 6 = [Esc] ., 7=F1, 8=F2, 9=F3, 10=F4, 11= [F0] key, 12= [I] key (green), 13= [0] key (red).

12 FAULT DIAGNOSIS

12.1 HAS A FAULT OCCURRED?

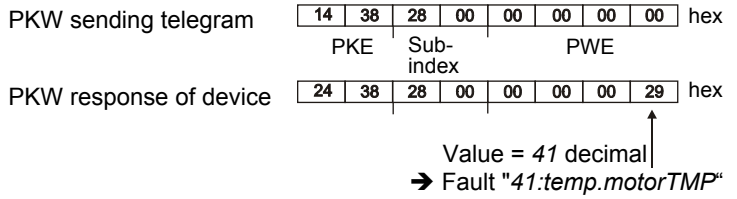
If bit 3 of **E46** (status word) equals 1, the inverter is in "fault" status.
The status word can be read via process process data or via PKW communication.

Example of PKW job and response for reading **E46** (status word):
PNU = 1080_{dec} = 438_{hex}
Subindex = 46_{dec} = $2E_{hex}$



12.2 WHICH FAULT HAS OCCURRED?

The inverter store the last 10 faults (type/time) in **E40** (fault type) and **E41** (fault time). They are stored in the sequence in which they occur. Fault 1 = latest fault is located in PNU 1080, fault 2 in PNU 1081, and so on.
When a fault occurs, the current type of fault is determined with **E40** (faultType1), and the fault time is determined with **E41** (faultTime1).
Example of PKW job and response for reading **E40** (faultType1):
PNU = 1080_{dec} = 438_{hex}
Subindex = 40_{dec} = 28_{hex}



The following table can then be used to determine the type of fault. For detailed explanations, see the device documentation.

31:short/ground.	36:high voltage	42:tempBrakeRes	47:device overl.	52:communication
32:short/gr.int.	38:tempDev.Sens	43:RV wire brk	48:accel. overl.	53:stop input
33:overcurrent	39:tempDev. i2t	44:ext.fault	49:decel. overl.	54:follow.error
34:hardw.fault	40:invalid data	45:oTempMot.i2t	50:operat.area	55:optionBoard
35:watchdog	41:temp.motorTMP	46:low voltage	51:refused	56:overspeed

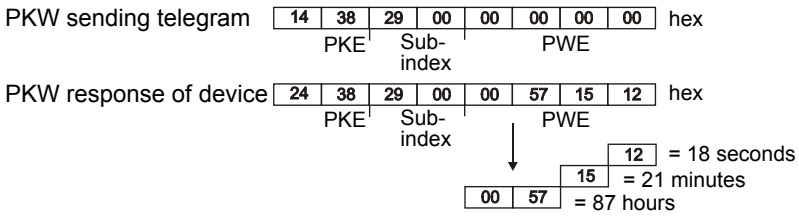
As you can see, this is an example of the fault *"41:temp.motorTMP."*

12.3 READING E41 (FAULT TIME 1)

This indication can be used to read the operation time at which the last fault occurred. The value is coded in a 4-byte value in hours, minutes and seconds.

Example of a PKW job and

response for reading **E41** (faultTime1):
PNU = 1080_{dec} = 438_{hex}
Subindex = 41_{dec} = 29_{hex}



12.4 ACKNOWLEDGING A FAULT VIA FIELDBUS

The reason for the fault must be corrected before a fault can be acknowledged (e.g., for *"temp.motorTMP"* let motor cool off). An acknowledgment only takes place at the rising edge (i.e., when the bit changes from 0 to 1) so the bit must be set to 0 first. Although there are several ways to perform acknowledgments, all methods are not permitted by all settings.

- **Change in state (0 → 1) of bit 7 (reset fault) in E45 (control word)**
Operation input **A30** must be set to "*3:Profibus-DP*" otherwise the control word has no effect.

- **Change in state (0 → 1) of bit 3 (acknowledgment) of the parameter E101 (control bits)**
No binary input (parameter **F31** ... **F35**/with option board **F60** ... **F64**) may be set to "*13:faultReset*" since the binary inputs always take precedence over **E101** control signals.

- **Change in state (0 → 1) of bit 6 (additional enable) of the parameter E101 (control bits)**
No binary input (parameter **F31** ... **F35** / with option board **F60** ... **F64**) may be set to "*7:addit.enable*" since the binary inputs always take precedence over **E101** control signals. The enable on the inverter must be turned on or jumpered since it is AND-linked to the additional enable.
When **E45** or **E101** was imaged on process data (**A110** …), these values must also be specified via PZD. Changes via PKW are disregarded.

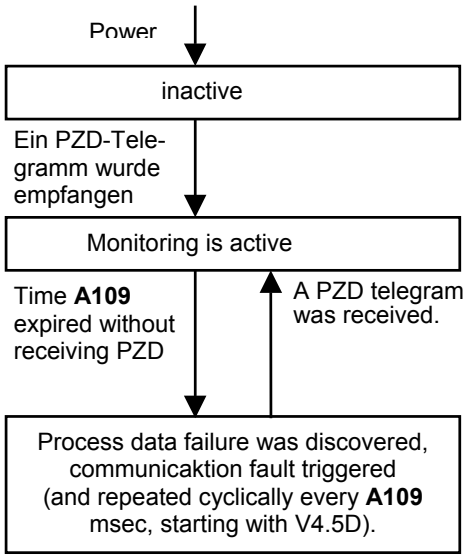
12.5 DIAGNOSTIC TELEGRAM

The bus master automatically manages the diagnostic telegram as part of the PROFIBUS system. The host system (e.g., the PLC) does not have to transmit this telegram. On the PLC, the address area for the I/O contains an area for the diagnostic information of the DP slaves. When a messages appears here, this can be used to trigger an alarm on the PLC, for instance, or the cause of the fault can be read via PKW communication.
The **POSIDYN**® SDS 4000 with the SDP 4000 option supports a device-specific expansion of the diagnostic telegram defined by the PROFIBUS standard. Not only is the fact that a diagnosis occurred transferred but also the cause of the diagnosis in two additional bytes.
Byte 1: Value = 0
Byte 2: Value = 1: The inverter is in status "fault" or "fault reaction active."
Value = 0: The inverter is not in "fault" status.

E41 (faultType 1) must also be read to determine the exact cause of the fault on the inverter.

13 PROCESS DATA MONITORING

Process data monitoring should be activated to prevent the inverter from continuing with the last received reference values if PROFIBUS or the PROFIBUS master fails. The Kommubox/option board monitors the receipt of user data telegrams (see PPO type 1) sent cyclically by the PROFIBUS master during normal operation. Parameter **A109** (proc.output control time) is used to activate this monitoring routine.
A time between 1[(1)] or 100[(2)] msec and 65534 msec is set here. The default setting is 65535. This value also means that monitoring is inactive. This setting is recommended when commissioning the inverter on PROFIBUS and for service and maintenance work. Monitoring should only be activated during the running process when a bus master is cyclically sending process data to the inverter. The monitoring time must be adapted to the maximum total cycle time on PROFIBUS plus a sufficient reserve for possible delays.
If process data monitoring is triggered on the inverter and parameter **A30** (operation input) is set to *"2:fieldbus"* (FAS/FDS) or to *"3:profibus-DP"* (SDS), the fault *"52:communication"* is triggered.



The PROFIBUS system itself offers a similar protection routine - trigger monitoring. Every configuration of a PROFIBUS system contains the time for trigger monitoring. If a slave does not receive a telegram during this time, all user-data output bytes (data to the inverter) are set to 0. If the assignment of the process data is changed to the point that **E45** (control word) is no longer transferred as process data to the device, trigger monitoring is unable to turn off the drive.
If this happens, it is essential that parameter **A109** (proc.output control time) be used.
(1) SDS
(2) FAS/FDS

14 PARAMETER LIST

14.1 EXPLANATION OF THE TABLES

The following tables are the directory of all communication objects. Most of the parameters, displays and actions which can be edited with the menu of the device are also available with PROFIBUS. The only parameters which cannot be accessed with PROFIBUS are those parameters which directly affect the menu and those actions which can only be executed directly on the device.
The parameter number and subindex for the access via PROFIBUS are easy to determine from the coordinates of the particular parameter in the menu of the inverter. The following rules apply.

PNU	=	1000 + 20 * letter of the menu coordinate + 500 for parameter set 2
Subindex	=	Number value of the menu coordinate

There is an appropriate menu on the FDS or SDS for all coordinates between 00 and 99. Only the coordinates above 99 are no longer included in the inverter's menu. These parameters can be disregarded for devices without fieldbus coupling.
The parameters from groups **B to G** are present once in parameter set 1 and then again in parameter set 2. The menu has only one coordinate for this. Parameter numbers for the parameters from parameter set 1 (between 1000 and 1499) and for parameter set 2 (starting with 1500) were selected for access via PROFIBUS access.

