KEB
ANTRIEBSTECHNIK

Instruction Manual
InterBus-S Operator

Technical Data

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Part number Operator	00.F4.010-8009
Part number Instruction Manual	**00.F4.Z10-K100**
Equipment	Clip-On Unit in KEB-Operator Housing
InterBus-S-Interface	LOOP-Topology, 4 Terminals
InterBus-S ID-Code (Module Ident.)	179
InterBus-S Register Width	2 Words IN + 2 Words OUT
InterBus-S Diagnosis	1 LED
Isolation to Inverter	Safe Isolation in accordance with VDE 0160
Voltage Supply	28,5V from the Loop Busterminal
Current Input	20mA max.

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Summary

The InterBus-S Operator is in a clip-on unit and is connected to a IBS-Loop. InterBus-S (IBS) and Loop are specifications of Phoenix Contact, Blomberg. The InterBus-S Operator occupies 2 data words in the IN- and OUT-address range of the InterBus-S. The voltage supply goes through the Loop from the previous Loop-Busterminal via 2-wire, twisted cables together with the modulated data signals. The isolation to the inverter is realized with photocouplers. If the inverter is shut off this does not effect the IBS-cycle. After the Loop-operating voltage is switched on, the inverter is adjusted to the quickest transmission rate by the internal serial KEB-DIN66019 protocol. With this the Application-Password (UD01=440), Baudrate (UD07) and the Inverter Address (UD06 = 1) are independently adjusted.

Connections

The connection of the Operator on the Loop is done with twisted, unshielded Loop cable (Phoenix Contact) as follows:

Terminal 1   Loop In +
Terminal 2   Loop In -
Terminal 3   Loop Out +
Terminal 4   Loop Out -

The last device in the Loop is connected again with the Loop-In interface of the Busterminal (Phoenix Contact). Other Loop devices can also be connected such as a digital I/O module etc. Make sure to observe the polarity and the data direction IN / OUT.
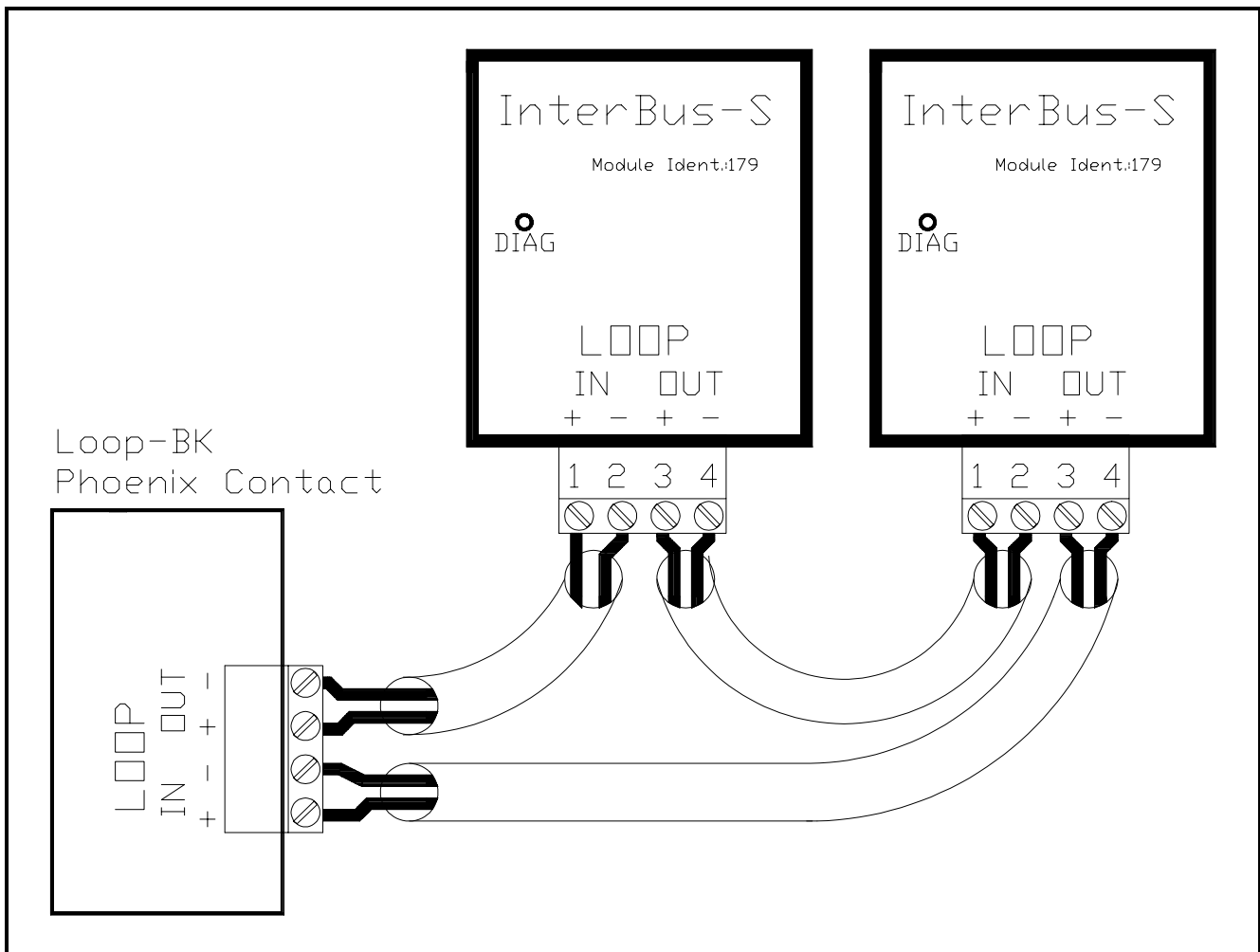
Diagnosis

