

INSTRUCTION MANUAL



KEB COMBICOM

INTERBUS V6.0



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1. General

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1.1 Product Description

The described module is an external InterBus-remote bus controller board for KEB frequency inverters. It is typically mounted in the control cabinet beside the inverter and connected with the inverter by way of a short 2-core cable. For special applications several inverters can be connected to one InterBus-controller board.

The voltage supply (+24 VDC) is supplied externally (control cabinet).

Through the use of Supi III as protocol chip the extended diagnostic possibilities are available.

Via the PCP channel 0, 1, 2 or 3 hardware InterBus register words can be configured for the process channel.

1.2 Definitions

PCP (Peripheral Communication Protocol)

Serves for reading/writing of all objects via the communication interface.

Prozess data Out (PD Out)

Fast writing of data from the control to the inverter without addressing. The target parameter in the inverter has been defined beforehand.

Prozess data In (PD In)

Cyclic reading of data from inverter to control. The source parameter in the inverter has been defined beforehand.

Host

InterBus-Master, e.g. PLC with InterBus-controller board, PC with InterBus-card, etc.

1.3 Technical Data

Communication-capable InterBus-module on 2-wire remote bus, supports a communication- and 0...3 process data words.

IB-2-wire remote bus	RS485
IB-ID-Code	227
Input IB_in	SUB-MIN-9-pole-MALE, DIN 41652 Part 1
Output IB_out	SUB-MIN-9-pole-FEMALE, DIN 41652 Part 1
Output to inverter	RS485 half duplex
Voltage supply	24VDC +/- 20 %
Current input	max 100 mA
Isolation	500 VDC
Housing	mountable on all common DIN EN mounting rails
Housing dimensions	B = 23 mm, H = 75 mm, T = 110 mm
Operating temperature	-10 to 45 °Celsius
Part number	00.B0.0BK-K001

2. Communication Interface (PCP)

After bus start the connection from the host to the controller board is established by way of the service *Context Management Initiate*. The connection is not aborted independently by the communication user.

The communication user reports the current physical and logical status via the function *VFD Support Status*. In case of interrupted connection to the inverter the physical status is set to NOT READY FOR OPERATION.

On executing the service *VFD Support Identify* the communication user identifies himself with manufacturer-specific data.

All parameters of the inverter are readable via the PMS-service *Variable Access Read*.

The operating parameters are writable via the PMS-service *Variable Access Write* or *Variable Access Information Report*. The objects in the index range 603Fh to 6049h (DRIVECOM parameters) are not available in all inverter types.

Furthermore, all parameters of the inverter can be reached directly via the objects 2000h to 5FF9h without conversion in the communication user (see example *Object Directory*).

2.1 Process Data Configuration

The process data assignment is adjusted by way of the PCP-objects 6000h and 6001h. The number of process data words is adjustable between 0 and 3 words by means of object 5FFFh. This change must be stored (object 5FFCh) and is activated only after Power-On or Bus-reset.

When changing only one process data value OUT **all active** process data OUT are transferred to the inverter in the sequence PD OUT1 / PD OUT2 / PD OUT2. Only then new PD-OUT values are accepted.

The IN-process data are transferred from the inverter in the sequence PD IN1 / PD IN2 / PD IN3. Only if all IN-process data are read successfully they are written in the same IB-cycle to the Interbus. To ensure the data consistency for 32 Bit parameters, the frozen 16 Bit activation parameter must be set e.g. to PD IN2 and the second frozen 16 Bit parameter must be set to PD IN3.

Whether a process data word is active depends on the adjustment of the process data length (object 5FFFh) and the process data activation (object 5FFEh for the IN-process data and object 6002h for the OUT-process data).