Column	Meaning
PNU	These two pieces of information uniquely identify each communication object via PROFIBUS.
Subindex	
Coordinate	This information defines the object as a known parameter or display of the inverter. For details, see the device documentation.
Name	

Column	Meaning
Value range	Contains the valid range. It is given as the "lower limit" to "upper limit" or is separated by commas for list types. If the value cannot be changed, only one value is given. Letters enclosed in quotation marks are listed for strings. Consecutive strings are shown for individual objects which have the same index but a different subindex. These subareas of strings contain 4 ASCII characters.
Scaling/unit	The unit and scaling with the resolution of the parameter is shown here. A blank column indicates a selection parameter and not a number. For the meaning of the choices, see the applicable documentation (FAS, publ. no. 441581; FDS, publ. no. 441408; SDS, publ. no. 441449).
Access	Specifies the PROFIBUS access rights separately for the devices (FAS, FDS or SDS). **r** Read access permitted **rw** Read and write access permitted **rs** Read access and setting (write access) of value 1 permitted (only for actions)
Rounding	If rounding errors can occur when converting scaling between the representation type of the object on PROFIBUS and the internal resolution on the device, the possible rounding error is given here.

14.2 SWITCHABLE SCALING

The representation of the value (scaling) can be switched on PROFIBUS for some parameters and displays. Parameter **A100** (scaling deviceintern) can be used for this (earlier: speed scaling).
Selection *0:standard*: Values are transferred as shown in the table (e.g., speed in rpm).
1:device raw: Values are transferred in internal-device scaling via PROFIBUS. This achieves the full resolution of the internal parameters and saves computing time for rescaling.

Auxiliary scaling variables (other parameters) are read (when Kommubox starts) from the FAS/FDS to Kommubox for the rescaling of certain parameters/displays on the PROFIBUS unit. If these parameters are changed by another unit than PROFIBUS (with menu of FAS/FDS or with FDS Tool), they are no longer current in Kommubox and some parameters/displays can no longer be converted correctly. The following list shows the parameters/displays which have auxiliary scaling variables. With such parameters/displays, these auxiliary scaling variables should be read first via PROFIBUS before the related parameters/displays are accessed (not necessary with SDS).

Parameter/ Display	Scaling for A100=0	Scaling for A100=1	Auxiliary Scaling Variable (for A100=0)
All speeds except group **E**..	rpm	FAS/FDS: ±32768 = ±400Hz SDS: rpm	FAS/FDS: **B10** Number of poles of the applicable parameter set
Speeds from group **E**..	rpm	FAS/FDS: ±32768 = ±400Hz SDS: rpm	FAS/FDS: **B10** Number of poles from active param. set SDS: 0.25 rpm
E01 P-motor	0.01 kW	Same as **A100**=0	FAS/FDS: **B11** P-nominal from parameter set 1 SDS: **B11** P-nominal from active parameter set
E02 M-motor	0.01 Nm	Same as **A100**=0	FAS/FDS: **B11** and **B13** n-nominal from param. set 1 SDS: **B11** and **B13** n-nominal from active param. set
E09 rotor position	0.001 U	Motor increments	**E84, B26, C60, F36, H20, H22, H41, G27, I02**
G29 synchron difference	°	Motor increments	**E84, B26, C60, F36, H20, H22, H41, G27, I02**
I80, **I81**, **I84**, **I88** (all posi actual values)	Posi unit without positions after decimal point **I05** * 10°**I06**	Posi increments	**E84, B26, C60, F36, H20, H22, H41, G27, I02**

14.3 PROFIDRIVE PARAMETERS

Parameter numbers 900 to 999 are permanently defined in the profile for adjustable-speed PROFIDRIVE drives. The following table shows the parameters which **POSIDRIVE**® FAS 4000, **POSIDRIVE**® FDS 4000 and **POSIDYN**® SDS 4000 with PROFIBUS-DP link support in conformance with the profile. These parameters can also be addressed under other parameter numbers in the vendor-specific area (1 to 899, 1000, ... 1999).

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
918	0	**A83**	Station address	0 to 125		rw	rw	rw	
919	0	**E55**	Device system no.	0 to 65535		rw	rw	rw	
928	0	**A30**	Operation input	FAS/FDS: 0 to 2 SDS: 0 to 4		rw	rw	rw	
963	0	**A84**	Current baud rate	0 to 10		r	r	r	
967	0	**E45**	Control word	0000 to $FFFF_{hex}$		rw	rw	rw	
968	0	**E46**	Status word	0000 to $FFFF_{hex}$		r	r	r	
970	0	**A04**	Load parameter set	0 to 1 (set 1 for start)		rs	rs	rs	
971	0	**A00**	Store in non-vol. memory	0 to 1 (set 1 for start)		rs	rs	rs	

14.4 PARAMETERS FROM GROUPS A.. (INVERTER) TO Z.. (FAULT MEMORY)

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1000	0	**A00**	start save parameter	0 to 1 (set 1 for start)		rs	rs	rs	
1000	0	**A00**	result save parameter	0 to 1 (set 1 for start)		rs	rs	rs	
1000	2	**A02**	start check parameter	0 to 1 (set 1 for start)		rs	rs	rs	
1000	2	**A02**	result check parameter	0 to 1 (set 1 for start)		rs	rs	rs	
1000	4	**A04**	start default settings	0 to 1 (set 1 for start)		rs	rs	rs	
1000	4	**A04**	result default settings	0 to 1 (set 1 for start)		rs	rs	rs	
1000	5	**A05**	load saved parameters	0 to 1		rs	rs	rs	
1000	5	**A05**	result load saved parameters	0 to 1		rs	rs	rs	
1000	10	**A10**	menu level	0 to 2		rw	rw	rw	
1000	12	**A12**	language	0 to 1		rw	rw	rw	
1000	15	**A15**	auto-return	0 to 1		rw	rw	rw	
1000	20	**A20**	braking resistor type	FAS: 0 to 5 (type-dep.) FDS: 0 to 7 (type-dep.) SDS: 19 to 26 (type-dep.)		rw	rw	rw	
1000	21	**A21**	braking resistor resist.	FAS: 100 to 600 (type-d.) FDS: 30 .. 600 (type-dep.) SDS: 10 to 600 (type-dep.)	0.1 Ohm	rw	rw	rw	
1000	22	**A22**	braking resistor rating	FAS/FDS: 0 to 3000 (type.-d.) SDS: 0 to 600 (type-dep.)	10 W	rw	rw	rw	
1000	23	**A23**	braking resistor therm.	1 to 1000	0.01 sec	rw	rw	rw	
1000	30	**A30**	operation input	FAS/FDS: 0 to 2 SDS: 0 to 4		rw	rw	rw	
1000	31	**A31**	Esc-reset	0 to 1		rw	rw	rw	
1000	32	**A32**	auto-reset	0 to 1		rw	rw	rw	
1000	33	**A33**	time auto-reset	1 to 255	min	rw	rw	rw	
1000	34	**A34**	auto-start	0 to 1		rw	rw	rw	
1000	35	**A35**	low voltage limit	1500 to 5700 (type-dep.)	0.1 V DC	rw	rw	rw	
1000	36	**A36**	mains voltage	FAS/FDS: 1~: 1400 to 2500 3~: 2200 to 4800 SDS: 1400 to 4800	0.1 V eff.	rw	rw	rw	-2
1000	37	**A37**	reset memorized values	0 to 1 (set 1 for start)		rs	rs	rs	
1000	37	**A37**	result reset memorized values	0 to 1 (set 1 for start)		rs	rs	rs	
1000	38	**A38**	DC power-input	0 to 1		-	-	rw	
1000	41	**A41**	select parameter set	0 to 2		rw	rw	rw	
1000	42	**A42**	copy parameter set 1>2	0 to 1 (set 1 for start)		rs	rs	rs	
1000	42	**A42**	result copy parameter set 1>2	0 to 1 (set 1 for start)		rs	rs	rs	
1000	43	**A43**	copy parameter set 2>1	0 to 1 (set 1 for start)		rs	rs	rs	
1000	43	**A43**	result copy parameter set 2>1	0 to 1 (set 1 for start)		rs	rs	rs	
1000	51	**A51**	tip reference value	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	rw	rw	rw	
1000	55	**A55**	key hand function	0 to 1		rw	rw	rw	
1000	82	**A82**	CAN-baudrate	0 to 8		rw	rw	rw	
1000	80	**A80**	Serial address	0 to 31		rw	rw	rw	
1000	83	**A83**	busaddress	0 to 125		rw	rw	rw	
1000	84	**A84**	profibus baudrate	0 to 10		r	r	r	
1000	100	**A100**	scaling deviceintern	0 to 1		rw	rw	rw	
1000	108	**A108**	emergencyservice	0 to 1		rw	rw	rw	
1000	109	**A109**	proc.output control time	FAS/FDS: 100 to 65535 SDS: 1 to 65535	msec	rw	rw	rw	
1000	110	**A110**	process output data 0	70790400 (**E45**), ...		rw	rw	rw	
1000	111	**A111**	process output data 1	70790912 (**E47**), ...		rw	rw	rw	
1000	112	**A112**	process output data 2	70790400 (**E45**), ...		rw	rw	rw	
1000	113	**A113**	process output data 3	70790912 (**E47**), ...		rw	rw	rw	
1000	114	**A114**	Can process output data 0	70790400 (**E45**), ...		-	-	rw	
1000	115	**A115**	Can process output data 1	70790912 (**E47**), ...		-	-	rw	
1000	116	**A116**	Can process output data 2	70790400 (**E45**), ...		-	-	rw	
1000	117	**A117**	Can process output data 3	70790912 (**E47**), ...		-	-	rw	
1000	119	**A119**	proc.output data enable	0 to 1		rw	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1000	120	**A120**	process input data 0	70790656 (**E46**), ...		rw	rw	rw	
1000	121	**A121**	process input data 1	70780928 (**E08**), ...		rw	rw	rw	
1000	122	**A122**	process input data 2	70790656 (**E46**), ...		rw	rw	rw	
1000	123	**A123**	process input data 3	70780928 (**E08**), ...		rw	rw	rw	
1000	124	**A124**	Can process input data 0	70790656 (**E46**), ...		-	-	rw	
1000	125	**A125**	Can process input data 1	70780928 (**E08**), ...		-	-	rw	
1000	126	**A126**	Can process input data 2	70790656 (**E46**), ...		-	-	rw	
1000	127	**A127**	Can process input data 3	70780928 (**E08**), ...		-	-	rw	
1000	130	**A130**	proc. out. length	0 to 12		r	r	r	
1000	131	**A131**	Can proc. out. length	0 to 12		-	-	r	
1000	132	**A132**	proc. in. length	0 to 12		r	r	r	
1000	133	**A133**	Can proc. in. length	0 to 12		-	-	r	
1000	140	**A140**	Displayline0 B0-3	„ 1“		rw	rw	rw	
1001	140	**A140**	Displayline0 B4-7	„23. „		-	-	-	
1002	140	**A140**	Displayline0 B8-11	„rpm „		-	-	-	
1003	140	**A140**	Displayline0 B12-15	„1.2A „		-	-	-	
1000	141	**A141**	Displayline1 B0-3	„1:Vo“		rw	rw	rw	
1001	141	**A141**	Displayline1 B4-7	„rwär“		-	-	-	
1002	141	**A141**	Displayline1 B8-11	„ts “		-	-	-	
1003	141	**A141**	Displayline1 B12-15	„ “		-	-	-	
1000	142	**A142**	key code	0 to 6		rw	rw	rw	
1000	143	**A143**	Display source	0 to 1		rw	rw	rw	