The green diagnosis Led DIAG gives information about the condition of the Loop:

Off: InterBus-S Loop has no operating voltage
Blinks:InterBus-S in Stop condition
On: InterBus-S in Run condition

Data Transmission

Format

xxxxh = Hexadecimal notation of a 16-Bit value.
Via the 2 data words, that are assigned to the Loop-Operator in InterBus-S, all inverter parameters can be read or written. For this purpose the meaning of the IN-data (from inverter) as well as OUT-data (to inverter) are specified:

In **1st word OUT** the parameter address is posted in the range of 0..7FFFh and in the highest bit the read/write identifier (R/W 0=read; 1=write) is selected.

R/W	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

In **2nd word OUT** during the write mode the parameter data is posted in the range of 0..FFFFh. During the read mode the value has no meaning.

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

In **1st word IN** the parameter address appears after the read/write function in the range from 0..7FFFh as well as an error flag in the highest bit (ERR 0=OK; 1=ERROR).

ERR	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

In **2nd word IN** after a read/write function, the parameter data (ERR=0) in the range 0..FFFFh or a fault code appears (ERR=1, see paragraph regarding error codes).

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

When writing parameters the parameter data must be written in the same cycle as the parameter address to the InterBus-S. If this is not ensured, then the IDLE-Address 0000h must be written to do the synchronization between different parameter addresses (see example 'Writing with Synchronization').

Parameter Addresses

0000h	**No** parameter is read or written when the address is 0 (IDLE). This is the basic state after reset on InterBus-S. The identifier 4B45h appears in the 2nd word IN.
0001h ..00FFh	Configuration parameters of the Loop-Operator. These parameters are **not** passed to the inverter. See paragraph 'Configuration Parameter'.
0100h..7FFFh	Parameter addresses of the inverter. These are read from the inverter or written to the inverter. A list of all permissible parameters for the respective inverter type is found in the (application) manual of the inverter.

Error Codes

The following error codes are defined:

1h	No Answer	Inverter is switched off
2h	Invalid Address	The parameter address is not available
3h	Invalid Data	The parameter value is invalid
4h	Read Only	The addressed parameter is write-protected
5h	BCC Error	Transmission error between operator and inverter
6h	Inverter Busy	The inverter cannot accept any data at this time
10h	Framing Error	Transmission error between operator and inverter

Configuration Parameter

The following parameters of the InterBus-S Operator are available:

Baudrate
Address: 0001h   Read Only
Returns the actual baudrate between Operator and inverter:
3 = 9600 Baud   4 = 19200 Baud   5 = 38400 Baud

Time Out
Address: 0002h   Read-Write
Specifies the maximum waiting time until the answer is received from the inverter in 10ms steps. Standard after power-on: 14h(200 ms), Value range 1..64h(10..1000 ms)
The standard value should not be altered!