2.2 Communication Relation List

The communication relation list of the controller board contains following entries:

Communication reference: 2	
Physical addresss	= 0 (Host)
Max. number of outstanding client services	= 1
Max. number of outstanding server services	= 1
Max. PDU-length Request/Response	= 64 Byte
Max. PDU-length Indication/Confirmation	= 64 Byte
Supported services as client	= None
Supported services as server	= Get-OV-Long, Read, Write and Information-Report

2.3 PCP-Channel-Objects

Index	2000h...5FF9h
Name	KEB_Object
Description	Via these objects all parameters of the inverter can be addressed directly. The parameter addresses of the inverter are found in the corresponding Application Manual. (Parameter address= Index - 2000h; Index = Parameter address+2000h)
Type	SIMPLE_VAR_OBJECT
Object length	2 Byte
Example	Write Request Index= 2007h; Subindex = 0 Data = 001Fh -> The parameter with the address 7 is set to value 001Fh.
Example	Read Request Index = 201Ah; Subindex = 0 -> Data = 1234h The parameter with the address 26 contains the value 1234h.

Index	5FFAh
Name	Handshake enable
Type	BOOLEAN
Object length	1Byte

Activates or deactivates the process data handshake bit.
On activation the most significant bit in the 1. process data word IN is changed each time, when all active process data OUT has been transferred to the inverter. This enables the fastest possible process data setting of new values.

Write: Index=5FFAh;Subindex=0;Data=FFh ->activating handshake bit
Write: Index=5FFAh;Subindex=0;Data=00h ->deactivating handshake bit (default value)
Read: Index=5FFAh;Subindex=0 ->Data=00h : deactivated->Data=FFh : activated
Note: When activated the most significant bit in the 1. process data word IN is NOT part of the process data value (bit must be masked out).

Index	5FFBh
Name	Baud Rate
Type	SIMPLE_VAR_OBJECT
Object length	1Byte

With this object the baud rate used between bus controller board and inverter is defined or read. A newly written baud rate is immediately active.

Write: Index=5FFBh;Subindex=0;Data=0h ->Baud rate = 9600 Baud (default value)
Write: Index=5FFBh;Subindex=0;Data=1h ->Baud rate = 19200 Baud
Write: Index=5FFBh;Subindex=0;Data=2h ->Baud rate = 38400 Baud
Read: Index=5FFBh;Subindex=0 ->Data=00h:9600 ->Data=01h:19200 ->Data=02h:38400

Note: The connected inverters must also be adjusted to the same baud rate.

Index	5FFCh
Name	Store settings
Type	BOOLEAN
Object length	1Byte

With this object the current settings of objects 5FFAh...6002h or their default values can be stored non-volatile. The settings are used again at the next Power-On or bus reset.

Write: Index=5FFCh;Subindex=0;Data=FFh ->all current settings are stored
Write: Index=5FFCh;Subindex=0;Data=00h ->default values are stored
Note:The default values become active after Power-On or bus reset.

Index Name **6000h (DRIVECOM)**
Name **None**
Type RECORD_OBJECT
Object length 19 Bytes
Architecture of record:

Subindex		Length	Default value
1	PD-In length in bytes	1 Byte	04h
2	Index IN-Data-1 High	2 Bytes	6041h
3	Subindex IN-Data-1 High	1 Byte	always 00h
4	Index IN-Data-1 Low	2 Bytes	always 0000h
5	Subindex IN-Data-1 Low	1 Byte	always 00h
6	Index IN-Data-2 High	2 Bytes	6044h
7	Subindex IN-Data-2 High	1 Byte	always 00h
8	Index IN-Data-2 Low	2 Bytes	always 0000h
9	Subindex IN-Data-2 Low	1 Byte	always 00h
10	Index IN-Data-3 High	2 Bytes	400Eh
11	Subindex IN-Data-3 High	1 Byte	always 00h
12	Index IN-Data-3 Low	2 Bytes	always 0000h
13	Subindex IN-Data-3 Low	1 Byte	always 00h

With this object the assignment of the IN-process data register can be adjusted or read. According to the profile DRIVECOM each process data byte must be configurable, but only the high bytes are changeable, since both process data bytes are always needed for one PD-word. For a change only the elements (subindex) 2, 6 and 10 are writable with values unequal 0. A change becomes effective immediately.

Element 1 (process data IN-length) indicates the actual physical process data register length and cannot be changed (see object 5FFFh).

Write: Index=6000h;Subindex=2;
DATA=xxxxh -> Index xxxxh is placed on the 1. process data word IN.
Write: Index=6000h;Subindex=6;
DATA=xxxxh -> Index xxxxh is placed on the 2. process data word IN.
Write: Index=6000h;Subindex=10;
DATA=xxxxh -> Index xxxxh is placed on the 3. process data word IN.