Note on using actions (e.g., **A00** store values):
To start actions, value 1 is written to the object with subindex 0. The PROFIBUS master must then continue to read this object and wait until the value 0 is read again. This concludes the action. Subindex 1 can now be used to query the result of the last executed action. The result of the last executed action is always returned by the inverter even when another action was started directly.
The result must, therefore, be evaluated directly after the action started via PROFIBUS is concluded. For the meaning of the values of the result of the action, see result table of the device documentation (pupl. no.: FAS 4000 = 441581, FDS 4000 = 441408, SDS 4000 = 441449).

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1020	1520	0	**B00**	motor-type	FAS: 0 to 26 (type-dep.) FDS: 0 to 29 (type-dep.) SDS: 60 to 69 (type-dep.)		rw	rw	rw	
1020	1520	2	**B02**	EMC-constant	200 to 2500	0.1 V / 1000 rpm	-	-	rw	
1020	1520	3	**B03**	Motor fan	0 to 1		-	-	rw	
1020	1520	10	**B10**	poles	2, 4, to 16		rw	rw	rw	-1
1020	1520	11	**B11**	P-nominal	FAS: 12 to 1100 (type-d.) FDS: 12 to 2500 (type-d.) SDS: 12 to 4500 (type-d.)	10 W	rw	rw	rw	
1020	1520	12	**B12**	I-nominal	FAS: 0 to 2000 (type-d.) FDS: 0 to 4400 (type-d.) SDS: 0 to 16000 (type-d.)	10 mA	rw	rw	rw	
1020	1520	13	**B13**	n-nominal	FAS/FDS: 0 to 12000 SDS: 0 to 6000	rpm[1]	rw	rw	rw	
1020	1520	14	**B14**	V-nominal	0 to 4800 (type-dep.)	0.1 V eff	rw	rw	-	-2
1020	1520	15	**B15**	f-nominal	819 to 27034	8192 = 100Hz	rw	rw	-	
1020	1520	16	**B16**	cos PHI	50 to 100	%	rw	rw	-	
1020	1520	17	**B17**	M0 (standstill)	0 to 32767	0.01 Nm	-	-	rw	
1020	1520	20	**B20**	control mode	FAS/FDS: 0 to 2 SDS: 0 to 3		rw	rw	-	
1020	1520	21	**B21**	V/f-characteristic	0 to 1		rw	rw	-	
1020	1520	22	**B22**	V/f-gain	7373 to 9011	8192 = 100%	rw	rw	-	
1020	1520	23	**B23**	boost	0 to 32767	8192 = 100%	rw	rw	-	
1020	1520	24	**B24**	switching frequency	4, 6, 8, 10, 12, 14, 16	kHz	rw	rw	-	-1
1020	1520	25	**B25**	halt flux	FAS/FDS: 1 to 4		rw	rw	-	
1020	1520	26	**B26**	motor-encoder	FAS: 0 FDS: 0 to. 1 SDS: 2 to 3		rw	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1020	1520	27	**B27**	time halt flux	0 to 255	sec	rw	rw	-	
1020	1520	30	**B30**	addit.motor-operation	0 to 1		rw	rw	-	
1020	1520	31	**B31**	oscillation damping	FAS/FDS: 0 to 100		rw	rw	-	
1020	1520	32	**B32**	SLVC-dynamics	0 to 100	%	rw	rw	-	
1020	1520	51	**B51**	J-motor	1 to 32767	1E-6 kgm^2	-	-	rw	
1020	1520	52	**B52**	L-motor	1 to 32767	10 µH	-	-	rw	
1020	1520	53	**B53**	R1-motor	1 to 32767	0.01 Ohm	rw	rw	rw	
1020	1520	60	**B60**	X1S-motor	1 to 32767	0.01 Ohm	rw	rw	-	
1020	1520	61	**B61**	therm-motor	1 to 32767	sec	rw	rw	-	
1020	1520	62	**B62**	TB-motor	1 to 255	msec	rw	rw	-	
1020	1520	63	**B63**	Mbreakdown / Mnom.	1 to 255	0.1	rw	rw	-	
1020	1520	64	**B64**	Ki-IQ (moment)	0 to 32767	8192 = 100%	rw	rw	rw	
1020	1520	65	**B65**	Kp-IQ (moment)	0 to 32767	8192 = 100%	rw	rw	rw	
1020	1520	66	**B66**	Ki-ID (flux)	0 to 32767	8192 = 100%	rw	rw	-	
1020	1520	67	**B67**	Kp-ID (flux)	0 to 32767	8192 = 100%	rw	rw	-	

