INTERBUS-S

Diagnostics Guide

Type: IBS SYS DIAG DCB UM E

Revision: A

Order No.: 27 47 04 4

This guide is valid for:

IBS S5 DCB...	Firmware $\geq$ 3.3
IBS IPC DCB...	Firmware $\geq$ 3.3
IBS A 25 DCB/I-T	Firmware $\geq$ 3.3
IBS S5 100U CB	
IBS PC CB	Firmware $\geq$ 3.3
IBS VME CB	Firmware $\geq$ 3.3

Table of Contents

Table of Contents

**Diagnostic Indicators on the Front Plate
of an IBS S5 DCB Controller Board**

Selector switches
for the display and
the LEDs, Page **10**

Diagnostic display
(7-segment),
Page **4, 24**

LED indicators for
the operating state:
         Page

Ready,   **4**
BASP   **8**
RUN   **6,8**
BSA,   **8**

Remote bus
interface

Reset button
(RESET)

INTERBUS-S
IBS S5 DCB-T

MODE   ADDRESS
BYTE

	n	n+1
8/0	○	0/0 ○
9/1	○	1/1 ○
10/2	○	2/2 ○
11/3	○	3/3 ○
12/4	○	4/4 ○
13/5	○	5/5 ○
14/6	○	6/6 ○
15/7	○	7/7 ○

READY ○ CTRL ○
BASP ○ RB ○
RUN ○ LB ○
BSA ○ MOD ○

X2   X3

REMOTE RS 232
RESET ●

LED indicators
for errors:
         Page

CTRL,   **14**,**16**
RB,   **26**
LB,   **34**
MOD,   **36**

RS 232 interface
for the connection
of a PC with an
external diagostics
software,
Page **46**, **47**

5096B128

Figure 1: Front plate of the IBS S5 DCB controller board with
diagnostic indicators and diagnostic elements

A flowchart showing you how to remove errors can be
found on the back cover page.

PHŒNIX CONTACT   5096A

Exemplary InterBus-S Topology For This Diagnostics Guide
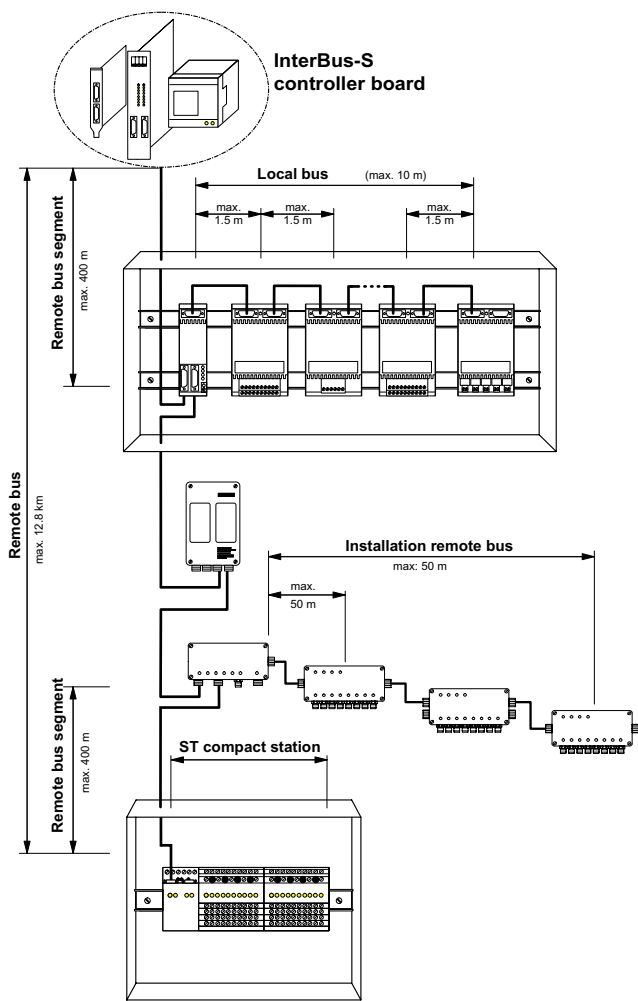
5074B104

Figure 2: Exemplary InterBus-S toplogy which can be used to locate transmission errors (The maximum distances given in the figure refer to copper lines.)

PHŒNIX CONTACT   5096A

General Information on the Diagnostics Guide

Unless mentioned otherwise, all information in this guide refers to the IBS S5 DCB/I-T controller board (in particular the illustrations of the front plate).

Moreover, this guide is also valid for the controller boards IBS VME CB, IBS PC CB and IBS S5 100 CB. Unlike the IBS S5 DCB board, the other controller boards feature only some of the diagnostic indicators (LEDs, no 7-segment display). For the mentioned contoller boards, the information given about the 7-segment display applies to their software registers.

The back cover page contains a table listing the various LEDs on the IBS S5 DCB board and their equivalents on other controller boards.

All descriptions are valid for firmware version 3.7x. "FW3.3:" or "FW3.5:" is written in front of information that is only valid for firmware versions 3.3 or 3.5.
When using this guide, please observe the following notes:

The *attention* symbol refers to erroneous handling, which could lead to damage to the hardware or software, or in indirect connection with dangerous process peripherals, to personal injury. This symbol is always located to the left of the tagged text.

The *hand* symbol gives you tips and advice on the efficient use of hardware and on software optimization, to save you from performing extra work, for example. In addition, text marked in this way informs you of system-related conditions that must absolutely be observed to achieve error-free operation. The hand is also found in front of clarifications of terms.

The *text* symbol refers to detailed sources on information (manuals, data sheets, literature, etc.) on the subject matter, product, etc. This text also provides helpful information for the orientation, reading order, etc. in the manual.

Diagnostic Functions of the Front Plate

Display After the Self-Test

X = valid I/O address setting

MODE	ADDRESS

BYTE

n	n+1
8/0 ○	0/0 ○
9/1 ○	1/1 ○
10/2 ○	2/2 ○
11/3 ○	3/3 ○
12/4 ○	4/4 ○
13/5 ○	5/5 ○
14/6 ○	6/6 ○
15/7 ○	7/7 ○

READY ●	CTRL ○
BASP ○	RB ○
RUN ○	LB ○
BSA ○	MOD ○

5096B113

● LED on
◐ LED off or on
○ LED off
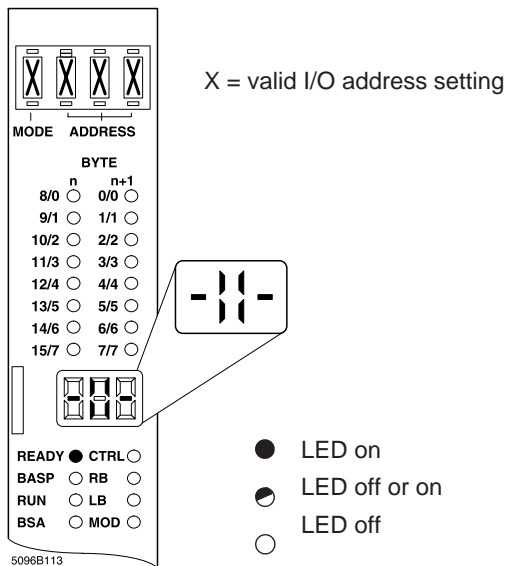
Table 1: Display after the self-test
(DD=diagnostic display)

DD	Description	Remedy
-||- 2b or 68	The controller board has completed the self-test without errors and is ready for operation (mode of oper.: controlled start). The board waits for commands from the control system or the EEPROM card. Logical addressing detected an error in an address list. (These displays appear when the board is operated with ISFP functions, address block FB72 with mode=1, or with a programmed EEPROM card). **Note:** The representation of the letter "b" and the number "6" on the diagnostic display are similar. Do not confuse!	Check the application program and/or the EEPROM card. The list number is specified in detail in the EREG byte of the FB 72 address block.

Display When the Bus Is Active

X = valid I/O address setting

● LED on
◐ LED off or on
○ LED off

5096B111

⊗ = invalid address setting

● LED on
◐ LED off or on
○ LED off

5096B112

PHŒNIX CONTACT
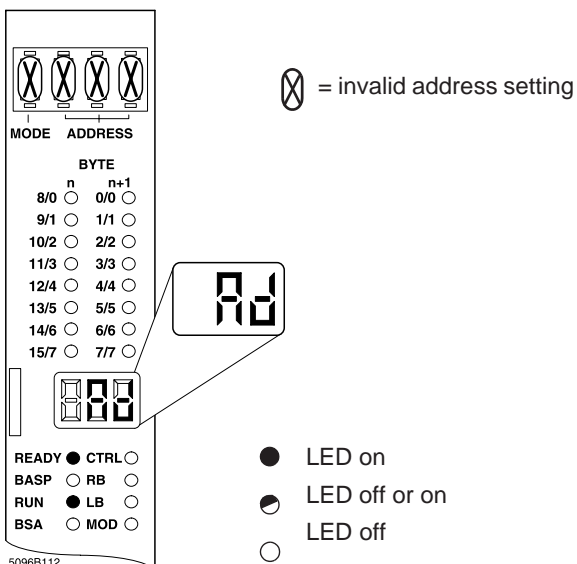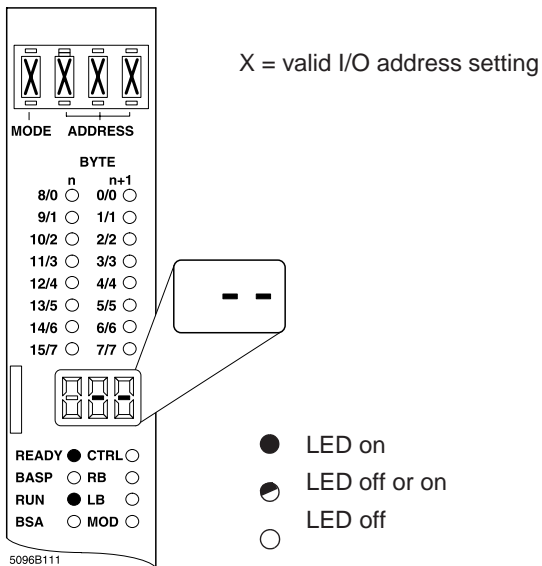
Table 2: Display when the bus is active
(DD=diagnostic display)