Note: The number of the actually used IN-words also depends on object 5FFFh.

Index **6001h** **(DRIVECOM)**
Name **None**
Type RECORD_OBJECT
Object length 19 Bytes
Architecture of record:

Subindex		Length	Default value
1	PD-Out length in bytes	1 Byte	04h
2	Index OUT-Data-1 High	2 Bytes	6040h
3	Subindex OUT-Data-1 High	1 Byte	always 00h
4	Index OUT-Data-1 Low	2 Bytes	always 0000h
5	Subindex OUT-Data-1 Low	1 Byte	always 00h
6	Index OUT-Data-2 High	2 Bytes	6042h
7	Subindex OUT-Data-2 High	1 Byte	always 00h
8	Index OUT-Data-2 Low	2 Bytes	always 0000h
9	Subindex OUT-Data-2 Low	1 Byte	always 00h
10	Index OUT-Data-3 High	2 Bytes	4910h
11	Subindex OUT-Data-3 High	1 Byte	always 00h
12	Index OUT-Data-3 Low	2 Bytes	always 0000h
13	Subindex OUT-Data-3 Low	1 Byte	always 00h

With this object the assignment of the OUT process data register can be adjusted or read. According to the profile DRIVECOM each process data byte must be configurable, but only the high bytes are changeable, since both process data bytes are always needed for one PD-word. For a change only the elements (subindexes) 2, 6 and 10 are writable with values unequal 0. The element 1 (process data OUT-length) states the current physical process data register length and cannot be changed (see object 5FFFh). By writing on this object the corresponding process data OUT-word is deactivated and must be enabled again with object 6002h (after correct adjustment of process data values).

Write: Index=6001h;Subindex=2;
DATA=xxxxh -> Index xxxhx is placed on the 1. process data word OUT.
Write: Index=6001h;Subindex=6;
DATA=xxxxh -> Index xxxhx is placed on the 2. process data word OUT.
Write: Index=6001h;Subindex=10;
DATA=xxxxh -> Index xxxhx is placed on the 3. process data word OUT.
Note: The number of actually used OUT-words also depends on object 5FFFh.

Index **6002h** **(DRIVECOM)**
Name **None**
Type SIMPLE_VAR_OBJECT
Object length 1Byte

Activates/deactivates the process data OUT processing. Deactivated PD-words are not written to the inverter. The activation/deactivation takes place immediately after the writing.

Write: Index=6002h;Subindex=0;
DATA 000c0b0a (binary)
a=1 -> 1.PD-Word OUT activating; a=0->deactivating
b=1 -> 2.PD-Word OUT activating; b=0->deactivating
c=1 -> 3.PD-Word OUT activating; c=0->deactivating
all other bits are ignored
Read: Index=6002h;Subindex=0;
DATA 00ccbbaa (binary) ; default value=00001111(binary)
a=1 -> 1.PD-Word OUT is active; a=0->deactive
b=1 -> 2.PD-Word OUT is active; b=0->deactive
c=1 -> 3.PD-Word OUT is active; c=0->deactive

Note: The number of actually used OUT-words also depends on object 5FFFh.

Index	603Fh (DRIVECOM)
Name	None
Description	Indicates the error code of the inverter in case of malfunction.
Type	OCTET_STRING
Object length	2 Byte
Significance	Refer to the description of parameters of the corresponding inverter control board.
Index	6040h (DRIVECOM)
Name	None
Description	Control word - Controls the operating states of the inverter (refer to state diagram Status/Control Word).
Type	OCTET_STRING
Object length	16 BIT
Significance	Bit 0 1 = switch on (0=switch off) Bit 1 1 = do not disconnect voltage Bit 2 1 = no fast stop Bit 3 1 = operation enabled (0=operation disabled) Bit 4 1 = do not disable RFG Bit 5 1 = do not stop RFG Bit 6 1 = do not disable setpoint value Bit 7 0 ->1 = malfunction reset Bit 8 at present without function Bit 9 at present without function Bit 10 at present without function Bit 11 at present without function Bit 12 at present without function Bit 13 at present without function Bit 14 at present without function Bit 15 at present without function
Example	Write Request Index = 6040h; Subindex = 0 Data = 0006h -> inverter is shut down Data = 003Fh -> operation enabled; setpoint value disabled Data = 007Fh -> operation and setpoint value enabled
Note:	The example doesn't work when at the same time the control word is adjusted by way of process data.