PNU(s) Pset 1/2		sub-index	coor-dinate	name	value range	scaling / measure unit	access			Round ing
							FAS	FDS	SDS	
1040	1540	0	**C00**	n-Min	0 to **C01**	rpm[1]	rw	rw	rw	
1040	1540	1	**C01**	n-Max	FAS/FDS: **C01** to 12000 SDS: **C01** to 6000	rpm[1]	rw	rw	rw	
1040	1540	2	**C02**	perm.direction of rotat.	0 to 2		rw	rw	rw	
1040	1540	3	**C03**	M-Max 1	0 to **C04**	8192 = 100%	rw	rw	rw	
1040	1540	4	**C04**	M-Max 2	**C03** to 32767	8192 = 100%	rw	rw	rw	
1040	1540	10	**C10**	skip speed 1	0 to 12000	rpm[1]	rw	rw	-	
1040	1540	11	**C11**	skip speed 2	0 to 12000	rpm[1]	rw	rw	-	
1040	1540	12	**C12**	skip speed 3	0 to 12000	rpm[1]	rw	rw	-	
1040	1540	13	**C13**	skip speed 4	0 to 12000	rpm[1]	rw	rw	-	
1040	1540	20	**C20**	startup mode	0 to 3		rw	rw	-	
1040	1540	21	**C21**	M-load start	0 to 32767	8192 = 100%	rw	rw	-	
1040	1540	22	**C22**	t-load start	0 to 99	0.1 sec	rw	rw	-	
1040	1540	30	**C30**	J-mach/J-motor	0 to 10000	0.1	rw	rw	rw	
1040	1540	31	**C31**	n-controller Kp	0 to 32767	8192 = 100%	rw	rw	rw	
1040	1540	32	**C32**	n-controller Ki	0 to 32767	8192 = 100%	rw	rw	rw	
1040	1540	33	**C33**	n-reference value lowpass	0 to 32767	0.1 msec	-	-	rw	
1040	1540	34	**C34**	n-motor lowpass	5 to 32767	0.1 msec	-	-	rw	
1040	1540	35	**C35**	n-control. Kp standstill	5 to 255	1%	rw	rw	rw	
1040	1540	40	**C40**	n-window	0 to 300	rpm[1]	rw	rw	rw	
1040	1540	41	**C41**	operating range n-Min.	0 to **C42**	rpm[1]	rw	rw	rw	
1040	1540	42	**C42**	operating range n-Max.	FAS/FDS: **C41** to 12000 SDS: **C41** to 6000	rpm[1]	rw	rw	rw	
1040	1540	43	**C43**	operating range M-Min.	0 to **C44**	8192 = 100%	rw	rw	rw	
1040	1540	44	**C44**	operating range M-Max.	**C43** to 32767	8192 = 100%	rw	rw	rw	
1040	1540	45	**C45**	operating range X-Min.	0 to **C46**	8192 = 100%	rw	rw	rw	
1040	1540	46	**C46**	operating range X-Max.	-32768 to **C46**	8192 = 100%	rw	rw	rw	
1040	1540	47	**C47**	operat. range C45/C46	0 to 12		rw	rw	rw	
1040	1540	48	**C48**	operat. range C47abs	0 to 1		rw	rw	rw	
1040	1540	49	**C49**	operat. range accel&ena	0 to 1		rw	rw	rw	
1040	1540	50	**C50**	display function	0 to 4		rw	rw	rw	
1040	1540	51	**C51**	display factor	- 10000000 to 10000000	0.0001	rw	rw	rw	
1040	1540	52	**C52**	display decimals	0 to 5		rw	rw	rw	
1040	1540	53	**C53**	display text	„xxxx“ (4 Zeichen)		rw	rw	rw	
1040	1540	60	**C60**	run mode	FAS/FDS: 1 to 2 SDS: 0 to 2		rw	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Rounding
							FAS	FDS	SDS	
1060	1560	0	**D00**	reference value accel	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	1	**D01**	reference value decel	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	2	**D02**	speed (max.ref.value)	FAS/FDS: 0 to 12000	rpm[1]	rw	rw	rw	
					SDS: 0 to 6000	rpm				
1060	1560	3	**D03**	reference value-Max.	__D05__ to 8191	8192 = 100%	rw	rw	rw	
1060	1560	4	**D04**	speed (min.ref.value)	FAS/FDS: 0 to 12000	rpm[1]	rw	rw	rw	
					SDS: 0 to 6000	rpm				
1060	1560	5	**D05**	reference value-Min.	0 to __D03__	8192 = 100%	rw	rw	rw	
1060	1560	6	**D06**	reference value offset	-8192 to 8181	8192 = 100%	rw	rw	rw	
1060	1560	7	**D07**	reference value enable	0 to 1		rw	rw	rw	
1060	1560	8	**D08**	monitor reference value	0 to 1		rw	rw	rw	
1060	1560	9	**D09**	fix reference value no.	0 to 7		rw	rw	rw	
1060	1560	10	**D10**	accel 1	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	11	**D11**	decel 1	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	12	**D12**	fix reference value 1	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	20	**D20**	accel 2	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	21	**D21**	decel 2	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	22	**D22**	fix reference value 2	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	30	**D30**	accel 3	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	31	**D31**	decel 3	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	32	**D32**	fix reference value 3	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	40	**D40**	accel 4	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	41	**D41**	decel 4	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	42	**D42**	fix reference value 4	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	50	**D50**	accel 5	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	51	**D51**	decel 5	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	52	**D52**	fix reference value 5	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	60	**D60**	accel 6	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	61	**D61**	decel 6	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	62	**D62**	fix reference value 6	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	70	**D70**	accel 7	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	71	**D71**	decel 7	FAS/FDS: 0 to 30000*__D98__	0.1 sec / 150 Hz	rw	rw	rw	
					SDS: 0 to 30000	1 msec/3000 rpm				
1060	1560	72	**D72**	fix reference value 7	FAS/FDS: -12000 to 12000	rpm[1]	rw	rw	rw	
					SDS: -6000 to 6000	rpm				
1060	1560	80	**D80**	ramp shape	0 to 1		rw	rw	-	
1060	1560	81	**D81**	decel-quick	1 to 30000	0.1 sec/150Hz	rw	rw	rw	
1060	1560	90	**D90**	reference value source	0 to 2		rw	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1060	1560	91	**D91**	motorpoti function	0 to 1		rw	rw	rw	
1060	1560	92	**D92**	negate reference value	0 to 1		rw	rw	rw	
1060	1560	93	**D93**	RV-generator	0 to 1		rw	rw	rw	
1060	1560	94	**D94**	ref. val. generator time	0 to 32767	msec	rw	rw	rw	
1060	1560	98	**D98**	Ramp factor	0=1; -1=0.1; 2=0.01		rw	rw	-	
1060	1560	99	**D99**	fast reference value	0 to 1		-	-	rw	

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1080	0	**E00**	I-motor	0 to 32767	0.1 A	r	r	r	-1
1080	1	**E01**	P-motor	-32768 to 32767	0.01 kW	r	r	r	-1
1080	2	**E02**	M-motor (fast)	-32768 to 32767	0.01 Nm	r	r	r	-2
1580	2	**E02**	M-Motor (smoothed)	-32768 to 32767	0.01 Nm	r	r	r	-2
1080	3	**E03**	DC-link-voltage	0 to 32767	0.1 V=	r	r	r	
1080	4	**E04**	V-motor	0 to 32767	0.1 V eff	r	r	-	-2
1080	5	**E05**	f1-motor	-16384 to 16383	8192 = 100 Hz	r	r	-	
1080	6	**E06**	n-reference value	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	r	r	r	
1080	7	**E07**	n-post-ramp	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	r	r	r	
1080	8	**E08**	n-motor (fast)	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	r	r	r	
1580	8	**E08**	n-motor (smoothed)	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	r	r	r	
1080	9	**E09**	rotor position	-2147483647 to 2147483647	0.001 r	r	r	r	-1
1080	10	**E10**	AE1-level	-8192 to 8191	8192 = 100%	r	r	r	
1080	11	**E11**	AE2-level	-8192 to 8191	8192 = 100%	-	r	r	
1080	12	**E12**	ENA-BE1-BE2-level	0 to 63		r	r	-	
1080	13	**E13**	BE3-BE4-BE5-level	0 to 63		r	r	-	
1080	14	**E14**	BE5-frequence ref.value	0 to 32767	8192 = 100%	r	r	-	
1080	15	**E15**	n-encoder	-12000 to 12000	rpm[1]	r	r	-	
1080	16	**E16**	analog-output1-level	0 to 32767	8192 = 100%	-	r	r	
1080	17	**E17**	relay 1	0 to 1		r	r	r	
1080	18	**E18**	BA2	0 to 1		-	-	r	
1080	18	**E18**	relay 2	0 to 1		r	r	-	
1080	19	**E19**	BE15...BE1 & enable	0 to 65535	one Bit for every BE	r	r	r	
1080	20	**E20**	device utilization	0 to 32767	8192 = 100%	r	r	r	
1080	21	**E21**	motor utilization	0 to 32767	8192 = 100%	r	r	r	
1080	22	**E22**	i2t-device	0 to 105	%	r	r	r	
1080	23	**E23**	i2t-motor	0 to 100	%	r	r	r	
1080	24	**E24**	i2t-braking resistor	0 to 100	%	r	r	r	
1080	25	**E25**	device temperature	-128 to 127	°C	r	r	r	
1080	26	**E26**	binary output 1	0 to 1		r	r	r	
1080	27	**E27**	BA15...BA1 & Relais1	0000 to $FFFF_{hex}$	one Bit for every BA	r	r	r	
1080	28	**E28**	analog-output2-level	0 to 32767	8192 = 100%	-	-	r	
1080	29	**E29**	n-ref. value raw	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	r	r	r	
1080	30	**E30**	run time	0 to $FFFF3B3B_{hex}$	h/min/sec	r	r	r	
1080	31	**E31**	enable time	0 to $FFFF3B3B_{hex}$	h/min/sec	r	r	r	
1080	32	**E32**	energy counter	0 to $FFFFFFFF_{hex}$	Wh	r	r	r	
1080	33	**E33**	Vi-max-memorized value	0 to 32767	0.1 V DC	r	r	r	
1080	34	**E34**	I-max-memorized value	0 to 32767	0.1 A	r	r	r	-1
1080	35	**E35**	Tmin-memorized value	-128 to 127	°C	r	r	r	
1080	36	**E36**	Tmax-memorized value	-128 to 127	°C	r	r	r	
1080	37	**E37**	Pmin-memorized value	-32768 to 32767	0.01 kW	r	r	r	
1080	38	**E38**	Pmax-memorized value	-32768 to 32767	0.01 kW	r	r	r	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1080 ... 1089	40	**E40**	fault type fault 1, - 2, -3, to fault type fault 10	0, 31 to 56		r	r	r	
1080 ... 1089	41	**E41**	fault time fault 1, -2, -3, to fault time fault 10	0 to FFFF3B3B$_{hex}$	h/min/sec	r	r	r	
1080	45	**E45**	control word	0000 to FFFF$_{hex}$		rw	rw	rw	
1080	46	**E46**	status word	0000 to FFFF$_{hex}$		r	r	r	
1080	47	**E47**	n-field-bus	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	rw	rw	rw	
1080	50	**E50**	device byte 0 to 3 of the String	„FDS“		r	r	r	
1081	50	**E50**	device byte 4 to 7 of the String	„ 402“		r	r	r	
1082	50	**E50**	device byte 8 to 11 of the String	„4/B“		r	r	r	
1083	50	**E50**	device byte 12 to 15 of the String	„ „		r	r	r	
1080	51	**E51**	softw.-vers. b. 0 to 3 of the String	„V 4.“		r	r	r	
1081	51	**E51**	softw.-vers. b. 4 to 7 of the String	„5 „		r	r	r	
1082	51	**E51**	softw.-vers. b. 8-11 of the String	„ „		r	r	r	
1083	51	**E51**	softw.-vers. b. 12-15 of the String	„ „		r	r	r	
1080	52	**E52**	device-number	8000000 ...		r	r	r	
1080	53	**E53**	variant-number	xxxxxxx		r	r	r	
1080	54	**E54**	option-board	0, 1, 2, ...		r	r	r	
1080	55	**E55**	identity-number	0 to 65535		rw	rw	rw	
1080	56	**E56**	parameter set ident.1	0 to 255		rw	rw	rw	
1080	57	**E57**	parameter set ident.2	0 to 255		rw	rw	rw	
1080	58	**E58**	Kommubox b. 0-3 of the String	„KBX“		r	r	-	
1081	58	**E58**	Kommubox b. 4-7 of the String	„ PRO“		r	r	-	
1082	58	**E58**	Kommubox b. 8-11 of the String	„FI V“		r	r	-	
1083	58	**E58**	Kommubox b. 12-15 of the String	„4.5“		r	r	-	
1080	59	**E59**	FAS with Posi-Upgrade	0 to 2		r	-	-	
1080	60	**E60**	reference value selector	FAS/FDS: 0 to 7 SDS: 0 to 31		r	r	r	
1080	61	**E61**	additional ref.value	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	r	r	r	
1080	62	**E62**	actual M-Max	-32768 to 32767	8192 = 100%	r	r	r	
1080	63	**E63**	PID-controller limit	0 to 1		-	r	r	
1080	64	**E64**	brake	0 to 1		-	-	r	
1080	65	**E65**	PID-error	-32768 to 32767	8192 = 100%	r	r	r	
1080	71	**E71**	AE1 scaled	-32767 to 32767	8192 = 100%	r	r	r	
1080	72	**E72**	AE2 scaled	-32767 to 32767	8192 = 100%	-	r	r	
1080	73	**E73**	AE2 scaled 2	-32767 to 32767	8192 = 100%	-	r	r	
1080	80	**E80**	operating condition	0 to 26		r	r	r	
1080	81	**E81**	event level	0 to 3		r	r	r	
1080	82	**E82**	event name	30 to 56		r	r	r	
1080	83	**E83**	warning time	0 to 255	sec	r	r	r	
1080	84	**E84**	active parameter set	1 to 2		r	r	r	
1080	85	**E85**	not saved	0 to 1		r	r	r	
1080	100	**E100**	statusbits	0 to 4294967295		r	r	r	
1080	101	**E101**	control bits	0 to 4294967295		rw	rw	rw	
1080	102	**E102**	torque-limit	-32767 to 32767	8192 = 100% M-mot-N	rw	rw	rw	
1080	103	**E103**	power-limit	-32767 to 32767	8192 = 100% P-mot-N	rw	rw	rw	
1080	104	**E104**	additional RV	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	rw	rw	rw	
1080	105	**E105**	RV-factor	-32767 to 32767	8192 = 100%	rw	rw	rw	
1080	106	**E106**	posi.override	0 to 32767	8192 = 100%	rw	rw	rw	
1080	107	**E107**	Posi.Offset	-2147483647 to 2147483647	**I05** * 10$^{\mathbf{I06}}$	rw	rw	rw	
1080	108	**E108**	wind. diameter	**G12** to **G13**	mm	-	rw	rw	
1080	109	**E109**	M-rot.magnet	-32767 to 32767	8192 = 100%	-	rw	rw	
1080	110	**E110**	analog output	-32767 to 32767	8192 = 100%	-	rw	rw	
1080	111	**E111**	BA2	0 to 1		-	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1080	112	**E112**	BA1	0 to 1		-	rw	rw	
1080	113	**E113**	BA3	0 to 1		-	rw	rw	
1080	114	**E114**	BA4	0 to 1		-	rw	rw	
1080	115	**E115**	BA5	0 to 1		-	rw	rw	
1080	116	**E116**	BA6	0 to 1		-	-	rw	
1080	117	**E117**	BA7	0 to 1		-	-	rw	
1080	118	**E118**	analog output2	-32767 to 32767	8192 = 100%	-	rw	rw	
1080	119	**E119**	reference value	-32767 to 32767	8192 = 100%	rw	rw	rw	
1080	120	**E120**	tension reduction	0 to 8192	8192 = 100%	-	rw	rw	
1080	121	**E121**	PID-reference	-32767 to 32767	8192 = 100%	-	rw	rw	
1080	122	**E122**	winder-roller	-32767 to 32767	8192 = 100%	-	rw	rw	
1080	123	**E123**	sync.offset	2147483648 to -2147483647	°	-	rw	rw	-4
1080	124	**E124**	start position 1	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1080	125	**E125**	synchron n-RV	FAS/FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	-	rw	rw	
1080	126	**E126**	n-Max	FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	rw	rw	rw	
1080	127	**E127**	BE-encoder-position	-32767 to 32767	Increments	r	r	r	
1080	128	**E128**	X20-encoder-position	-32767 to 32767	Increments	-	r	r	
1080	130	**E130**	Posi-Upgrade orderconf.	0 to 2147483647	Increments	r	-	-	
1080	131	**E131**	Posi-Next latched	-2147483648 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	-2
1080	132	**E132**	SSI raw value	±16777215	1/4096 r	-	r	r	