ROM-Version Number
Address: 0003h   Read Only
Shows the version number of the Operator firmware: 0100h=V1.0; 0120h=V1.2 etc.

Extended Recognition
Address: 0004h   Read-Write
Returns the by 1 decreased value of the 2nd word Out and can be used to differentiate from other InterBus-S units with the same ID-code.

Examples

xxxxh = Hexadecimal notation of a 16-Bit value

Reading a Parameter

The parameter with the address 2101h should be read from the inverter.
The OUT-data values are set as follows:
OUT1 = 2101h   OUT2 = optional
In the next InterBus-S-cycle the IN-data change to 0. Used for identification, that a job to the inverter is active.
IN1 = 0000h   IN2= 0000h
After the data is available from the inverter, the IN-data words change onto
IN1 = 2101h (parameter address)   IN2= 0044h (parameter data)
In case of an error the highest bit is set in 1st IN-word, in 2nd IN-word the error code is found
IN1 = A101h (parameter address+error bit)   IN2= 0002h (error 2: address invalid)
The addressed parameter is continuously read from the inverter and the newest parameter value automatically appears in 2nd IN-word.

Writing a Parameter

The parameter value 1234h should be written to the address 3301h of the inverter.
With this the OUT-data words are set <u>in the same</u> cycle as follows:
OUT1 = B301h (address+ write identifier)   OUT2 = 1234h (data)
In the next InterBus-S-cycle the IN-data change to 0. Used for identification, that a job to the inverter is active.
IN1 = 0000h   IN2= 0000h
After the data are acknowledged by the inverter, the IN-data words change:
IN1 = 3301h (parameter address)   IN2= 1234h (parameter data)
In case of an error the highest bit is set in 1st IN-word, in 2nd IN-word the error code is found
IN1 = B301h (parameter address+error bit)   IN2= 0003h (error 3: data invalid)

Quick Reading of several Parameters

To quickly read several parameters do the following:
1. Write parameter address in 1st word OUT.
2. Wait until this parameter address appears in 1st word IN, observe error bit!
     Parameter value in 2nd word IN is valid when ERR=0. The next parameter can
     be read, continue with 1.

Quick Writing of several Parameters

To quickly write several parameters do the following:
1. Write parameter address with set write-bit in 1st word OUT and parameter data for
this parameter in 2nd word OUT.
2. Wait until this parameter address appears in 1st word IN, observe error-bit!
     If the error-bit is 0, then the data was correctly accepted and the next parameter can
     be written (continue with 1).

Quick Writing of several Parameter Values on the same Address

Do as follows:
1. Write parameter address with set write-bit in 1st word OUT.
2. Write parameter data for this parameter in 2nd word OUT.
3. Wait until this parameter data appears in 2nd word IN, observe error bit in 1st word IN!
   If the error-bit is 0, then the data was correctly accepted.
4. Write new parameter data in 2nd word OUT.
5. Wait until this parameter data appears in 2nd word IN,
   observe error bit in 1st word IN!
6. Continue with 4

Writing with Synchronization

Synchronization is only necessary when, based on the system, the 1st and 2nd word OUT cannot be simultaneously transferred to the InterBus-S Master, so that the parameter address and parameter data does no appear in the same InterBus-S cycle. As a result, e.g. the new parameter data could have been sent to the previous parameter address or the old parameter data sent to the new parameter address. All new InterBus-S-interface cards have the chance to secure the data consistency, so that this function probably must not be used.
1. Write Idle-address 0000h in 1st word OUT.
2. Write parameter data for the parameter in 2nd word OUT.
   (Data is not written yet while the address=0)
3. Write parameter address with set write-bit in 1st word OUT.
4. Wait until this parameter address appears in 1st word IN, observe error-bit!
   If the error-bit 0, then that data was correctly accepted and the next parameter
   can be written (continue with 1).