DD	Description	Remedy
-- *	The InterBus-S system is in operation and transmits data. The data item of the set I/O address is shown with the two rows of status LEDs.	
Ad *	The selector switches have a wrong setting: - Invalid address area (mode) - Odd address set - The set address is not used by any IBS module or the associated module is located in a segment that was shut down. **Note (cf. Page 10):** for FW 3.3 : Mode 4 to 9 must **not** be set. for FW 3.5x: Mode 4 to 8 must **not** be set. for FW 3.7 and higher: Mode 8 must **not** be set.	Change the setting of the address and/ or mode selector switches

* In addition to the displays mentioned above the displays below mean that the transmission statistics feature was disabled by means of the application program:

]-- or]Ad

STOP Request of the PLC

MODE ADDRESS

BYTE

n   n+1
8/0 ○ 0/0 ○
9/1 ○ 1/1 ○
10/2 ○ 2/2 ○
11/3 ○ 3/3 ○
12/4 ○ 4/4 ○
13/5 ○ 5/5 ○
14/6 ○ 6/6 ○
15/7 ○ 7/7 ○

READY ● CTRL ○
BASP ● RB ○
RUN ◐ LB ○
BSA ○ MOD ○

5096B114
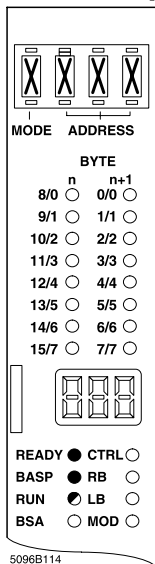
X = valid setting

● LED on
◐ LED off or on
○ LED off

Bus Segment Disabled (BSA)

MODE ADDRESS

BYTE

n   n+1
8/0 ○ 0/0 ○
9/1 ○ 1/1 ○
10/2 ○ 2/2 ○
11/3 ○ 3/3 ○
12/4 ○ 4/4 ○
13/5 ○ 5/5 ○
14/6 ○ 6/6 ○
15/7 ○ 7/7 ○

READY ● CTRL ○
BASP ○ RB ○
RUN ● LB ○
BSA ● MOD ○

5096B119
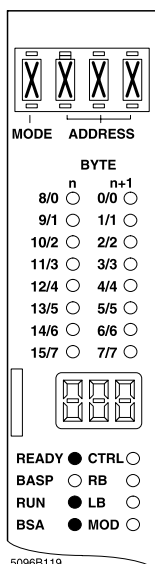
X = valid setting

● LED on
◐ LED off or on
○ LED off

Table 3: STOP request of the PLC
(DD=diagnostic display)

DD	Description	Remedy
Any	The automation equipment is in the STOP state. With an active BASP signal (**B**efehls **A**usgabe **Sp**erren= block command output) the outputs of all IBS devices are set to zero. Data transmission over the bus continues.	The cause of the STOP state can be found in the application program.

Table 4: Bus segment disabled (BSA)
(DD=diagnostic display)
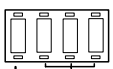
DD	Description
Any	The BSA LED indicates that one (or several) bus segments were shut down with a command in the user program.

Table 5: Designations for BASP on other controller boards

Controller board	Equivalent designation
IBS A25 DCB	NORM
IBS BA AT	CLAB
IBS IPC DCB	CLEAR OUT
IBS VME CB	SYS FAIL
IBS S5 100 CB	Diagnostic bit 6

Settings of the Selector Switches
(for IBS S5 DCB only)

With the selector switches you may set device addresses and values for the representation of diagnostic information on the diagnostic display. Please observe the following figure when you select the area (1st digit; P,Q or extended) of an I/O address (digits 2-4).

MODE	Address Area		MODE	Address Area	
0	Inputs	P area	4	Inputs	Extended area 1
1	Outputs	P area	5	Outputs	Extended area 1
2	Inputs	Q area	6	Inputs	Extended area 2
3	Outputs	Q area	7	Outputs	Extended area 2
4-9	Do not set (up to FW 3.3)		as of FW 3.7		
4-8	Do not set (up to FW 3.5x)				

5096A115

Figure 3: Modes to be set with the selector switches

Example: Figure 4 shows how the input data word (P area) of a set module address (1) is displayed on the controller board (2).
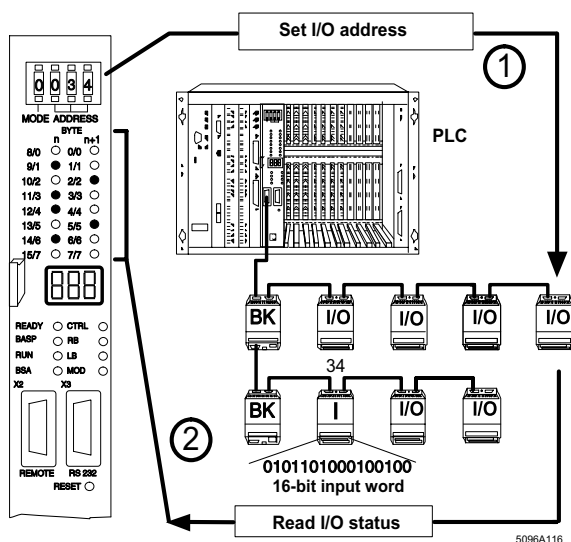
Figure 4: Example of a selector switch setting

Selector Switch Setting for Diagnostic Information in Mode 9 (valid as of firmware version 3.5)

The mode selector switch is set to 9 to show the diagnostic information. With the last three positions you may select the desired diagnostic information which will then be shown on the diagnostic dispay (**DD = diagnostic display**).

Mode switch	Meaning/Explanation
918x	DD shows the nos. of the ten modules with the most transmission errors (x=0...9, highest...smallest number of errors). The module numbers correspond to the physical appearance of the modules in the bus toplogy.
	Additional explanation for 918x: If there are less than ten module to which errors can be assigned, the DD will display less than 10 module numbers. The free positions then show Ad. Transmission errors on the path from the last module to the controller board are shown with the module number FF. In addition, all I/O data LEDs light up. The hundred's place of the module numbers is also mapped onto the I/O data LEDs. LED 0 lights up for the module numbers 0 to 99, LED 1 for the module numbers 100 to 199, and so on, and the LED 5 lights up for the module numbers 500-511.
919x	DD shows the nos. of the last 10 local busses with a module status error (x=0,1,...9; last, last but one, ...LB No.); observe the type of addressing (logical or physical) for the local bus numbers!

PHŒNIX CONTACT

Mode switch	Meaning/Explanation
9200	DD shows the implemented firmware revision.
93xx (as of FW 3.71)	An output and an input word are reserved in the PLC memory with the help of the special ID code 0015_{hex}. The contents of the output word appears on the yellow I/O LEDs when the selector switches are set to 93xx. The switch setting xx (decimal, value range 0 - 99) is copied into the defined input word. By means of logical addressing the two words can then be placed on any address in the PLC memory.
9400	DD shows the number of modules of the current configuration.
9401- 9912	DD shows the ID codes (in hexadecimal notation) of the current physical configuration (9401 = first bus device), the first position of the diagnostic display is invalid.

PHŒNIX CONTACT

This page is intentionally left blank.

PHŒNIX
CONTACT

Hardware Fault on the Controller Board
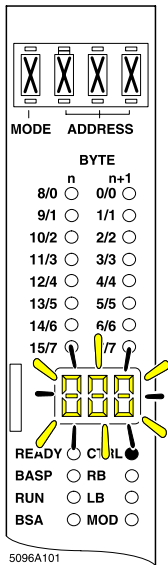
X = valid I/O address setting

MODE   ADDRESS

BYTE

	n		n+1
8/0	○	0/0	○
9/1	○	1/1	○
10/2	○	2/2	○
11/3	○	3/3	○
12/4	○	4/4	○
13/5	○	5/5	○
14/6	○	6/6	○
15/7	◐	/7	◐

READY	○	CTRL	●
BASP	○	RB	○
RUN	○	LB	○
BSA	○	MOD	○

5096A101

● LED on

◐ LED off or on

○ LED off

**InterBus-S
controller board**

Error location

1	2	3	4	5
IBS BK-T ID: 52	IBS 24 DI ID: 130	IBS AO1 ID: 65	IBS 24 DO ID: 129	IBS PT 100 ID: 70

5096B102

PHŒNIX CONTACT

5096A
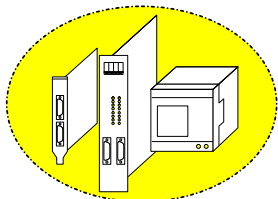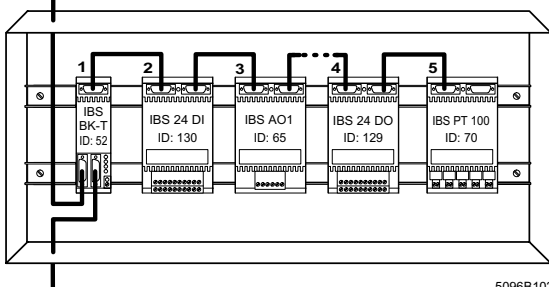
Table 6: Description of the hardware fault
(DD=diagnostic display)

DD	Description	Outputs	Bus
Blinking numbers	The READY LED is off. There is a hardware fault. -> Replace controller board. When you send in the board for repair, please note the number that is shown on the display on the service sheet (Page 57 ff).	00	STOP

Parameterization Error CTRL

```
MODE  ADDRESS
        BYTE
        n    n+1
    8/0 ○  0/0 ○
    9/1 ○  1/1 ○
   10/2 ○  2/2 ○
   11/3 ○  3/3 ○
   12/4 ○  4/4 ○
   13/5 ○  5/5 ○
   14/6 ○  6/6 ○
   15/7 ○  7/7 ○

READY ● CTRL●
BASP  ○ RB  ○
RUN   ◑ LB  ○
BSA   ○ MOD ○
5096B103
```
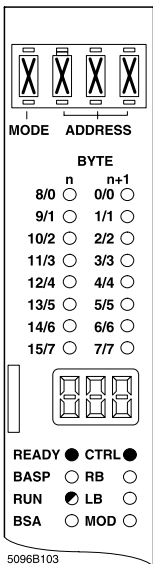
X = valid I/O address setting

● LED on
◑ LED off or on
○ LED off

The diagnostic display shows an error number (in hexadecimal notation), see Table 7 on opposite page.