Index	6041h (DRIVECOM)
Name	None
Description	Status Word - Indicates the status of the inverter (refer to state diagram Status/Control Word).
Type	OCTET_STRING
Object length	16 BIT
Significance	Bit 0 1 = ready for switch-on Bit 1 1 = switched on Bit 2 1 = operation enabled Bit 3 1 = malfunction Bit 4 1 = no voltage disconnection Bit 5 1 = no fast stop Bit 6 1 = switch-on inhibited Bit 7 1 = warning Bit 8 at present without significance Bit 9 1 = no local operation active Bit 10 1 = setpoint value reached Bit 11 1 = limiting active Bit 12 at present without significance Bit 13 at present without significance Bit 14 at present without significance Bit 15 handshake Out-process data
Example	Read Request Index = 6041h; Subindex = 0 -> Data = 1234h Operation enabled (no malfunction) Clockwise rotation active; setpoint value not yet reached Index = 6041h -> Data = 1228h State = Malfunction - Voltage disconnection because of malfunctioning. The cause of malfunction can be read via object 603Fh. This state can be left only by giving the command <i>Reset</i> in the control word.
Index	6042h
Name	None
Description	Adjusts the setpoint speed. In case of negative values the rotation counter-clockwise is selected.
Type	SIMPLE_VAR_OBJECT
Object length	2 Byte
Unit	1/min
Example	Write Request Index = 6042h; Subindex = 0 Data = 0514h (1300) -> setpoint speed = 1300 1/min When adjusting a value outside the Min/Max speed range, it is limited to the Min/Max speed.
Index	6043h
Name	None
Description	Indicates the current speed reference variable. In case of negative sign the state counter-clockwise rotation is active.
Type	SIMPLE_VAR_OBJECT
Object length	2 Byte
Unit	1/min
Example	Read Request Index = 6043h; Subindex = 0 -> Data = 0432h (1074 1/min)

Index **6044h**
Name **None**
Description Indicates the current speed value. In case of negative sign the state counter-clockwise rotation is active.
Type SIMPLE_VAR_OBJECT
Object length 2 Byte
Unit 1/min

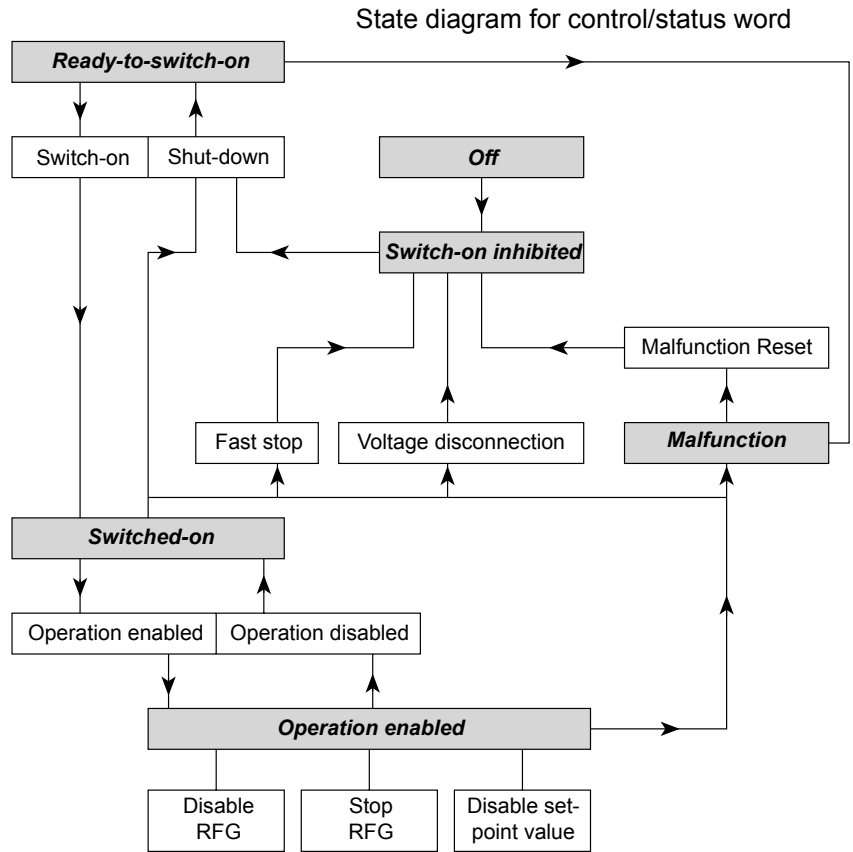
Index **6046h**
Name **None**
Description Presets or indicates the minimum and maximum speed of the inverter as amount (equally for clockwise and counter-clockwise rotation).
Type ARRAY_OBJECT
Object length 4 BYTE per element
Unit 1/min
Element Subindex 1 = speed-min-amount
 Subindex 2 = speed-max-amount
Example Write Request
 Index = 6046h
 Subindex = 01h
 Data = 000003E8h (1000) -> speed-min-amount = 1000 1/min
Example Read Request
 Index = 6046h
 Subindex = 02h -> Data = 00000BB8h (3000)
 The speed-max-amount is 3000 1/min.