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1100	1600	0	**F00**	BA2-function	0 to 31		-	-	rw	
1100	1600	0	**F00**	relay2-function	0 to 31		rw	rw	-	
1100	1600	1	**F01**	brake release	0 to 300	rpm[1]	rw	rw	-	
1100	1600	2	**F02**	brake set	0 to 300	rpm[1]	rw	rw	-	
1100	1600	3	**F03**	BA2 t-on	0, 32, to 5024	msec	-	-	rw	
1100	1600	3	**F03**	relay2 t-on	0, 32, to 5024		rw	rw	-	
1100	1600	4	**F04**	BA2 t-off	0, 32, to 5024	msec	-	-	rw	
1100	1600	4	**F04**	relay2 t-off	0, 32, to 5024		rw	rw	-	
1100	1600	5	**F05**	BA2 invert	0 to 1		-	-	rw	
1100	1600	5	**F05**	relay2 invert	0 to 1		rw	rw	-	
1100	1600	6	**F06**	t-brake release	0 to 5024	msec	rw	rw	rw	
1100	1600	7	**F07**	t-brake set	0 to 5024	msec	rw	rw	rw	
1100	1600	8	**F08**	brake	0 to 1		-	-	rw	
1100	1600	10	**F10**	relay 1-function	0 to 2		rw	rw	rw	
1100	1600	19	**F19**	quick stop end	0 to 1		rw	rw	rw	
1100	1600	20	**F20**	AE2-function	0 to 14		-	rw	rw	
1100	1600	21	**F21**	AE2-offset	-8192 to 8191	8192 = 100%	-	rw	rw	
1100	1600	22	**F22**	AE2-gain	-32768 to 32767	8192 = 100%	-	rw	rw	
1100	1600	23	**F23**	AE2-lowpass	0 to 10000	msec	-	rw	rw	
1100	1600	24	**F24**	AE2-offset2	-32768 to 32767	8192 = 100%	-	rw	rw	
1100	1600	25	**F25**	AE1-function	0 to 14		rw	rw	rw	
1100	1600	26	**F26**	AE1-offset	-32768 to 32767	8192 = 100%	rw	rw	rw	
1100	1600	27	**F27**	AE1-gain	-32768 to 32767	8192 = 100%	rw	rw	rw	
1100	1600	30	**F30**	BE-logic	0 to 1		rw	rw	rw	
1100	1600	31	**F31**	BE1-function	0 to 32		rw	rw	rw	
1100	1600	32	**F32**	BE2-function	0 to 32		rw	rw	rw	
1100	1600	33	**F33**	BE3-function	0 to 32		rw	rw	rw	
1100	1600	34	**F34**	BE4-function	0 to 32		rw	rw	rw	
1100	1600	35	**F35**	BE5-function	0 to 32		rw	rw	rw	
1100	1600	36	**F36**	BE-increments	30 to 4096	I/r	rw	rw	rw	
1100	1600	37	**F37**	fmax frequency-ref.value	30 to 512	0.1 kHz	rw	rw	-	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1100	1600	38	**F38**	quick stop	0 to 2		rw	rw	rw	
1100	1600	40	**F40**	analog-output1-function	0 to 11		-	rw	rw	
1100	1600	41	**F41**	analog-output1-offset	-819 to 819	8192 = 100%	-	rw	rw	
1100	1600	42	**F42**	analog-output1-gain	-32768 to 32767	8192 = 100%	-	rw	rw	
1100	1600	43	**F43**	analog-output1-absolut	0 to 1		-	rw	rw	
1100	1600	45	**F45**	analog-output2-function	0 to 8	8192 = 100%	-	-	rw	
1100	1600	46	**F46**	analog-output2-offset	-819 to 819	8192 = 100%	-	-	rw	
1100	1600	47	**F47**	analog-output2-gain	-32768 to 32767	8192 = 100%	-	-	rw	
1100	1600	49	**F49**	BE-gear ratio	0 to 32767	0.001	-	rw	rw	
1100	1600	51	**F51**	BE1-invert	0 to 1		rw	rw	rw	
1100	1600	52	**F52**	BE2-invert	0 to 1		rw	rw	rw	
1100	1600	53	**F53**	BE3-invert	0 to 1		rw	rw	rw	
1100	1600	54	**F54**	BE4-invert	0 to 1		rw	rw	rw	
1100	1600	55	**F55**	BE5-invert	0 to 1		rw	rw	rw	
1100	1600	60	**F60**	BE6-function	0 to 32		-	rw	rw	
1100	1600	61	**F61**	BE7-function	0 to 32		-	rw	rw	
1100	1600	62	**F62**	BE8-function	0 to 32		-	rw	rw	
1100	1600	63	**F63**	BE9-function	0 to 32		-	rw	rw	
1100	1600	64	**F64**	BE10-function	0 to 32		-	rw	rw	
1100	1600	65	**F65**	BE11-function	0 to 32		-	rw	rw	
1100	1600	66	**F66**	BE12-function	0 to 32		-	rw	rw	
1100	1600	67	**F67**	BE13-function	0 to 32		-	rw	rw	
1100	1600	68	**F68**	BE14-function	0 to 32		-	rw	rw	
1100	1600	70	**F70**	BE6-invert	0 to 1		-	rw	rw	
1100	1600	71	**F71**	BE7-invert	0 to 1		-	rw	rw	
1100	1600	72	**F72**	BE8-invert	0 to 1		-	rw	rw	
1100	1600	73	**F73**	BE9-invert	0 to 1		-	rw	rw	
1100	1600	74	**F74**	BE10-invert	0 to 1		-	rw	rw	
1100	1600	75	**F75**	BE11-invert	0 to 1		-	rw	rw	
1100	1600	76	**F76**	BE12-invert	0 to 1		-	rw	rw	
1100	1600	77	**F77**	BE13-invert	0 to 1		-	rw	rw	
1100	1600	78	**F78**	BE14-invert	0 to 1		-	rw	rw	
1100	1600	80	**F80**	BA1-function	1 to 32		-	rw	rw	
1100	1600	80	**F81**	Relay2-function	0 to 32		rw	rw	-	
1100	1600	81	**F81**	BA2-function	0 to 32		-	-	rw	
1100	1600	82	**F82**	BA3-function	1 to 32		-	rw	rw	
1100	1600	83	**F83**	BA4-function	1 to 32		-	rw	rw	
1100	1600	84	**F84**	BA5-function	1 to 32		-	rw	rw	
1100	1600	85	**F85**	BA6-function	1 to 32		-	-	rw	
1100	1600	86	**F86**	BA7-function	1 to 32		-	-	rw	