InterBus-S controller board

▢ **Error location**

```
 1     2      3      4      5
 IBS
 BK-T  IBS 24 DI  IBS AO1  IBS 24 DO  IBS PT 100
 ID: 52  ID: 130   ID: 65   ID: 129    ID: 70
                                   5096B102
```

PHOENIX CONTACT   5096A

Table 7: Error codes shown on the diagnostic display
(DD=diagnostic display)

DD	Description	Remedy
07	An invalid command was sent.	Remove the non-defined command (PCP commands as well) from the application program.
08	Parameters are expected after a command, but another command follows	Check the command sequences in the application program and add data blocks, if necessary.
09	The PLC accessed the communication registers. Reasons: - Double addressing of the communication register with other boards or modules connected to the PLC - Communication register access via the application program - Communication register base address lies in the process image - A command was written without parameters.	
0A	An interrupt was caused which cannot be assigned.	1. Set controller to the STOP state. 2. Perform a reset on the PLC and the controller board or exchange the hardware when the error occurs during operation.
0b	Error on the controller board	Send in controller board (see Page 56ff).

Table 7: Error codes shown on the diagnostic display
(DD=diagnostic display)

DD	Description	Remedy
0C	**Gen.:** The controller board sent a message (error message, command acknowledgment) and the PLC did not fetch it in time (**Esp. S5:** ISFP block CON/IND).	**Esp. S5:** Call CON/IND block in the cycle of the application program unconditionally (auxiliary driver CIH must be available in the programmable controller) or, **gen.**, disable receipt of message directly or by programming the parameterization memory (DISABLE ALL MESSAGES command).
0d	**Gen.:** Previous command has not yet been processed. **Esp. S5:** Wrong parameters in the ADDRESS data block	**Gen.:** Check application program. **Esp. S5:** Correct parameters in ADDRESS data block
23-25	Error on the controller board	Replace controller board; inform Phoenix Contact if the error continues to occur (see Page 56 ff).
26-29	Hardware fault	Send in controller board (see Page 56 ff).

Table 7: Error codes shown on the diagnostic display
(DD=diagnostic display)

DD	Description	Remedy
2b	a) Address list error in the input or output address list b) An attempt was made to send address lists to the controller board, while the bus is in operation.	a) Check address lists. b) Change bus to STOP mode and send address list again.
3b-45	Error on controller board	Replace controller board (see Page 56 ff); inform Phoenix Contact if the error continues to occur.
46	**Esp. S5:** Wrong base address of window 1	**Esp. S5:** Change base address of window 1.
47	**Esp. S5:** Wrong base address of window 2	**Esp. S5:** Change base address of window 2.
48	**Esp. S5:** Wrong address length of window 1	**Esp. S5:** Change address length of window 1.
49	**Esp. S5:** Wrong address length of window 2	**Esp. S5:** Change address length of window 2.
4A	No ID list available or non-existent IBS configuration.	Check ID list and/or connect IBS remote bus cable to controller board.
4b	Too many or not enough parameters in the command.	Check number of parameters.
4C	Error in event list	Check event list.

Table 7: Error codes shown on the diagnostic display
(DD=diagnostic display)

DD	Description	Remedy
4d	Error on the controller board	Replace controller board (see Page 56 ff); inform Phoenix Contact if the error continues to occur.
4E	Too many commands were sent within a short time.	**Gen.:** Check application program. **Esp.:** Call function blocks conditionally, evaluate the busy bits of the individual function blocks individually.
50, 51	Error on the controller board	Replace controller board (see Page 56 ff); inform Phoenix Contact if the error continues to occur.
55	Error in the group definition	Check the group definition.
57, 58	Error on the controller board	Replace the controller board (see Page 56 ff); inform Phoenix Contact if the error continues to occur.
59	Function call with a group no. that was not defined or a group that cannot be disconnected	Apply function only to groups that are defined as a group and can be disconnected.
5A	A wrong bus segment number was specified when a BK alarm was enabled or disabled.	Use only defined or available bus segment number.

PHOENIX CONTACT

Table 7: Error codes shown on the diagnostic display
         (DD=diagnostic display)

DD	Description	Remedy
5b	Non-allowable length code	Check ID code list, a non-allowable length code was entered.
5c	**Esp. for AEG, IPC PLC:** - Base node address and node number do not match - Base address for dig./ analog areas is not in the valid range	Adapt base node address and node number. Set correct base address.
65	The maximum number of communication modules on the bus was exceeded.	Reduce the number of the communication modules (PCP-capable).
66	Invalid communication reference (CR) or wrong number of parameters	Check CR list. - Check the parameter number in the address list. - Check the CR no., CRs in the CR list must be in an ascending order (starting with CR=2) and without gap.
68	a) Differences in the ID code list and the existing bus configuration b) Wrong number of parameters in the ID code list	a, b) Check ID code list.

Table 7: Error codes shown on the diagnostic display
  (DD=diagnostic display)

DD	Description	Remedy
69	PCP command sent, and the communication was not initialized.	**Gen.:** Initialize communication **Spec. S5:** Specify CR list in the ADDRESS function block.
6A	Base address of window 3 was not set correctly.	Base address must be divisible by 4 and outside the process image.
6b	Error on the controller board	Replace the controller board (see Page 56 ff); inform Phoenix Contact if the error continues to occur.
6C	Checksum error on the parameterization memory; **(may also occur when the firmware is changed from 3.5x to 3.72 or higher)**	1. Place PLC in STOP mode 2. Reprogram the parameterization memory **(with firmware 3.72 or higher)** 3. Push the reset button on the controller board or - replace the parameterization memory if the error occurs again.
6D	Write error on the parameterization memory; write protection active	- De-activate the write protection.

Table 7: Error codes shown on the diagnostic display
        (DD=diagnostic display)

DD	Description	Remedy
6E (as of FW 3.72)	Minimum voltage of the battery of the S-RAM reached (only if it is used as a parameterization memory)	Replace the battery of the S-RAM

Diagnostics After a Bus Stop ($\geq$ FW 3.72)

X = valid I/O address setting

	LED on
	LED off or on
	LED off
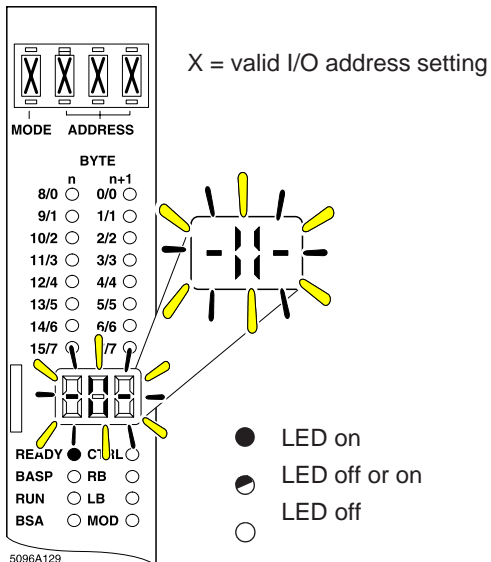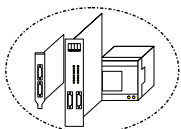
5096A129

InterBus-S controller board

Checked areas

5096A130

PHŒNIX CONTACT
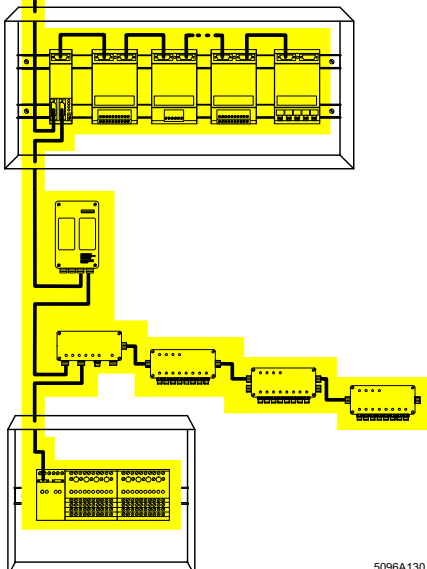
Table 8: Description of the diagnostic behavior after a bus
stop as of firmware revision 3.72
(DD=diagnostic display)

DD	Description	Remedy
-||-, blink-ing *	**As of FW 3.72:** Bus operation was often interrupted. Thus, the bus is stopped and all outputs are reset. In the course of the error analysis the entire bus topology is checked. The diagnostic display is blinking during this analysis, which may last from several seconds up to several minutes. Note: Depending on the PLC's status, the BASP LED may also light up when the bus stops. If groups were disabled before the bus was stopped, the BSA LED lights up. Upon completion of the diagnostic phase there is either an - LED error indication (CTRL, RB, LB or MOD) **or** - E0x is output on the diagnostic display.	Wait until DD stops blinking! Afterwards - see error remedy of the respective display: Error indication Page CTRL 16 RB 26 LB 34 MOD 36 E0x 30

* At the same time the analysis bit is set in the diagnostic
register (bit 15).

Remote Bus Error RB
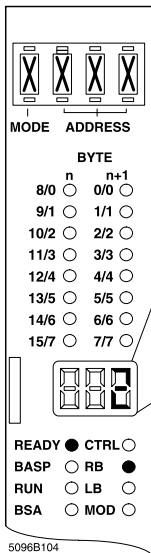
X = valid I/O address setting

When logical addressing (physical addressing is shown **here**) is used, the order of the bus segment numbering may differ from the one shown here (see System Documentation).