Index **6048h**
Name **None**
Description Presets or indicates the rate of rise of the acceleration ramp in dn/dt.
Type RECORD_OBJECT
Element Subindex 1 = delta speed 4 Byte 1/min
 Subindex 2 = delta time 2 Byte sec
Example Write Request
 Index = 6048h
 Subindex = 00h
 Data = 000003E8000Ah -> acceleration= 1000 1/min in 10 sec
Example Read Request
 Index = 6048h
 Subindex = 00h -> Data = 00000BB80036h
 The inverter accelerates in 54 seconds by 3000 1/min.

Index **6049h**
Name **None**
Description Presets or indicates the rate of rise of the deceleration ramp in dn/dt.
Type RECORD_OBJECT
Element Subindex 1 = delta speed 4 Byte 1/min
 Subindex 2 = delta time 2 Byte sec
Example refer to object 6048h

2.4 Parameter Description

The application manual for the respective KEB frequency inverter contains a listing and short description of the control board parameters.



2.5 Error Codes of PCP-Channel

Error Class	Error Code	Add. Code	Significance
6=ACCESS	2=HARDWARE_FAULT	0	No response from the inverter
6=ACCESS	3=OBJ_ACCESS_DENIED	0	Object/Parameter write-protected
6=ACCESS	4=ADDR_INVALID	0	Invalid parameter address
6=ACCESS	5=OBJ_ATTR_INCONSIST	10h 11h 14h	Data length too long or too short Wrong subindex No free Buffer
6=ACCESS	6=ACC_UNSUPP	0	Object access denied
6=ACCESS	7=OBJ_NON_EXIST	0	Object non-existing
6=ACCESS	8=TYPE_CONFLICT	0	Invalid data type
8=OTHER	0=OTHER	22h 30h 41h 10h	Inverter busy Invalid data Process data assignment impossible Invalid function

Example

Writing on object 6041h generates the error type 6 with code 3, since this object represents a read-only object.

Reading of object 60FFh generates error type 6 with code 7, since this object is non-existing.

Writing on object 6046h with subindex 1 and value FFFFFFFFh generates the error type 8 with code 0 and the additional error code 30h, since this value is invalid for this parameter.

2.6 Example for Re-assignment of Process Data Channel

The process data length shall be adjusted to 3 words.

PD-IN-assignment: KEB-parameter addresses 2000h, 2007h and 2012h (from Application Manual)

PD-OUT-assignment: KEB-parameter addresses 2101h and 210Bh, 3.PD-word not used.
The baud rate shall be 38400 baud, inverter 5 shall be addressed.