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1120	1620	0	**G00**	PID-controller	0 to 1		-	rw	rw	
1120	1620	1	**G01**	PID-controller Kp	0 to 1000	0.1	-	rw	rw	
1120	1620	2	**G02**	PID-controller Ki	0 to 1000	0.01	-	rw	rw	
1120	1620	3	**G03**	PID-controller Kd	0 to 1000	1msec	-	rw	rw	
1120	1620	4	**G04**	PID-controller limit	-32768 to 32767	8192 = 100%	-	rw	rw	
1120	1620	5	**G05**	PID-controller limit2	-32768 to 32767	8192 = 100%	-	rw	rw	
1120	1620	6	**G06**	PID-controller Kp2	0 to 1000	0.01	-	rw	rw	
1120	1620	10	**G10**	winding operation	0 to 2		-	rw	rw	
1120	1620	11	**G11**	diameter	0 to 2		-	rw	rw	
1120	1620	12	**G12**	min.winding diameter	10 to 3000	mm	-	rw	rw	
1120	1620	13	**G13**	max.winding diameter	10 to 3000	mm	-	rw	rw	
1120	1620	14	**G14**	begin.winding diameter	10 to 3000	mm	-	rw	rw	
1120	1620	15	**G15**	overdrive ref.value	FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	-	rw	rw	
1120	1620	16	**G16**	diam.calculator ramp	0 to 32767	0.01 mm/sec	-	rw	rw	
1120	1620	17	**G17**	tension reduction	0 to 100	%	-	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1120	1620	19	**G19**	actual winding diameter	0 to 3000	mm	-	r	r	
1120	1620	20	**G20**	electronic gear	0 to 3		-	rw	rw	
1120	1620	21	**G21**	speed master	1 to 2147483647		-	rw	rw	
1120	1620	22	**G22**	speed slave	1 to 2147483647		-	rw	rw	
1120	1620	23	**G23**	Kp synchron	0 to 100	1 / sec	-	rw	rw	
1120	1620	24	**G24**	max.synchron difference	0 to 30000	°	-	rw	rw	
1120	1620	25	**G25**	synchron reset	0 to 3		-	rw	rw	
1120	1620	26	**G26**	n-correction-Max.	FDS: 0 to 12000 SDS: 0 to 6000	rpm[1]	-	rw	rw	
1120	1620	27	**G27**	synchronous encoder	FDS: 0 to 1 SDS: 0 to 2		-	rw	rw	
1120	1620	28	**G28**	n-Master	FDS: -12000 to 12000 SDS: -6000 to 6000	rpm[1]	-	r	r	
1120	1620	29	**G29**	synchron difference	2147483648 to -2147483647	°	-	r	r	-4
1120	1620	30	**G30**	speed feed forward	0 to 100	%	-	rw	rw	
1120	1620	31	**G31**	reference direction	0 to 1		-	rw	rw	
1120	1620	32	**G32**	reference speed fast	0 to 12000	rpm[1]	-	rw	rw	
1120	1620	33	**G33**	reference speed slow	0 to 12000	rpm[1]	-	rw	rw	
1120	1620	35	**G35**	ref.encoder signal 0	0 to 1		-	rw	rw	
1120	1620	38	**G38**	synchronous offset	-2147483648 to 2147483647	0.1 °	-	rw	rw	
1120	1620	40	**G40**	static friction torque	0 to 32767	0.01 Nm	-	rw	rw	
1120	1620	41	**G41**	dynamic friction torque	0 to 32767	0.01 Nm	-	rw	rw	
1120	1620	42	**G42**	T-dyn lowpass	0 to 10000	msec	-	rw	rw	

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1140	1640	20	**H20**	X20-function	FDS: 0 to 5 SDS: 0 to 4		-	rw	rw	
1140	1640	21	**H21**	encodersim. increments	0 to 4		-	rw	rw	
1140	1640	22	**H22**	X20-increments	30 to 4096		-	rw	rw	
1140	1640	23	**H23**	X20-gear ratio	0 to 32767	0.001	-	rw	rw	
1140	1640	24	**H24**	X20-zeroPos.	0 to 3600	0.1°	-	rw	rw	
1140	1640	31	**H31**	resolver poles	2, 4, to 16		-	-	rw	
1140	1640	32	**H32**	commutation-offset	0 to 3600	0.1 ° elec.	-	-	rw	
1140	1640	40	**H40**	X41-function	0 to 3		-	-	rw	
1140	1640	41	**H41**	X41-increments	30 to 4096		-	-	rw	
1140	1640	42	**H42**	X41-gear ratio	0 to 32767	0.001	-	-	rw	
1140	1640	60	**H60**	SSI-invert	0 to 1		-	rw	rw	
1140	1640	61	**H61**	SSI-coding	0 to 1		-	rw	rw	
1140	1640	62	**H62**	SSI-data bits	24 to 25		-	rw	rw	

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1160	0	**I00**	position range	0 to 1		rw	rw	rw	
1160	1	**I01**	circular length	0 to 2147483647	**I05** * 10 ^ **I06**	rw	rw	rw	
1160	2	**I02**	posi.encoder	FDS: 0 to 2 SDS: 0 to 3		-	rw	rw	
1160	3	**I03**	direction optimization	0 to 1		rw	rw	rw	
1160	4	**I04**	move direction	0 to 2		rw	rw	rw	
1160	5	**I05**	measure unit selection	0 to 4		rw	rw	rw	
1160	6	**I06**	decimal digits	0 to 3		rw	rw	rw	
1160	7	**I07**	way/revolution numerator	1 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	8	**I08**	way/revolution denomin.	1 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	9	**I09**	measurement unit	xxxx		rw	rw	rw	
1160	10	**I10**	max.speed	0 to 2147483647	**I05**/sec * 10^{I06}	rw	rw	rw	
1160	11	**I11**	max.acceleration	0 to 2147483647	**I05**/sec² * 10^{I06}	rw	rw	rw	
1160	12	**I12**	tip speed	0 to 2147483647	**I05**/sec * 10^{I06}	rw	rw	rw	

[1] rpm: For FAS / FDS: Limit value is dependant to the number of poles.