MODE ADDRESS

BYTE

n	n+1
8/0 ○	0/0 ○
9/1 ○	1/1 ○
10/2 ○	2/2 ○
11/3 ○	3/3 ○
12/4 ○	4/4 ○
13/5 ○	5/5 ○
14/6 ○	6/6 ○
15/7 ○	7/7 ○

● LED on
◖ LED off or on
○ LED off

READY ● CTRL ○
BASP ○ RB ●
RUN ○ LB ○
BSA ○ MOD ○
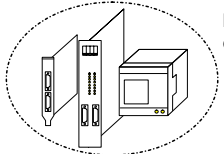
5096B104

InterBus-S controller board

Remote bus segment number

Error location

IBS BK-T ID: 52 | IBS 24 DI ID: 130 | IBS AO1 ID: 65 | IBS 24 DO ID: 129 | IBS PT 100 ID: 70

0

IBS IP DIO 1/24-F ID: 7

1

IBS IP CBK 1/24 ID: 12

IBS IP CDI 1/24-F ID: 10

IBS IP CDO 1/24-F ID: 9

IBS IP CDI 1/24-F ID: 10

2

5096B105

PHENIX CONTACT
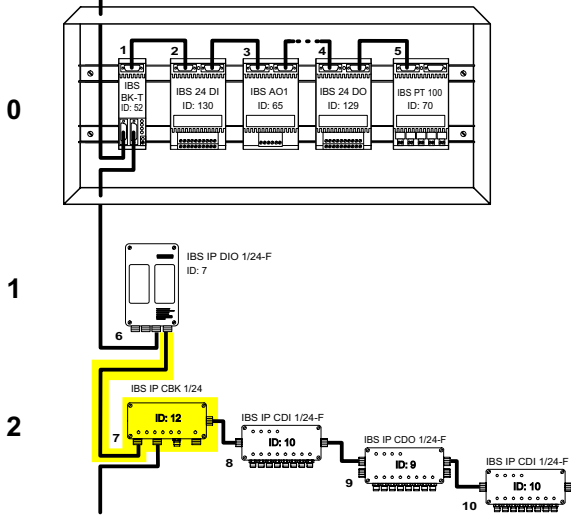
Table 9: Error description of the remote bus error
(DD=diagnostic display)

DD	Description	Remedy
0-255	Bus operation is disturbed and the bus was stopped. All outputs were reset. The display shows the number of the remote bus segment with the error. Please refer to Page 32 for additional information on the error description.	Check the following in the remote bus segment: - Power supply of the remote bus device - Cabling to the remote bus device (with the help of the LEDs on the BK module, see Page 38)

X = valid I/O address setting

● LED on

◐ LED off or on

○ LED off
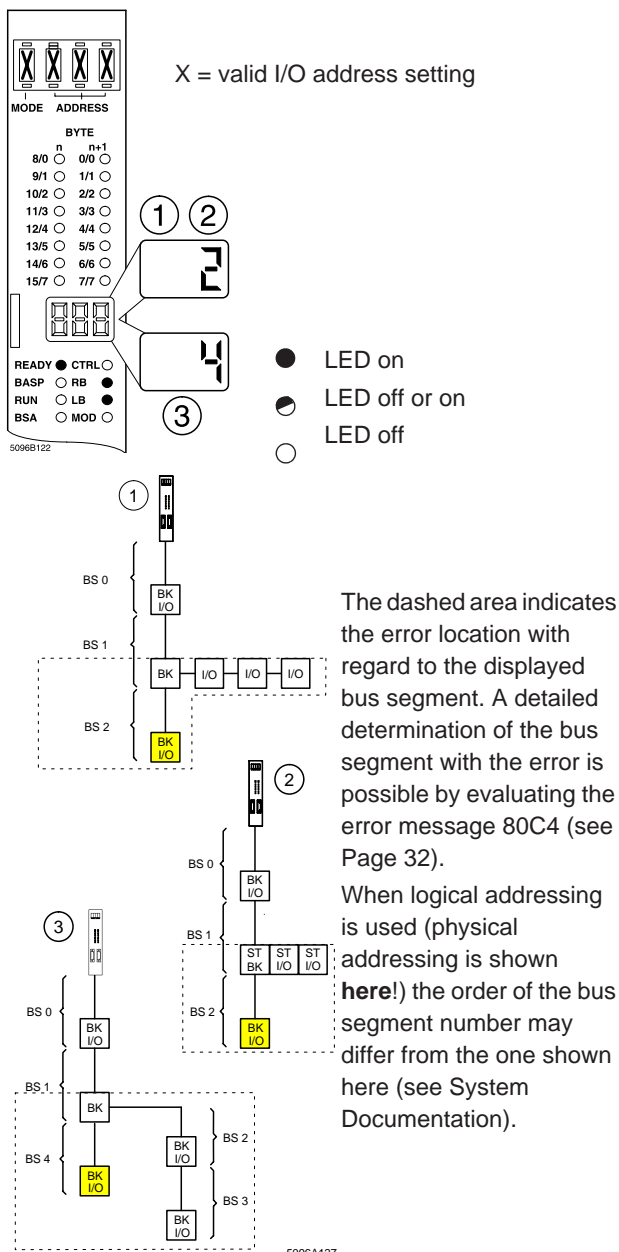
The dashed area indicates the error location with regard to the displayed bus segment. A detailed determination of the bus segment with the error is possible by evaluating the error message 80C4 (see Page 32).

When logical addressing is used (physical addressing is shown **here**!) the order of the bus segment number may differ from the one shown here (see System Documentation).

Figure 5: Error location (dashed area) with respect to the dis-
played bus segment (BS2 or BS4, gray)

5096A

Table 10: Error description of the remote bus error
(DD=diagnostic display)

DD	Description	Remedy
0-255	Bus operation was disturbed and the bus was stopped. All outputs were reset. The display shows a bus segment number. The error can be found in the previous bus segment **1)** of a local bus **2)** of an IB ST compact station or in the bus segments of a previous **3)** installation remote bus and/or in the displayed bus segment **(see numbered, schematic examples on the left)**.	Check the following in the indicated bus segment: - Power supply of the bus devices - Cabling of the bus devices (with the help of the LEDs on the BK module, see Page 38)

Bus Error (E0x)

X = valid I/O address setting

MODE   ADDRESS

BYTE

	n		n+1
8/0	○	0/0	○
9/1	○	1/1	○
10/2	○	2/2	○
11/3	○	3/3	○
12/4	○	4/4	○
13/5	○	5/5	○
14/6	○	6/6	○
15/7	○	7/7	○

READY	●	CTRL	○
BASP	○	RB	●
RUN	○	LB	●
BSA	○	MOD	○

5096B121

● LED on

◖ LED off or on

○ LED off

PHŒNIX CONTACT

5096A
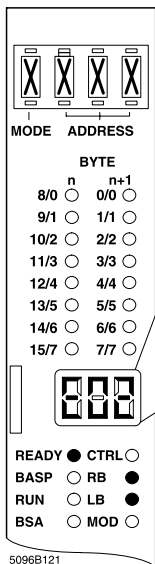
☞ As of firmware version 3.7 the following applies to the displays E01-E06:
The LEDs RB and LB light up simultaneously and the associated bits in the diagnostic register are set.

Table 11: Error description of the E0x error
(DD=diagnostic display)

DD	Description	Remedy
E01	No error was found when the configuration was acquired and compared after the error occurred. Cabling and/or shielding error	- Check remote and local bus cabling - Check the power supply - Check the PE connection - Diagnostic tool; IBS SYS SWT or IBS CMD SWT - Evaluate mode 918x, see Page 11
E02	The maximum permissible configuration was exceeded.	- Check the address lists and the configuration.
E04	The configuration could not be acquired because the device does not respond.	Check the power supply for dips. - Evaluate mode 918x, see Page 11
E05	All groups were disabled.	Check the application program.
E06	No error was found when the configuration was acquired and compared, but no data cycle is possible due to transmission errors.	- Diagnostic tool: IBS SYS SWT/ IBS CMD SWT - Inform the Technical Support Dep. of Phoenix Contact. - Evaluate mode 918x, see Page 11

The error message "Bus-Error-Information-Indication (80C4)" shows all bus errors. The following illustration shows the error E03. The location of the error is encoded in the specified way.

Error Message "Bus-Error-Information-Indication (80C4)" for Error E03

Word		
1	Bus-Error-Information-Ind.	80C4
2	PC	
3	Defective-Bus	EE03
4	GROUPS block	FF01
5	QTYGRP	
6	GRPNO	for 1st GRPNO
	...	
	GRPNO	for nth GRPNO
	REMOTE BUS block	FF02
	QTYRB	
	RBNO	for 1st RBNO
	RBERRNO	for 1st RBERRNO
	...	...
	RBNO	for mth RBNO
	RBERRNO	for mth ERRNO
	LOCAL BUS block	FF03
	QTYLB	
	LBNO	for 1st LBNO
	LBERRNO	for 1st ERRNO
	...	...
z+1	LBNO	for pth LBNO
z+2	LBERRNO	for pth LBERRNO
Bit	15 0	

Key to abbreviations:

PC — Parameter count (is generated automatically)
QTYGRP — Quantity of disconnected groups
GRPNO — Number of the first /nth disconnected group
QTYFB — Quantity of remote busses with errors
RB(-ERR)-NO — No.(error no.) of 1st to last remote bus with an error
QTYLB — Quantity of local busses with errors
LB(-ERR)-NO — No.(error no.) of 1st to last local bus with an error

Please refer to the following table for the error numbers (Abbr.: BK= bus terminal module, LB = local bus, E or e.= error, w = wire, DC= data cycle)

Error numbers for the error message 80C4 (in particular the error E03)

E.-No.	Error description (error numbers used with FW 3.71, FW 3.72 extended).
DD01	The BK ID does not agree with the original configuration (e.g. due to replacement or device error).
DD02	Error description like DD01, however, related to a BK I/O.
DD03	LB is missing or there is an open LB cable (no or defective local bus connection).
DD04	LB is longer than expected, because a module was added during operation.
DD05	LB is shorter than expected, because the module was removed during operation.
DD06	In the specified LB a module ID code does not agree with the original configuration.
DD07	The configuration could not be read in, because the bus system was not connected.
DD08	Local bus was connected to a BK module that originally had no local bus connected.
DD09	Bus segment is missing or there is an open remote bus cable (no or defective remote bus cable connection).
DD0A	Too many transm. err. (=E. type EE06,no error when configuration was acquired a. compared) between 2 error-free DC.
DD0B	Configuration is longer than expected, because the remote bus was extended compared with the original configuration.
DD0C	Maximum configuration was exceeded, the no. of bus devices or the register locations are too large.
DD11	Wrong process data length or data register of a bus device is defective (remote bus).
DD12	Wrong process data length or data registers of a bus device defective (local bus).
DD15	Short-time change of an ID code during operation with specified BK or module in specified LB (similar to DD01/02/06).
DD18	Short-time err. in a LB using the 8-w techn. during operation caused by cable and/or module error (similar to DD03/05/08).
DD19	Bus interruption or voltage reset in the additional diagnostic phase.
DD1A	Like DD0A, but in the additional diagnostic phase.
DD2B	Like DD0B, but in the additional diagnostic phase.
DD42	Short-time bus interrupt, voltage reset or jumper in outgoing remote bus connector defective.
DD50	Remote bus - or local bus error detected in the additional diagnostic phase.
DD51	Local bus error detected in the additional diagnostic phase.
DD52	Remote bus error detected in the additional diagnostic phase.
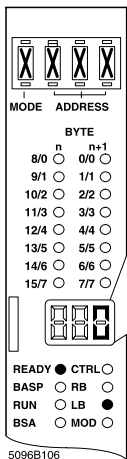
PHOENIX CONTACT

Local Bus Error LB

MODE   ADDRESS

BYTE

	n	n+1
8/0	○	0/0 ○
9/1	○	1/1 ○
10/2	○	2/2 ○
11/3	○	3/3 ○
12/4	○	4/4 ○
13/5	○	5/5 ○
14/6	○	6/6 ○
15/7	○	7/7 ○

READY ● CTRL ○
BASP ○ RB ○
RUN ○ LB ●
BSA ○ MOD ○

5096B106

X = invalid I/O address setting

When logical addressing is used (physical addressing is shown **here**!) the order of bus segment numbering may differ from the one shown here (see System Documentation).