1. Adjustment of PD-register length

Write: Index=5FFFh;Subindex=0;DATA=06 h -> 6Bytes(3Words) process data length

2. Adjustment of PD-IN-assignment

Write: Index=6000h;Subindex=2;DATA=4000h -> KEB-Parameter 2000h (Index=4000h)

Write: Index=6000h;Subindex=6;DATA=4007h -> KEB-Parameter 2007h (Index=4007h)

Write: Index=6000h;Subindex=10;DATA=4012h -> KEB-Parameter 2012h (Index=4012h)

or write entire object at once:

Write: Index=6000h;Subindex=0;Len=19 Bytes

DATA=00h,4000h,00h,0000h,00h,4007h,00h,0000h,00h,4012h,00h,0000h,00h,

3. Adjustment of PD-Out-assignment

Write: Index=6001h;Subindex=2;DATA=4101h -> KEB-Parameter 2101h (Index=4101h)

Write: Index=6001h;Subindex=6;DATA=410Bh -> KEB-Parameter 210Bh (Index=410Bh)

(Subindex 10 is not needed)

or write entire object at once:

Write: Index=6001h;Subindex=0;Len=19 Bytes

DATA=00h,4101h,00h,0000h,00h,410Bh,00h,0000h,00h,2000h,00h,0000h,00h,

4. Enabling of PD-IN-processing

Write: Index=5FFEh;Subindex=0;DATA=FFh -> PD-IN 1..3 enabling

5. Enabling of PD-OUT-processing

Write: Index=6002h;Subindex=0;DATA=0Fh -> PD-OUT 1..2 enabling, PD-OUT 3 disabling