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1160	15	**I15**	accel-override	0 to 1		rw	rw	rw	
1160	16	**I16**	S-ramp	0 to 32767	msec	rw	rw	rw	
1160	16	**I19**	ENA-interrupting	0 to 1		rw	rw	rw	
1160	20	**I20**	Kv-factor	0 to 100		rw	rw	rw	
1160	21	**I21**	max.following error	0 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	22	**I22**	target window	0 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	23	**I23**	dead band pos. control.	0 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	25	**I25**	speed feed forward	0 to 8192	8192 = 100%	rw	rw	rw	
1160	30	**I30**	reference mode	0 to 4		rw	rw	rw	
1160	31	**I31**	reference direction	0 to 1		rw	rw	rw	
1160	32	**I32**	reference speed fast	0 to 2147483647	**I05**/sec * 10^{I06}	rw	rw	rw	
1160	33	**I33**	reference speed slow	0 to 2147483647	**I05**/sec * 10^{I06}	rw	rw	rw	
1160	34	**I34**	reference position	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	35	**I35**	ref.encoder signal 0	0 to 1		rw	rw	rw	
1160	36	**I36**	continuous reference	0 to 1		rw	rw	rw	
1160	37	**I37**	power-on reference	0 to 2		rw	rw	rw	
1160	38	**I38**	reference block	FAS/FDS: 0 to 8 SDS: 0 to 32		rw	rw	rw	
1160	40	**I40**	posi.-step memory	0 to 1		rw	rw	rw	
1160	50	**I50**	software-stop -	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	51	**I51**	software-stop +	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	60	**I60**	electronic cam 1 begin	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	61	**I61**	electronic cam 1 end	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	70	**I70**	position-offset	0 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1160	80	**I80**	actual position	-2147483647 to 2147483647	**I05** * 10^{I06}	r	r	r	-2
1160	81	**I81**	target position	-2147483647 to 2147483647	**I05** * 10^{I06}	r	r	r	-2
1160	82	**I82**	active process block	FAS/FDS: 0 to 8 SDS: 0 to 32		r	r	r	
1160	83	**I83**	selected process block	FAS/FDS: 0 to 8 SDS: 0 to 32		r	r	r	
1160	84	**I84**	following error	-2147483647 to 2147483647	**I05** * 10^{I06}	r	r	r	-2
1160	85	**I85**	in position	0 to 1		r	r	r	
1160	86	**I86**	referenced	0 to 1		r	r	r	
1160	87	**I87**	electronic cam 1	0 to 1		r	r	r	
1160	88	**I88**	speed	-2147483647 to 2147483647	**I05**/sec * 10^{I06}	r	r	r	-2
1160	90	**I90**	switchmemory 1	0 to 1		r	r	r	
1160	91	**I91**	switchmemory 2	0 to 1		r	r	r	
1160	92	**I92**	switchmemory 3	0 to 1		r	r	r	

The **POSIDYN**® SDS 4000 servo inverter supports 32 process blocks. The frequency inverter series **POSIDRIVE**® FAS 4000 and **POSIDRIVE**® FDS 4000 supports eight process blocks.
All devices have the same parameters and the same access to these parameters for these first eight process blocks. (These parameters are accessed via PNU 1180 with subindex 10 to 88 for **J10** to **J88** and via PNU 1220 with subindex 10 to 80 for **L10** to **L80**.) Here you will notice that there is an easy-to-remember relationship between the menu coordinates on the device and the values for the subindex.
In addition, there is another type of addressing for all 32 process blocks of the SDS. The process block number is used as the subindex, and each element of a process block has one of the parameter numbers 10 to 20.

List of the **J..** parameters which are not assigned to any process block:

PNU	Ssub index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1180	0	**J00**	posi.start	0 to 1 (set 1 for start)		rs	rs	rs	
1181	0	**J00**	result posi.start	0 to 21		r	r	r	
1180	1	**J01**	posi.step	0 to 1 (set 1 for start)		rs	rs	rs	
1181	0	**J01**	result posi step	0 to 21		r	r	r	
1180	2	**J02**	process block number	0 to 8		rw	rw	rw	
1180	4	**J04**	teach-in	0 to 1 (set 1 for start)		rs	rs	rs	
1181	4	**J04**	result teach-in	0 to 21		r	r	r	
1180	5	**J05**	start reference	0 to 1 (set 1 for start)		rs	rs	rs	
1181	5	**J05**	result start reference	0 to 21		r	r	r	

List of the **J..** parameters for the first eight process blocks organized by FAS/FDS-compatible type of addressing:

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1180	10	**J10**	position	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1180	11	**J11**	position mode	0 to 3		rw	rw	rw	
1180	12	**J12**	speed	0 to 2147483647	**I05** / sec * 10^{I06}	rw	rw	rw	
1180	13	**J13**	accel	0 to 2147483647	**I05** / sec² * 10^{I06}	rw	rw	rw	
1180	14	**J14**	decel	0 to 2147483647	**I05** / sec² * 10^{I06}	rw	rw	rw	
1180	15	**J15**	repeat number	0 to 254		rw	rw	rw	
1180	16	**J16**	next block	FAS/FDS: 0 to 8 SDS: 0 to 32		rw	rw	rw	
1180	17	**J17**	next start	0 to 4		rw	rw	rw	
1180	18	**J18**	delay	0 to 65535	msec	rw	rw	rw	
1180	20 ... 28	**J20 ... J28**	position ... delay	see process block 1		rw	rw	rw	
1180	30 ... 38	**J30 ... J38**	position ... delay	see process block 1		rw	rw	rw	
1180	40 ... 48	**J40 ... J48**	position ... delay	see process block 1		rw	rw	rw	
1180	50 ... 58	**J50 ... J58**	position ... delay	see process block 1		rw	rw	rw	
1180	60 ... 68	**J60 ... J68**	position ... delay	see process block 1		rw	rw	rw	
1180	70 ... 78	**J70 ... J78**	position ... delay	see process block 1		rw	rw	rw	
1180	80 ... 88	**J80 ... J88**	position ... delay	see process block 1		rw	rw	rw	

List of the parameters of all 32 process blocks organized by the new type of addressing (**only for SDS**):

PNU	Subindex = no. of the process block	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
10	1, 2, ..., 31, 32	**Jxx0**	position	-2147483647 to 2147483647	**I05** * 10^{I06}	-	-	rw	
11	1, 2, ..., 31, 32	**Jxx1**	position mode	0 to 3		-	-	rw	
12	1, 2, ..., 31, 32	**Jxx2**	speed	0 to 2147483647	**I05** / sec * 10^{I06}	-	-	rw	
13	1, 2, ..., 31, 32	**Jxx3**	accel	0 to 2147483647	**I05** / sec² * 10^{I06}	-	-	rw	
14	1, 2, ..., 31, 32	**Jxx4**	decel	0 to 2147483647	**I05** / sec² * 10^{I06}	-	-	rw	
15	1, 2, ..., 31, 32	**Jxx5**	repeat number	0 to 254		-	-	rw	
16	1, 2, ..., 31, 32	**Jxx6**	next block	0 to 32		-	-	rw	
17	1, 2, ..., 31, 32	**Jxx7**	next start	0 to 4		-	-	rw	
18	1, 2, ..., 31, 32	**Jxx8**	delay	0 to 65535	msec	-	-	rw	
20	1, 2, ..., 31, 32	**Lxx0**	brake	0 to 1		-	-	rw	
21	1, 2, ..., 31, 32	**Lxx1**	switch A	0 to 4		-	-	rw	
22	1, 2, ..., 31, 32	**Lxx2**	switch B	0 to 4		-	-	rw	

The parameters of the **K..** group are commentary texts which are only visible in the FDS-Tool. With FDS Tool, commentary texts can be entered, saved and printed to provide extra information on a configuration. Parameters **K00** to **K03** (PNU 1200 to 1203) have default values and can be overwritten if necessary. Together they represent the configuration information (name of the clerk, file name and date of the FDS file). The parameter **K00** (P-user) can be changed via fieldbus.

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1200	0	**K00**	P-user B0-3	" VOR"		rw	rw	rw	
1201	0	**K00**	P-user B4-7	"NAME"		rw	rw	rw	
1202	0	**K00**	P-user B8-11	"und"		rw	rw	rw	
1203	0	**K00**	P-user B12-15	"NAME"		rw	rw	rw	
1200	1	**K01**	P-Date B0-3	"24.0"		rw	rw	rw	
1201	1	**K01**	P-Date B4-7	"2.20"		rw	rw	rw	
1202	1	**K01**	P-Date B8-11	"00 "		rw	rw	rw	
1203	1	**K01**	P-Date B12-15	" "		rw	rw	rw	
1200	2	**K02**	P-filename B0-3	"TEST"		rw	rw	rw	
1201	2	**K02**	P- filename B4-7	"1234"		rw	rw	rw	
1202	2	**K02**	P- filename B8-11	".FDS"		rw	rw	rw	
1203	2	**K02**	P- filename B12-15	" "		rw	rw	rw	

14. Parameter list

List of the **L..** parameters for the first eight process blocks organized by FDS-compatible type of addressing:

PNU	sub-index	coor-dinate	name	value range	scaling / measure unit	access			Round-ing
						FAS	FDS	SDS	
1220	10	**L10**	brake	0 to 1		rw	rw	rw	
1220	11	**L11**	switch A	0 to 4		rw	rw	rw	
1220	12	**L12**	switch B	0 to 4		rw	rw	rw	
1220	20	**L20**	brake	0 to 1		rw	rw	rw	
1220	21	**L21**	switch A	0 to 4		rw	rw	rw	
1220	22	**L22**	switch B	0 to 4		rw	rw	rw	
1220	30	**L30**	brake	0 to 1		rw	rw	rw	
1220	31	**L31**	switch A	0 to 4		rw	rw	rw	
1220	32	**L32**	switch B	0 to 4		rw	rw	rw	
1220	40	**L40**	brake	0 to 1		rw	rw	rw	
1220	41	**L41**	switch A	0 to 4		rw	rw	rw	
1220	42	**L42**	switch B	0 to 4		rw	rw	rw	
1220	50	**L50**	brake	0 to 1		rw	rw	rw	
1220	51	**L51**	switch A	0 to 4		rw	rw	rw	
1220	52	**L52**	switch B	0 to 4		rw	rw	rw	
1220	60	**L60**	brake	0 to 1		rw	rw	rw	
1220	61	**L61**	switch A	0 to 4		rw	rw	rw	
1220	62	**L62**	switch B	0 to 4		rw	rw	rw	
1220	70	**L70**	brake	0 to 1		rw	rw	rw	
1220	71	**L71**	switch A	0 to 4		rw	rw	rw	
1220	72	**L72**	switch B	0 to 4		rw	rw	rw	
1220	80	**L80**	brake	0 to 1		rw	rw	rw	
1220	81	**L81**	switch A	0 to 4		rw	rw	rw	
1220	82	**L82**	switch B	0 to 4		rw	rw	rw	

PNU	sub-index	coor-dinate	name	value range	scaling / measure unit	access			Round-ing
						FAS	FDS	SDS	
1240	50	**M50**	F1-jump to	0 to 0x1A*63*	1. byte 1=group **A**, ... *2. byte* *00..99 numbers in group*	rw	rw	rw	
1240	51	**M51**	F1-lower limit	-2147483647 to 2147483647	scaling see parameter	rw	rw	rw	
1240	52	**M52**	F1-upper limit	-2147483647 to 2147483647		rw	rw	rw	
1240	60	**M60**	F2-jump to	0 to 0x1A*63*	s. **M50**	rw	rw	rw	
1240	61	**M61**	F2-lower limit	-2147483647 to 2147483647	scaling see parameter	rw	rw	rw	
1240	62	**M62**	F2-upper limit	-2147483647 to 2147483647		rw	rw	rw	
1240	70	**M70**	F3-jump to	0 to 0x1A*63*	s. **M50**	rw	rw	rw	
1240	71	**M71**	F3-lower limit	-2147483647 to 2147483647	scaling see parameter	rw	rw	rw	
1240	72	**M72**	F3-upper limit	-2147483647 to 2147483647		rw	rw	rw	
1240	80	**M80**	F4-jump to	0 to 0x1A*63*	s. **M50**	rw	rw	rw	
1240	81	**M81**	F4-lower limit	-2147483647 to 2147483647	scaling see parameter	rw	rw	rw	
1240	82	**M82**	F4-upper limit	-2147483647 to 2147483647		rw	rw	rw	

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1260	10	**N10**	s1-position	-2147483647 ... 2147483647	**I05** * $10^{\mathbf{I06}}$	rw	rw	rw	
1260	11	**N11**	s1-method	0 to 2		rw	rw	rw	
1260	12	**N12**	s1-memory1	0 to 3		rw	rw	rw	
1260	13	**N13**	s1-memory2	0 to 3		rw	rw	rw	
1260	14	**N14**	s1-memory3	0 to 3		rw	rw	rw	
1260	20	**N20**	s2-position	-2147483647 to 2147483647	**I05** * $10^{\mathbf{I06}}$	rw	rw	rw	
1260	21	**N21**	s2-method	0 to 2		rw	rw	rw	
1260	22	**N22**	s2-memory1	0 to 3		rw	rw	rw	
1260	23	**N23**	s2-memory2	0 to 3		rw	rw	rw	
1260	24	**N24**	s2-memory3	0 to 3		rw	rw	rw	
1260	30	**N30**	s3-position	-2147483647 to 2147483647	**I05** * $10^{\mathbf{I06}}$	rw	rw	rw	
1260	31	**N31**	s3-method	0 to 2		rw	rw	rw	
1260	32	**N32**	s3-memory1	0 to 3		rw	rw	rw	

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1260	33	**N33**	s3-memory2	0 to 3		rw	rw	rw	
1260	34	**N34**	s3-memory3	0 to 3		rw	rw	rw	
1260	40	**N40**	s4-position	-2147483647 to 2147483647	**I05** * 10^{I06}	rw	rw	rw	
1260	41	**N41**	s4-method	0 to 2		rw	rw	rw	
1260	42	**N42**	s4-memory1	0 to 3		rw	rw	rw	
1260	43	**N43**	s4-memory2	0 to 3		rw	rw	rw	
1260	44	**N44**	s4-memory3	0 to 3		rw	rw	rw	

The parameters of the **U..** group are also not visible in the menu of the inverter. They can only be specified via fieldbus and by FDS Tool:
Reactions of the inverter to events can be manipulated by the U.. parameters.

0: Off; No reaction to the event

1: Message; The event is indicated in plain text (see Ux2 text) on Controlbox or on the display of the FDS.

2: Warning; When it occurs, the event is indicated as under "*1:Message*." After a tolerance time expires (Ux1), the inverter assumes malfunction status.

3*: Fault;* When it occurs, the event is indicated as under "*1:Message*." The inverter immediately assumes malfunction status.

PNU(s) Pset 1/2		Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
							FAS	FDS	SDS	
1400	-	0	**U00**	level low voltage	2 to 3		rw	rw	rw	
1400	-	1	**U01**	time low voltage	1 to 10	sec	rw	rw	rw	
1400	-	2	**U02**	level low voltage device i2t	0 to 3		-	-	rw	
1400	-	3	**U03**	time low voltage device i2t	1 to 120	sec	-	-	rw	
1400	1900	10	**U10**	level temp.limit mot.i2t	0 to 2		rw	rw	rw	
1400	1900	11	**U11**	time temp.limit mot.i2t	1 to 120	sec	rw	rw	rw	
1400	1900	20	**U20**	level drive overload	0 to 3		rw	rw	rw	
1400	1900	21	**U21**	time drive overload	1 to 120	sec	rw	rw	rw	
1400	1900	22	**U22**	text drive overload	xxxx		rw	rw	rw	
1400	1900	30	**U30**	level accelerat.overload	0 to 3		rw	rw	rw	
1400	1900	31	**U31**	time accelerat.overload	1 to 10	sec	rw	rw	rw	
1400	1900	32	**U32**	text accelerat.overload	xxxx		rw	rw	rw	
1400	1900	40	**U40**	level break overload	0 to 3		rw	rw	rw	
1400	1900	41	**U41**	time break overload	1 to 10	sec	rw	rw	rw	
1400	1900	42	**U42**	text break overload	xxxx		rw	rw	rw	
1400	1900	50	**U50**	level operating range	0 to 3		rw	rw	rw	
1400	1900	51	**U51**	time operating range	1 to 120		rw	rw	rw	
1400	1900	52	**U52**	text operating range	xxxx		rw	rw	rw	
1400	1900	60	**U60**	level following error	0 to 3		rw	rw	rw	
1400	1900	61	**U61**	time following error	0 to 32767	msec	rw	rw	rw	
1400	1900	70	**U70**	level posi.refused	0 to 3		rw	rw	rw	

The indications for the number of faults are located in group **Z..** as with FDS Tool. They can be viewed in the menu of the inverter with **E42**.

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1500	31	**Z31**	short circuit/to ground	0 to 65535		r	r	r	
1500	32	**Z32**	short circ./toGround int	0 to 65535		r	r	r	
1500	33	**Z33**	overcurrent	0 to 65535		r	r	r	
1500	34	**Z34**	hardware fault	0 to 65535		r	r	r	
1500	35	**Z35**	watchdog	0 to 65535		r	r	r	
1500	36	**Z36**	high voltage	0 to 65535		r	r	r	
1500	37	**Z37**	n-feedback	0 to 65535		r	r	r	
1500	38	**Z38**	temp.limit device sensor	0 to 65535		r	r	r	
1500	39	**Z39**	temp.limit device i2t	0 to 65535		r	r	r	
1500	40	**Z40**	invalid data	0 to 65535		r	r	r	
1500	41	**Z41**	temp.limit motor TMP	0 to 65535		r	r	r	
1500	42	**Z42**	temp.limit motor resist.	0 to 65535		r	r	r	
1500	43	**Z43**	line break ref.value	0 to 65535		r	r	r	
1500	44	**Z44**	extern fault	0 to 65535		r	r	r	
1500	45	**Z45**	temp.limit motor i2t	0 to 65535		r	r	r	
1500	46	**Z46**	low voltage	0 to 65535		r	r	r	
1500	47	**Z47**	drive overload	0 to 65535		r	r	r	

PNU	Sub-index	Coor-dinate	Name	Value range	Scaling / measure unit	Access			Round-ing
						FAS	FDS	SDS	
1500	48	**Z48**	acceleration overload	0 to 65535		r	r	r	
1500	49	**Z49**	deceleration overload	0 to 65535		r	r	r	
1500	50	**Z50**	operating range	0 to 65535		r	r	r	
1500	51	**Z51**	posi.refused	0 to 65535		r	r	r	
1500	52	**Z52**	communication	0 to 65535		r	r	r	
1500	53	**Z53**	stop input	0 to 65535		r	r	r	
1500	54	**Z54**	following error	0 to 65535		r	r	r	
1500	55	**Z55**	option-board	0 to 65535		r	r	r	
1500	56	**Z56**	overspeed	0 to 65535		-	-	r	

15 NOTES

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