● LED on
◐ LED off or on
○ LED off
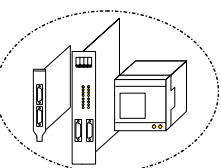
InterBus-S controller board

☐ **Error location**

Local bus segment number

0

1	2	3	4	5
IBS BK-T ID: 52	IBS 24 DI ID: 130	IBS AO1 ID: 65	IBS 24 DO ID: 129	IBS PT 100 ID: 70

11	12	13
IB ST 24 BK-T ID: 8	IB ST 24 DI 32/2 ID: 190	IB ST 24AI/SF ID: 126

5096B107

PHŒNIX CONTACT

5096A
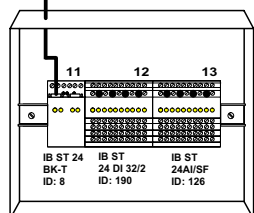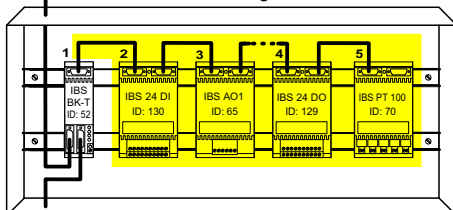
Table 12: Error description of the local bus error
            (DD=diagnostic display)

DD	Description	Remedy
0-255 (dec)	InterBus-S operation is disturbed and the bus was stopped. All outputs were reset. Possible causes: - Defective module - Defective connection between the modules. This display shows the number of the defective local bus. Please refer to Page 32 for additional information on the error description.	- Replace defective module - Replace defective connection Help for remedy: - LEDs on the modules

Module Error MOD

X = invalid I/O address setting

MODE   ADDRESS

BYTE
n	n+1
8/0	0/0
9/1	1/1
10/2	2/2
11/3	3/3
12/4	4/4
13/5	5/5
14/6	6/6
15/7	7/7

READY CTRL
BASP   RB
RUN   LB
BSA   MOD

5096B108

● LED on
◖ LED off or on
○ LED off

Error location

BS0 — IBS BK-T ID: 52 | IBS 24 DI ID: 130 | IBS AO1 ID: 65 | IBS 24 DO ID: 129 | IBS PT 100 ID: 70

BS1 — IBS IP DIO 1/24-F ID: 7

BS2 — IBS IP CBK 1/24 ID: 12
BS3 — IBS IP CDI 1/24-F ID: 10
BS4 — IBS IP CDO 1/24-F ID: 9
BS5 — IBS IP CDI 1/24-F ID: 10

BS6 — IB ST 24 BK-T ID: 8 | IB ST 24 DI 32/2 ID: 190 | IB ST 24AI/SF ID: 126

5096B109

PHOENIX CONTACT   5096A

Table 13: Error description of the module error

Dis-play	Description	Remedy
0-255 (dec)	The module error (MOD) indicates an error in the periphery of an I/O module, and the associated bus segment number is shown on the display. Possible causes: - Failure of the I/O voltage of a module (Indication: green LED is off) - Short-circuit or overload of an output (Indication: red E LED is on) **Note:** The bus is not affected by a module error and continues to operate! The error is indicated on the controller board and remains on the display even after the error has been removed. Depending on the current consumption, a short-circuit at an actuator can have an effect on further outputs of the voltage group concerned.	Check the I/O voltage of the module concerned and/or determine a short-circuit at the actuator(s). After the error has been removed: Clear the message with the CLEAR DISPLAY-REQUEST or SEND-ALL-MODULE-ERROR-REQUEST commands For modules with a holding error indication the error indication must be cleared with the CONFIRM-MODULE-ERROR-ALL-REQUEST (0065) command.

Diagnostic Functions on IBS Devices

Diagnostic Functions on the BK Module

Diagnostic LEDs

UL : Logic voltage

RC: Incoming remote bus connected

BA : Bus active

E : Error in connected local bus branch

LD : Local bus disabled

RD : Outgoing remote bus disabled

○ green ● red
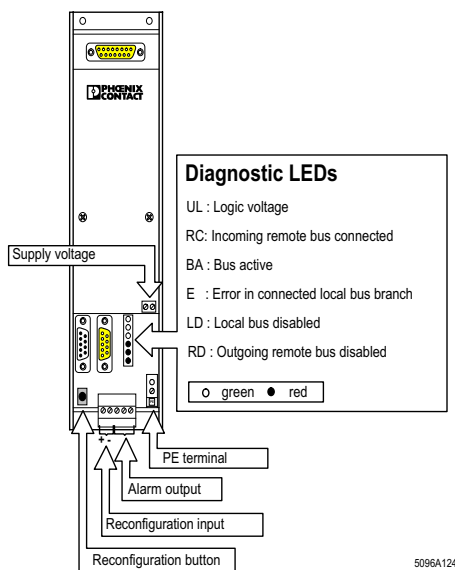
Figure 6: Diagnostic LEDs for BK modules
(here: IBS 24 BK-T)

☞ BK modules with I/O terminals can also indicate module errors (short-circuit of a sensor/actuator, missing I/O voltage). For this purpose, they have additional LEDs (see also diagnostic function on I/O modules).

U_L Green LED Voltage for the module's logic circuitry
on: Voltage is in the valid range
off: No voltage, remedy the cause, replace fuse, if required (either under the housing or with IBS ST modules pluggable from the outside, for fuse type see data sheet or "Fuse Types for IBS Devices", Page 49)

BA Green LED Bus active indication
on/off: Bus active/stopped

RC Green LED   Status of incoming remote bus
   on/off: Incoming remote bus active/shut down

RD Red LED   Status of outgoing remote bus
   on/off: Outgoing remote shut down/active

LD Red LED   Local bus status
   on/off: Local bus shut down/active

Rec button   After the button has been actuated the
   or terminal   PLC application program receives a
   for ext. button   message. The application program must
   fetch the message.

E   Red LED   Error indication for outgoing local bus
   on: Error in the outgoing local bus
   off: Local bus active

Some BK terminals (e.g. IBS 24 BK-T, IBS 24 BK-I/O-T) offer
a floating alarm output (relay changeover contact). The alarm
output is switched in the event of errors in the branching local
bus (E LED is on).

IB ST I/O Modules

Figure 7: LED locations using the IB ST 24 DIO 8/8/3-2A
module as an example
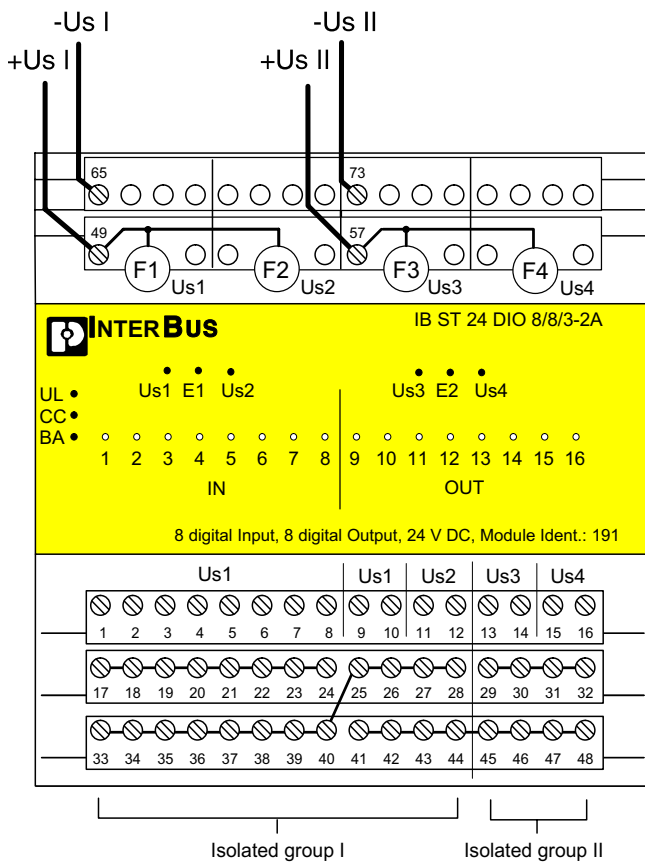
F1:   Fuse +Us1 (4AF)
F2:   Fuse +Us2 (4AF)
F3:   Fuse +Us3 (4AF)
F4:   Fuse +Us4 (4AF)

────── internally connected
━━━━━ to be connected externally

5096B110

UL	Green LED	Supply voltage for the electronics module
	on:	Supply voltage UL present
	off:	Supply voltage UL not present
		- Incoming ST cable missing
		- Fuse blown in BK module
		- Internal power pack of BK module
		defective
BA	Green LED	Bus active
	on:	Data transmission on InterBus-S active
	off:	No data transmssion
CC	Grn LED	ST cable check
	on:	Incoming ST cable connected
	off:	Incoming ST cable not connected or
		defective
E1	Red LED	Fuse blown in isolated group I
		terminals 1-8/9-12 (inputs or outputs)
	on:	F1 is blown, if Us1 off and Us2 on
		(relevant for terminals 1-8 and 9-10)
		F2 is blown, if Us2 is off and Us1 is on
		(relevant for terminals 11-12)
	off:	No fuse is blown
E2	Red LED	Fuse blown in isolated group II
		terminals 13-16 (outputs)
	on:	F3 is blown, if Us3 is off and Us4 is on
		(relevant for terminals 13-14)
		F4 is blown, if Us4 is off and Us3 is off
		(relevant for terminals 15-16)
	off:	No fuse is blown
XX	Yel.LED	I/O status (of channel XX)
	on:	Input/output is active
	off:	Input/output is inactive
Usn	Grn LED	24V I/O supply (group n)
	on:	Supply voltage Usn is present
	off:	- Supply voltage Usn is not present
		- Fuse of group n blown