6. Adjustment of baud rate

Write: Index=5FFBh;Subindex=0;DATA=02h -> Baud rate = 38400 Baud

7. Adjustment of inverter address

Write: Index=5FFDh;Subindex=0;DATA=05h -> Inverter= 5

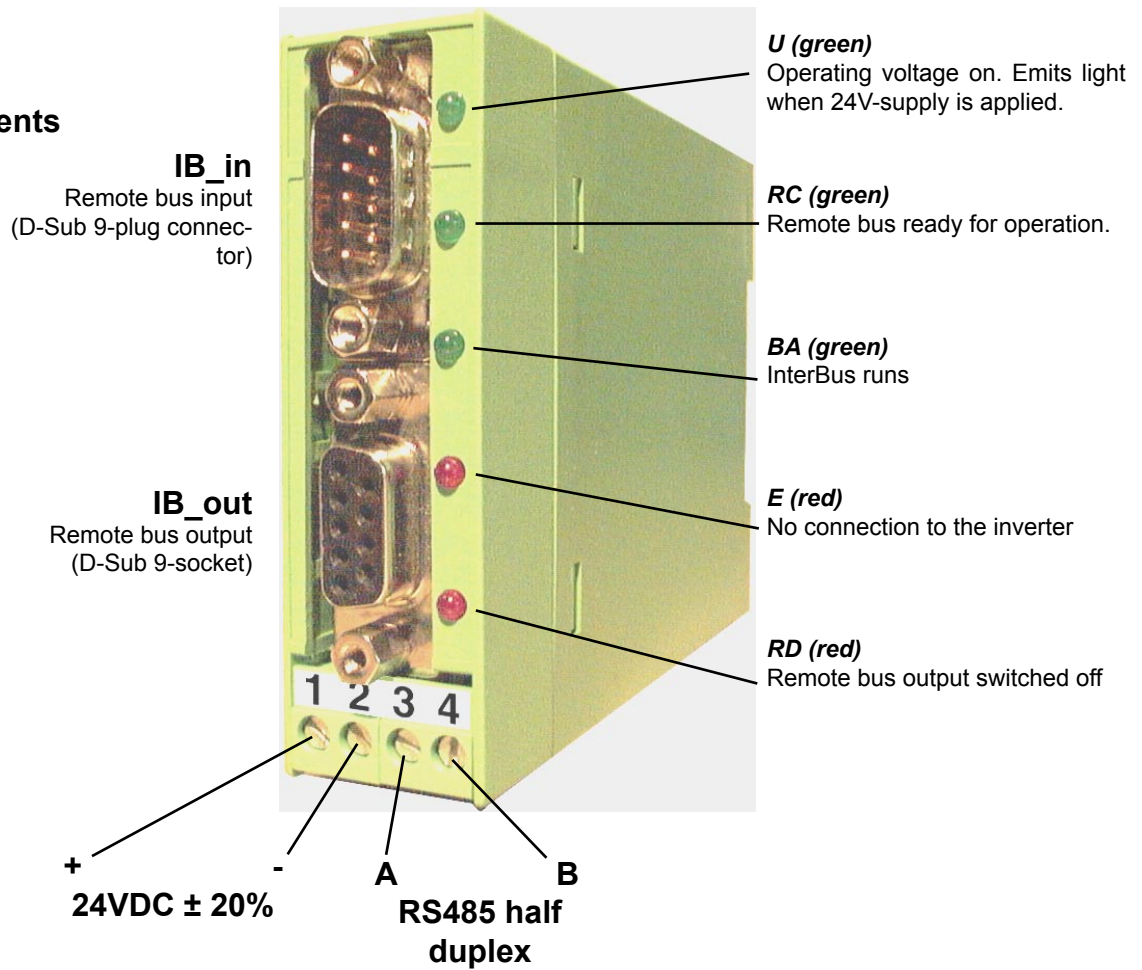
8. Storing of all adjustments

Write: Index=5FFCh;Subindex=0;DATA=FFh -> Storing!

The desired parameters are processed after the next switch-on.

3. Operation

3.1 Diagnostic Elements



3.2 Error Diagnosis

- | | |
|--------------------------|--|
| „U“ dark: | <ul style="list-style-type: none"> • Voltage at terminals „+“ and „-“ too low or non-existing |
| „RC“ dark: | <ul style="list-style-type: none"> • Remote bus cable either defective or non-existing • Host not in operation or defective |
| „BA“ blinking: | <ul style="list-style-type: none"> • InterBus has been stopped by the host |
| „E“ emits light: | <ul style="list-style-type: none"> • Inverter without voltage supply • Interconnecting cable at terminal A/B faulty or not poled correctly • Wrong adjustment of Inverter address / baud rate |
| „RD“ emits light: | <ul style="list-style-type: none"> • The continuation of the remote bus interface (IB_out) has been switched off by the host |

3.3 Connector Pin Assignment

Connector IB_in (D-Sub 9-pole plug connector)

Function: Input IB 2-wire remote bus

Pin CN1.1	DI1	Pin CN1.6	/DI1
Pin CN1.2	DO1	Pin CN1.7	/DO1
Pin CN1.3	Ground1	Pin CN1.8	reserved
Pin CN1.4	reserved	Pin CN1.9	reserved
Pin CN1.5	reserved		

Connector IB_out (D-Sub 9-pole socket)

Function: Output IB 2-wire remote bus

Pin CN2.1	DO2	Pin CN2.6	/DO2
Pin CN2.2	DI2	Pin CN2.7	/DI2
Pin CN2.3	Ground2	Pin CN2.8	reserved
Pin CN2.4	reserved	Pin CN2.9	RBST
Pin CN2.5	+5V		

4-pole plug-in / terminal strip

Function: Connection of voltage supply / serial interface

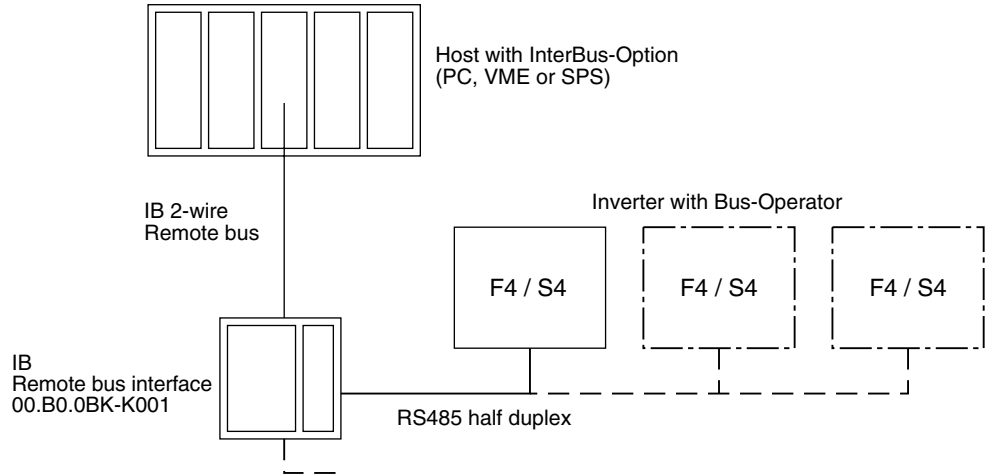
Terminal 1 / +	} 24VDC / < 100mA
Terminal 2 / -	
Terminal 3 / RS485-A	} Serial interface to the inverter
Terminal 4 / RS485-B	