Flat-Pack Modules with IP 20 Protection
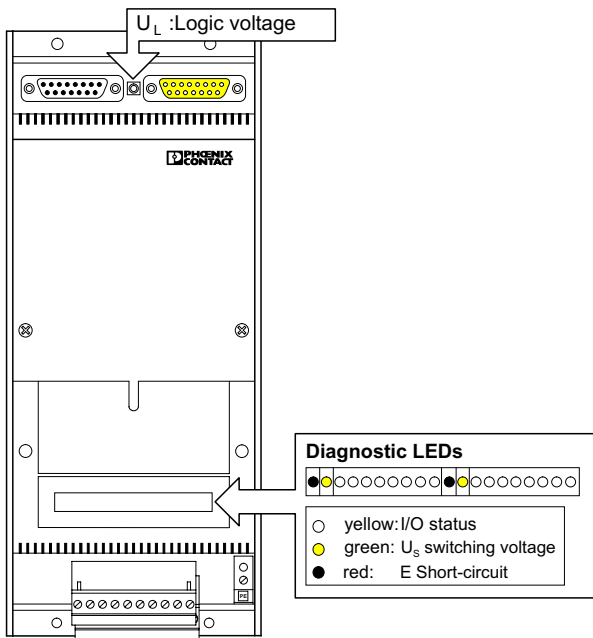
Figure 8: Example of LED diagnostics on an I/O module with IP20 protection

No.	Yel. LED	I/O status
	on:	Output set or input is active

U_S	Grn LED	Switching (I/O) voltage for the sensors and/or actuators
	on:	Voltage is in the valid range
	off:	No voltage or voltage is too low

E	Red LED	Overload or short-circuit indication
	on:	Output of the module is shorted or overloaded.
	off:	Output is okay

U_L	Green LED	Logic voltage for the module's electronics. (drawn from the local bus cable of the BK module)
	on:	Voltage is in the valid range
	off:	No voltage is present

☞   The meaning of the LEDs described above is
       different for all PCP modules that are capable of
       communications (IBS V.24, IBS AI 3/16, IBS UTH-
       J, IBS AI 1/8, IBS AI,6/8, IBS CNT, etc.). In this
       case, the three green LEDs between the local bus
       terminals have the following meanings:

U_P Green LED Power supply of the module electronics
       on: Voltage is in the valid range
       off: No voltage or voltage is too low

R   Green LEDReset
       on: Reset is not active
       off: Reset active

TR   Green LEDTransmission of parameter data is
                  active
       on: Transmission is active
       off: No transmission

Installation Remote Bus Modules with IP 65 Protection
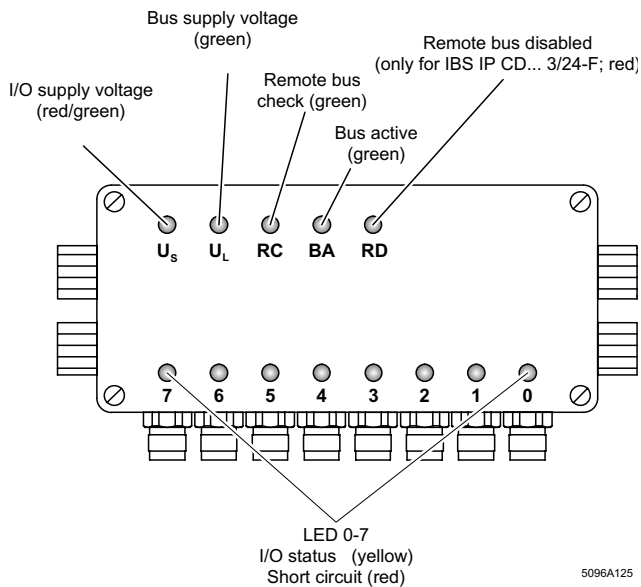
Figure 9: LED diagnostics on the installation remote bus
module with IP65 protection

No. Yel./red LED I/O status/overload or short-circuit
                  indication
    Yellow on: Ouput is set or input is active
    Red on: Short-circuit or overload at the output

U_S Green LED   Switching (I/O) voltage for the sensors
     Green (f. CDI) and/or actuators green/red (f.CDO)
     on: Voltage is present and in the valid range
     off: No voltage or voltage is too low

U_L Green LED   Voltage for the module electronics
     on: Voltage is present and in the valid range
     off: No voltage is present

BA   Green LED   Bus active indication
     on: Bus active

RC   Green LED   Status of incoming remote bus cable
     on/off: Incoming cable connected/not connected

RD   Red LED   Remote bus status (for IBS CDI or
                     CDO 3/24-F only)
     on/off: Remote bus disabled due to an error

PHŒNIX CONTACT

5096A

☞   For all IP65 modules that were not designed for
the use in an installation remote bus the LEDs
have the following meaning:

U_S	Green LED	Operating voltage indication
BA	Green LED	Remote bus active
RC	Green LED	Remote bus check
RD	Red LED	Remote bus disabled
0-7	Yellow LED	I/O status indicators

Additional Diagnostic Tools

IBS SYS SWT Configuration Software

The flowchart shows the operating steps in the program part "Diagnostics" which are used to evaluate the InterBus-S transmission quality.

Please refer to the user manual IBS SYS SWT UM E (Order no. 27 53 87 6) for a detailed description of the operating steps for all program parts.

```
                    ┌─────────────────────────────┐
                    │      Start InterBus-S        │
                    └─────────────────────────────┘
                    ┌─────────────────────────────┐
                    │ Call "Diagnostics" program part │
                    └─────────────────────────────┘
   (1)         ╱ (1) Evaluate diagnostic file only   ╲
     ◄────────⟨  (2) Record and evaluate diagnostic   ⟩
     │         ╲         data                         ╱
     │                    (2) │
     │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
     │               Set/modify scan time
     │         └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
     │         ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
     │            Set/modify data update mode
     │            (auto or manual)
     │         └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
     │         ┌─────────────────────────────┐
     │         │ If "manual": define time delay │
     │         └─────────────────────────────┘
     │         ┌─────────────────────────────┐
     └────────►│ Define evaluation period in the │
               │ diagnostic file              │
               └─────────────────────────────┘
               ┌─────────────────────────────┐
               │ If manual data regeneration: │
               │ select <Forward>, <Backward> │
               └─────────────────────────────┘
        ┌─────►┌─────────────────────────────┐
        │      │ - Evaluate table of error messages, │
        │      │ change accuracy of representation, if │
        │      │ necessary                    │
        │      │ For online operation:        │
        │      │ - Assess total evaluation and │
        │      │ allow for the sum of bus cycles │
        │      └─────────────────────────────┘
    (1) │       ╱ (1) Exit "Diagnostics" program part ╲
        └──────⟨  (2) Terminate online operation       ⟩
                ╲                                      ╱
                        (2) │
                ┌─────────────────────────────┐
                │ Online operation with <STOP> │
                └─────────────────────────────┘
```

- - - - - = optional step

IBS CMD SWT - The InterBus Manager

The IBS CMD SWT program is a graphical user interface under Microsoft Windows®, which offers functions for system configuration, start-up and diagnostics. Dialog functions allow to operate and display (monitor) all connected IBS devices. Moreover, the open structure of the software allows the integration of vendor- or device-specific operation and parameterization functions:

The program makes the following functions available:

- Functions to design a bus topolgy which is needed to assign the addresses between the PLC and the connected IBS devices
- Functions to parameterize complex IBS devices
- Dialog functions to output data (e.g. set outputs) as well as to read and display current input data (monitor inputs)
- Diagnostic functions to detect and locate defective system parts (IBS devices, cables, power supplies, etc.)
- Functions for documentation of your IBS system by preparing a system description including the programmed device settings

Utility programs, which are written by other IBS device manufacturers or IBS user groups (e.g. DRIVECOM) provide further functions. The user can integrate these utility program easily into the IBS CMD SWT user interface.

Thus, IBS CMD SWT is a platform which is open to all IBS users and device manufacturers and which allows an easy to manage configuration, monitoring and diagnostics of your InterBus-S system under Microsoft Windows®.

IBS CMD SWT can be fully used as of firmware 3.7, and with restrictions with firmware 3.5x.

Please refer to the IBS CMD SWT UM E user manual (Order no.: 27 53 95 7) for further information about the IBS SYS SWT software.

Process Data Monitor Program
IBS PC CB MONI

The file PCCBMONI.EXE is delivered together with the driver software for the IBS PC CB/../I-T controller boards.

The file is a separate program which can be started under DOS by calling PCCBMONI.EXE. It provides the following services:

- Start-up of an InterBus-S system using the PC
- Test of an InterBus-S system using the PC
- Control of the connected configuration
- Address allocation of the peripheral words
- Setting of outputs (binary and hex.)
- Display of the status of inputs (binary and hex.)
- Start and stop of the InterBus-S system

```
                         PROCESS DATA                          Help
┌BUS-DATA──────────────────────────────────────────────────────────┐
│                                                                    │
│   Number of the Bus Segments :  1            Bus Mode  : Manual    │
│   Number of the Modules       :  4           Bus State : RUN       │
│   Number of the PCP Modules   :  ---------                         │
│   Number of the PD Words      :  6           OUT Data  : Controlled │
│                                                                    │
└────────────────────────────────────────────────────────────────────┘

┌MODULE-DATA───────────────────────────────────────────────────────┐
│                                                                    │
│   Bus Segment No.:  0          PCP Length     :  ---------         │
│   Bus Type       :  Local bus  PCP Address(KR):  ---------         │
│   Module No.   :  1            PD Length      :  1 Word            │
│   Module Ident :  150d - 96h   PD IN Address  :  0                 │
│   Module Type  :  DI Standard  PD OUT Address :  ---------         │
│   Module Name  :  IBS 24 DI/LC Module Channel :  0                 │
│                                                                    │
│     ┌IN-DATA────────────────────┐  ┌OUT-DATA──────────────────────┐│
│     │1111000011110000 ¦ F0F0 ¦ 61680│  │--------------- ¦ ---- ¦ -----││
│                                                                    │
└────────────────────────────────────────────────────────────────────┘

Exit Alt-X   Next Word=   Previous Word=   Start Bus= +   Stop Bus= -
                                       5096A117
```

Figure 10: Input and output screen of the process data
monitor program IBS PC CB MONI

PHŒNIX CONTACT

Fuse Types for IBS Devices

All IBS devices with a 24V terminal are equipped with TR5 fuses. They protect the device on the bus side and, if the ones with active inputs are used, on the input side. The TR5 fuses are available from Phoenix Contact. The following table lists the fuses that are used in the modules. Fuses which are soldered in and can only be replaced at Phoenix Contact are listed as well.

⚠️ For some modules (marked in bold) the built-in medium-blow fuses are to be replaced by the ones listed below after they have blown.

Table 14: Overview of the fuse types

Module Order no	Device	Fuse type	Order no.	Order designation
	IB ST modules			
2754309	IB ST 24 AI 4/SF	SI. TR5 0,200AT	2753452	IBS TR5 0,2AT
2754309	IB ST 24 AI 4/SF	SI. TR5 0,400AT	2753478	IBS TR5 0,4AT
2752534	IB ST 24 AI 4/SF-WT	SI. TR5 0,400AT	2753478	IBS TR5 0,4AT
2752521	IB ST 24 AO 4/BP	SI. TR5 0,400AT	2753478	IBS TR5 0,4AT
2754312	IB ST 24 AO 4/SF	SI. TR5 0,400AT	2753478	IBS TR5 0,4AT
2752440	IBS ST 24-BK- DIO-8/8/ 3-T-WT	SI. TR5 1AT	2806600	IBS TR5 1AT
2752440	IBS ST 24-BK- DIO-8/8/ 3-T-WT	SI. TR5 5AT	2767383	IBS TR5 5AT
2753232	IBS ST 24 BK LB-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2754435	IBS ST 24 BK-LK	SI. TR5 1AT	2806600	IBS TR5 1AT
2753504	IBS ST 24 BK-RB-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2754341	IBS ST 24 BK-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2752437	IBS ST 24 BK-T-WT	SI. TR5 1AT	2806600	IBS TR5 1AT
2753012	IB ST 24 DI 32/2	SI. TR5 2AT	2752505	IBS TR5 2AT
2752479	IB ST 24 DI 32/2-WT	SI. TR5 2AT	2752505	IBS TR5 2AT
2753708	**IB ST 24 DIO 8/8/3-2A**	**SI. TR5 4 AT**	**2753465**	**IBS TR5 4AF**
2753449	**IB ST 24 DIO 8/8/3-2A-S**	**SI. TR5 4AT**	**2753465**	**IBS TR5 4AF**
2754914	**IB ST 24 DO 16/3**	**SI. TR5 4AT**	**2753465**	**IBS TR5 4AF**
2754325	IB ST 24 DO 32/2	SI. TR5 5AT	2767383	IBS TR5 5AT
2752482	IB ST 24 DO 32/2-WT	SI. TR5 5AT	2767383	IBS TR5 5AT
2754891	**IB ST 24 DO 8/3/2A**	**SI. TR5 4AT**	**2750374**	**IBS TR5 4AT**
2752767	IB ST 24 PT100 4/4	SI. TR5 0,4AT	2753478	IBS TR5 0,4 AT
	IBS flat-pack modules with IP 20 protection			
2784023	IBS 115 DI	SI. 5x20 2 AM	5032086	SI. 5*20 2AM
2784065	IBS 115 DO	SI. 5x20 6,3 AFF	None	
2784036	IBS 220 DI	SI. 5x20 2 AM	5032086	SI. 5*20 2AM
2784078	IBS 220 DO	SI. 5x20 6,3 AFF	None	
2784104	IBS 230 BK	UL500 mA	None	
2784120	IBS 24 BK	SI. TR5 1,600AT	2767367	IBS TR5 1,6AT
2784133	**IBS 24 BK I/O**	**SI. TR5 0,5AT**	**2767370**	**IBS TR5 0,5AT**
2784133	**IBS 24 BK I/O**	**SI. TR5 5AT**	**2767383**	**IBS TR5 5AT**
2759980	IBS 24 BK I/O-T	SI. TR5 5AT	2767383	IBS TR5 5AT
2753630	IBS 24 BK-I/O-LK	SI. TR5 1AT	2806600	IBS TR5 1AT
2758981	IBS 24 BK LWL/K	SI. TR5 1AT	2806600	IBS TR5 1AT
2767529	**IBS 24 BK/LC**	**SI. TR5 0,500AT**	**None**	**IBS TR5 0,5AT**
2759090	IBS 24 BK/LC 2	SI. TR5 1AT	2806600	IBS TR5 1AT
2780797	IBS 24 BK-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2784010	IBS 24 DI	No fuse		
2784421	IBS 24 DI/32	No fuse		

Table 14: Overview of the fuse types

Module Order no	Device	Fuse type	Order no.	Order designation
2806516	IBS 24 DI/32/F2	No fuse		
2784654	IBS 24 DI/I	SI. TR5 5AT	2767383	IBS TR5 5AT
2784670	IBS 24 DI/LC	No fuse		
2758017	IBS 24 DIO BB1/ET	SI. TR5 1 AT	2806600	IBS TR5 1AT
2807007	IBS 24 DIO BB1/RELS-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2806998	IBS 24 DIO BB1-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2784049	IBS 24 DO	PICO 15 AF Wick-mann	Soldered	
2767972	IBS 24 DO 1	PICO 15 AF Wick-mann	Soldered	
2784052	IBS 24 DO/32	SI. TR5 5AT	2767383	IBS TR5 5AT
2806503	IBS 24 DO/32/F2	SI. 5x20 2 AM	5032086	SI. 5*20 2AM
2780810	IBS 24 DO/32B	SI. TR5 5AT	2767383	IBS TR5 5AT
2784667	IBS 24 DO/LC	SI. TR5 5AT	2767383	IBS TR5 5AT
2767215	IBS 24 DO/R	SI. TR5 1AT	2806600	IBS TR5 1AT
2754422	IBS 24 DO/SSR	SI. TR5 1AT	2806600	IBS TR5 1AT
2758347	IBS 24 DO-B	PICO 15 AF Wick-mann	Soldered	
2784913	IBS 24 Rels	SI. TR5 1AT	2806600	IBS TR5 1AT
2768007	IBS 60 DI	No fuseg		
2784926	IBS 60 Rels	SI. TR5 1AT	2806600	IBS TR5 1AT
2784081	**IBS AI**	**SI. TR5 0,500AT**	**2767370**	**IBS TR5 0,5AT**
2758583	IBS AI 1/8	SI. TR5 0,400AT	2753478	IBS TR5 0,4AT
2767192	**IBS AI 3**	**SI. TR5 0,500AT**	**2767370**	**IBS TR5 0,5AT**
2759223	IBS AI 3/16	No fuse		
2752709	IBS AI 3/D	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2751522	IBS AI 3/I	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2806590	IBS AI 5/8	No fuse		
2780658	IBS AI/I	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2784094	IBS AO 1	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2784230	IBS AO 2	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2767202	IBS AO 3	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2758596	IBS AO 4/8	SI. TR5 0,4AT	2753478	IBS TR5 0,4AT
2784227	IBS CNT	SI. TR5 5AT	2767383	IBS TR5 5AT
2787839	IBS PT 100A/2	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2787842	IBS PT 100A/4	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
	IBS modules with IP 65 protection			
2758046	IBS 24 IP DIO BB1-T	SI. 5x20 6,3 AT	5030512	SI. 5*20 6,300AT
2754260	IBS 24 IP DIO BB1/EFK-T	SI. TR5 1AT	2806600	IBS TR5 1AT
2758020	IBS 24 IP DIO BB1/ET	SI. 5x20 6,3 AT	5030512	SI. 5*20 6,300AT
2758033	IBS 24 IP DIO BB1/RELS-T	SI. 5x20 6,3 AT	5030512	SI. 5*20 6,300AT
2758033	IBS 24 IP DIO BB1/RELS-T	SI. 5x20 0,5 AT	None	
2759948	IBS IP CBK 1/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2759731	IBS IP CDI 1/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2754503	IBS IP CDI 2/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2753203	IBS IP CDI 3/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2759799	IBS IP CDO 1/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2754493	IBS IP CDO 2/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
2753216	IBS IP CDO 3/24-F	SI. TR5 0,5AT	2767370	IBS TR5 0,5AT
	Host controller boards			
2806969	IBS A25 DCB/I-T	SI. TR5 1AT	Soldered	
2751153	IBS ETH CB-T	SI. TR5 1,6AT	2767367	IBS TR5 1,6AT
2806448	IBS IPC DCB/I-T	SI. TR5 2AT	2752505	IBS TR5 2AT
2806435	IBS IPC DCB-T	SI. TR5 2AT	2752505	IBS TR5 2AT
2784780	IBS PC AT	SI. TR5 1AT	2806600	IBS TR5 1AT
2806040	IBS PC AT 2	SI. TR5 1AT	2806600	IBS TR5 1AT
2784793	IBS PC AT/I	SI. TR5 1AT	2806600	IBS TR5 1AT
2806587	IBS PC AT/I 2	SI. TR5 1AT	2806600	IBS TR5 1AT
2751797	IBS S5 DSC/I-T P1	SI. TR5 2AT	2752505	IBS TR5 2AT
2806215	IBS S5 DCB-T	SI. TR5 2AT	2752505	IBS TR5 2AT
2758156	IBS S5 DCB/I-T	SI. TR5 2AT	2752505	IBS TR5 2AT
2752712	IBS SIN CB-T	SI. TR5 2AT	2752505	IBS TR5 2AT

PHENIX CONTACT

5096A

Replacement of INTERBUS-S Components

Replacing the InterBus-S Controller Board

If you want to replace the controller board you should proceed as follows:

1. Observe system-related safety information
2. Shut down the host system (PLC, VMEbus computer, PC).
   Caution: The bus system stops!
3. Unplug the remote bus cable from the controller board.
4. Pull out the controller board
   (In the case of DCB controller boards the EEPROM card must be replaced as well.)
5. Make the necessary settings on the controller board (jumper/DIP switches).
6. Insert the new controller board.
7. Plug the remote bus cable into the controller board and screw it tight.
8. Supply the host system with voltage
9. Start the host system.

☞ The settings on the controller board should be put down in writing and, if they are not quite clear, be verified by means of the user manual of the controller board.

⚠ Tighten the screws of the remote bus cable only manually tight using a screwdriver. Otherwise, the threads in the connector socket may be pulled out.

VMEbus Systems

The front plate of the controller board for VMEbus systems must be connected conductively with the mounting rack. Therefore, transitions between front pate and the mounting rack must neither be anodized nor painted!

PC

The IBS CB cover plate must be connected conductively with the PC housing. Tighten the screw of the IBS CB cover plate carefully.