4. Installation



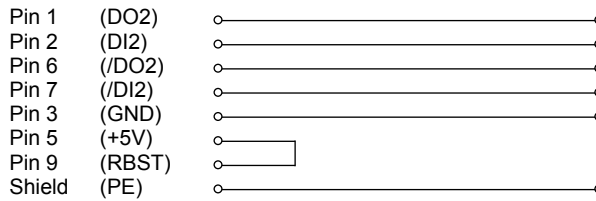
It is absolutely necessary to lay the bus cables separately from the mains or motor cables of the inverter ! For further information refer to „Part 1“ of the Instruction Manual of the inverter.

4.1 Concept

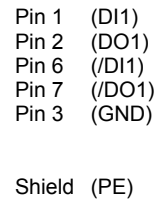


4.2 IB 2-wire Remote Bus Cable 9-pole/9-pole

D-Sub 9-pole connector

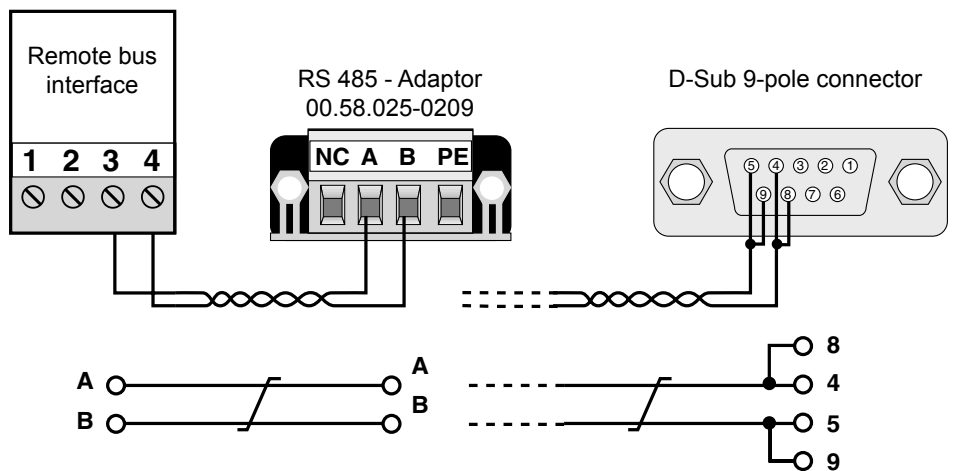


D-Sub 9-pole socket

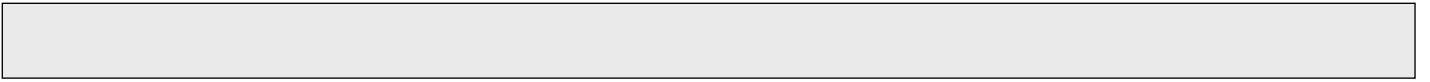


4.3 Connection to the Inverter

For short cable lengths (< 2m) the connection is done via an unshielded, 2-core twisted cable or 2 individual cables, which must be twisted.



If more than one inverter is connected to the remote bus interface, the cable „A“ and „B“ at the connectors/adaptors must be wired parallel.



Ⓞ Prior to delivery all products pass several quality and performance inspections so that malfunctions can be ruled out. When used in accordance with the operating instructions failure is most unlikely. However, if you have cause for complaint the unit should be returned stating invoice number, delivery date, cause of failure and field conditions. We do not accept the responsibility for failures due to misuse, wrong storage or similar causes. Leaflets, catalogues and quotations contain only standard values. We reserve the right to make technical changes without obligation. All rights reserved. Any piratic printing, mimeograhing or photomechanical reproduction, even in extracts, is strictly prohibited.



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