Replacing an InterBus-S Device (IB ST)

If you want to replace a device you should proceed as follows:

1. Put the system into a safe state
2. Switch off power supply of the bus segment concerned.
3. Unplug the bus cable at the device (does not apply to IB ST modules).
4. Remove signal cable/CombiCon connector from IBS device (does not apply to IB ST modules).
5. Remove the IBS device; for IB ST: pull out the electronics module.
6. Make the necessary settings/configuration on the new device (Page 55).
7. Install the new device. For IB ST: insert new electronics module.
8. Connect the signal cable/CombiCon connectors to the device (does not apply to IB ST modules).
9. Connect the bus cable with the device (does not apply to IB ST modules).
10. Switch on the power supply of the bus segment concerned.

☞ Signal cables which are connected to CombiCon screw-clamp connectors need not be removed if the device is to be replaced.
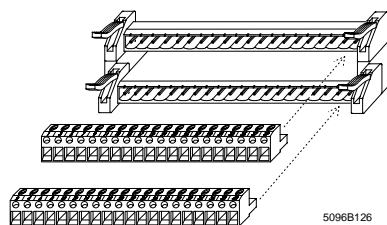

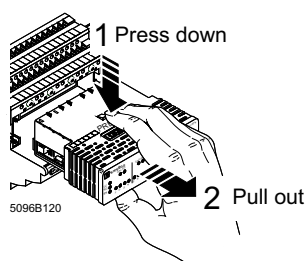Figure 11: CombiCon screw-clamp connectors

Figure 12: Easy removal of the IB ST electronics module

Replacing InterBus-S Devices With IP20 Protection

Do not remove the cover from the devices!

1. Unplug the bus connectors from the device.
2. Remove connectors and PE connecting cable.
3. Unhook the device from the DIN rail.
4. Installation is done in reverse order.

IBS 24 BK-T

Remove connector for the reconfiguration button REC (if used), remove connector for the alarm output and unscrew the power supply cables (not pluggable).

IBS BB1 module without IP65 housing

The module electronics is located in the middle of the module in its own housing and can be pulled out after two fixing screws have been loosened.

Replacing InterBus-S Devices With IP65 Protection

The location of the mouting screws is described in the data sheet of the associated device.

IBS CBK, IBS CDI, IBS CDO (compact module)

The module can be replaced without having to open the housing.

1. Remove connectors after the screwed cap has been loosened.
2. Unscrew the mounting screws.

IBS BB2 module

1. Switch off the power.
2. Open the housing.
3. The module electronics can be found in the middle of the module in its own housing and can be pulled out after two fixing screws have been removed.

IBS IP DIO and IBS IP BDIO module

1. Open the housing.
2. Remove the flanges by pulling out the fixing clamps (see figure on next page).
3. Take out the CombiCon scew-clamp connectors through the openings on the side.
4. Loosen the PE connecting cable.
5. Loosen the fixing screws.
6. Installation is done in reverse order.
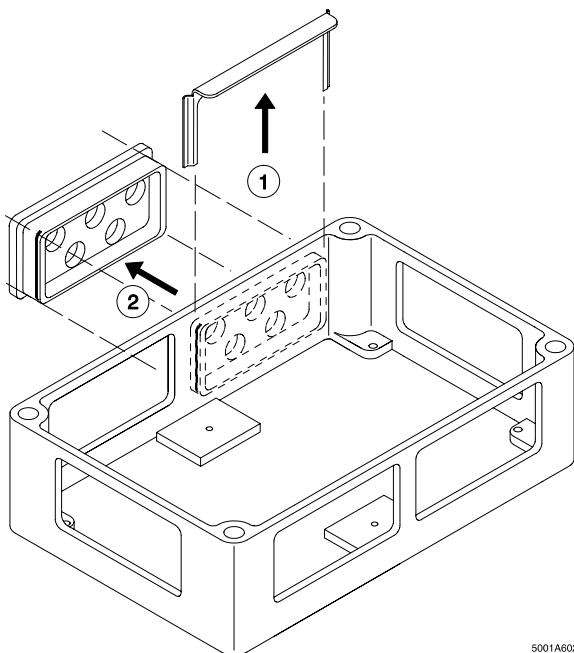
5001A602

Figure 13: Removing a flange from the housing of an IP DIO
module

⚠ Please ensure that there is a conductive
connection between the flange and the housing
when you re-install the housing. Only then can a
proper shielding be ensured.

Making Settings on/Configuring a New Device

Some IBS devices can be configured. In this case, the settings of the old device must be set on the new device as well.

IBS Devices with Voltage or Short-Circuit Monitoring:
Some IBS devices can indicate a power supply failure or the short circuit of an output via the bus system. This is not a standard setting, it must be activated by a jumper. Please refer to the package slip for information about this function and the location of the jumpers.

Retrofitting IBS Analog Modules with a Voltage Input to a Current Input:
The modules IBS AI/3 and IBS AI can be retrofitted with a current input. The current input is implemented by soldering a 50 Ω precision measurement resistor (IBS AI/R , Order No.: 27 84 43 53) into the input step of the voltage input. These resistors must be ordered when the module is purchased. When the module is replaced, it has to be ensured that the new module also has this 50 Ω resistor. The package slip shows the location of the 50 Ω resistor.

IBS CNT:
Unscrew the cover of the module. A jumper bank is located on the motherboard above the LEDs. These jumpers can be used to configure the counter channels. The positions of the jumpers must be set on the new module as well.

IBS AI x/8, IBS AI x/16:
If an input gain different than 1 is required, this gain can be stored in an EEPROM on the module. The module can be programmed directly by means of the control program (via PCP) or by means of the configuration software SACON (Order no. 27 58 56 7).

Repair of Defective INTERBUS-S Components

Information on a Defective Device

If you need to send in a defective InterBus-S component for repair to Phoenix Contact, please copy the service sheet overleaf to a DIN A4 format and fill it out.

Your complete information facilitates the service and allows a quick processing.

Please enclose the filled out service sheet with the component to be sent in.

Send defective parts which were manufacturered by Phoenix Contact with the note "For Repair" to your nearest Phoenix Contact representative or agency.

Consultation in the Event of Application Difficulties

Should you have any general questions concerning InterBus products, or application difficulties which cannot be overcome by means of this diagnostics guide, please contact your nearest Phoenix Contact representative or agency.

PHOENIX CONTACT

5096A

We Are Interested in Your Opinion!

We would like to hear your suggestions, wishes, criticism concerning this diagnostics guide.

No matter how small your contribution, we will deal with any hint or comment.

Please sent your comments, suggestions, etc. to the following address:

Phoenix Contact GmbH & Co.
Produktmarketing INTERBUS/ME-DOKU

Flachsmarktstr. 8-28
D-32825 Blomberg
Germany

Alternatively, you may use the following FAX number:

FAX No.: Germany-5235-331199

Phoenix Contact GmbH & Co.
Produktmarketing INTERBUS/ME-DOKU

PHŒNIX
CONTACT

Service Sheet For the Repair of Defective INTERBUS-S Components

Contact name for Phoenix Contact	
Mr./Mrs./Ms.	
Company	
Department	
Address	
Postal code/city country	
Phone	FAX

General information about the system concerned						
Control system and CPU used						
What other boards are plugged?						
Type and serial number of the controller board						
The letter which is marked on the controller board **or**	A	B	C	D	E	F
Version number of the controller board						
Version number of the software						
Is PCP communication used?	Yes		No			

Defective component	
Designation	
Revision letter/number	
Serial number	
Vendor	

PHOENIX CONTACT

5096A

Error description	
Since when does the error occur?	
How often does it occur?	
How does the error manifest itself?	

Notes:

PHŒNIX
CONTACT

5096A

Comparing the DCB Board With Other Controller Boards

Table 15: Comparison of the displays between the DCB controller board and other controller boards

LED indicators			
DCB	VME CB	PC CB	S5 100 CB
Ready	RDY	MA Ready	Run (blinking)
BASP	SYSFAIL	See user manual	Diagnostic bit 6
RUN	RUN	MA RUN	RUN (permanent light)
BSA	BSA	Driver message x_1	-
CTRL	ERR	x_2	Error (quadruple blinking interval)
RB	ERR	x_2	Error (triple blinking interval)
LB	ERR	x_2	Error (double blinking interval)
MOD	ERR	x_2	Error (single blinking interval)
Blinking diagnostic display	-	-	Error (permanent light)

x_1: Get IBS Diagnostic , structure element "State"

x_2: Get IBS Diagnostic , structure element "ErrType"

Flowchart for the Error Recovery

```
                        ┌──────────────────┐
                        │  An error occurs │
                        └──────────────────┘
                                 │
         ┌──────────────────────────────────────────┐
         │ The error is reported:                    │
         │ - Front plate of controller board         │
         │ - Software function                       │
         │ - Distributed diagnostic LEDs             │
         └──────────────────────────────────────────┘
                                 │
         ┌──────────────────────────────────────────┐
         │ Front plate diagnostics shows the         │
         │ group, location and code of the error     │
         └──────────────────────────────────────────┘
```

LED CTRL ERR	LED RB ERR / LED LB ERR / LED MOD ERR	LED READY off
Parameterization error	Error is indicated **Note:** Observe bus segment numbering (physical or logical)	Controller board is defective! Replace it!

```
                 Check the bus segment with errors
```

LED RB	LED LB	LED MOD
Error: remote bus cabling, power supply of BK module Help: LED of BK. **Caution:** Bus stopped	Error: Local bus cabling I/O module Help: LED on module **Caution:** Bus stopped	Error: Failure of I/O voltage, short-circuit on the sensor or actuator **Caution:** Bus continues to run

```
                        Repair the system
```

Clear error indication:

a: By means of the application program (send Clear-Display Req. 004E)
   or
b: Perform a RESET, switch PLC voltage on/off

⚠ Perform a RESET only when the PLC is in the STOP state and if it is permitted by the application program.

5096B118

The diagnostic response of the controller board is as follows:

1. Detection of an operating or error condition;
   automatic diagnostics

2. Display of the diagnostic data by means of
   - Front plate (error group and parameter via LED)
   - Diagnostic reg. (like front plate, but via memory)
   - Acknowledgment delay

3. Further diagnostic functions by means of the ISFP
   software program (included function blocks)
   V.24 port for the connection of a diagnostic program (IBS
   SYS SWT or IBS CMD SWT).

PHŒNIX
CONTACT

Phoenix Contact GmbH & Co. KG
Postfach 13 41
D-32819 Blomberg
Phone: Germany-5235-3-00
Fax: Germany-5235-3-41200