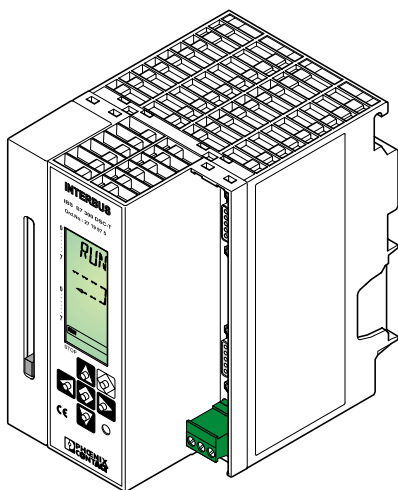


INTERBUS

Quick Start Guide



Designation: IBS S7 300 DSC QS UM E

Revision: B / C01

Order No.: 27 43 16 1

This guide is valid for:

IBS S7 300 DSC-T, Revision \geq 10/442

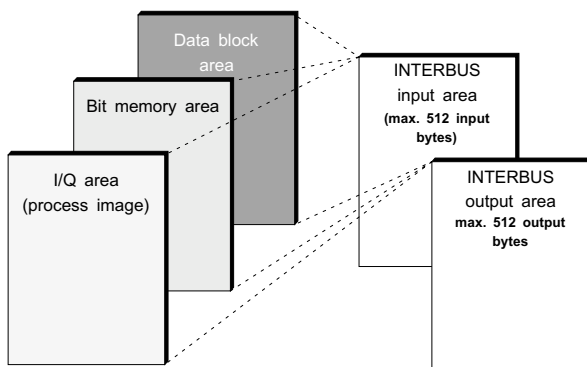
INTERBUS Process Data in the PLC

The I/O address area of the SIMATIC® S7-300 PLC depends on the type of CPU. It is split into an input and an output address area. These contain the data of the boards operated in the PLC.

Driver blocks allow the area of the INTERBUS process data (input and output data of INTERBUS devices) to be transferred into or out of the S7-300 PLC block by block. The driver blocks create a process image that reads the inputs prior to the application program, and writes the outputs to the controller board or output devices after they have been processed by the application program.

The driver can transfer the input/output data of the INTERBUS system into the I/Q area of the PLC, bit memory areas or data blocks, or out of these areas.

Addressable Areas of the SIMATIC® S7-300



5770B013

Application Areas / Technical Data

The controller board is compatible with the Siemens SIMATIC® S7-300 PLC.

Mechanical Structure

Format (w x h x d)	80 mm x 125 mm x 110 mm (3.150 in. x 4.921 in. x 4.330 in.)
Weight	500 g

PLC

Permissible CPU types CPU 313 through 316

Data interfaces

PLC	SIMATIC® S7-300 I/O bus
INTERBUS	Remote bus, 9-pos. D-SUB female connector
Operation/diagnostics	RS-232-C, 9-pos. D-SUB male connector
Connection method	Via SIMATIC® S7-300 I/O bus

Supply

Voltage	Through external power supply
Current consumption	Max. 300 mA at 24 V DC Max. 10 mA from the S7-300 I/O bus

Addressable PLC areas

Input/output areas, bit memory areas and data blocks

Occupied analog address area

16 byte inputs and 16 byte outputs

INTERBUS data

Number of devices	512 (254 remote bus devices)
Amount of process data	256 words (4096 digital inputs/outputs)
Number of devices with parameter channel	62

Operating temperature 0°C to 60°C (horizontal
mounting), 0°C to 40°C
(vertical mounting)

Optical diagnostics

Operating status	Through 4-line LCD
Error status	Through 4-line LCD
I/O status	Through 4-line LCD



The following overview lists the sections of this Quick Start Guide, which informs you about how to start up the controller board and the entire INTERBUS system.

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Installing the Controller Board <ul style="list-style-type: none">– Controller board installation in the PLC– Inserting the parameterization memory– INTERBUS system connection	Page 10
INTERBUS Operating Modes <ul style="list-style-type: none">– Description of the timing interaction between the INTERBUS and the PLC	Page 17
Example of an INTERBUS and PLC Configuration	Page 18
Integration of the Controller Board in STEP 7 <ul style="list-style-type: none">– Integrating the controller board into the PLC	Page 19
Startup for Testing the INTERBUS System <ul style="list-style-type: none">– Startup of the entire system during the installation phase to test the connected INTERBUS devices	Page 24
Startup With IBS CMD SWT G4 Configuration Software <ul style="list-style-type: none">– Startup of the controller board and the connected INTERBUS system with IBS CMD SWT G4 software. During startup with IBS CMD SWT G4, all system options are available	Page 27
INTERBUS System Operation From the PLC <ul style="list-style-type: none">– Description of the INTERBUS standard and diagnostic registers and its position in the PLC	Page 42
Automatic Diagnostic Functions <ul style="list-style-type: none">– Description of the diagnostic driver block	Page 52
Appendix <ul style="list-style-type: none">– Replacing the controller board– Replacing the parameterization memory– Upgrading the firmware– Connecting cable	Page 57

General Notes

Unless mentioned otherwise, all information in this guide refers to the IBS S7 300 DSC-T controller board, Order No. 27 19 97 5.

When using this guide, please observe the following notes:



The *attention* symbol refers to an operating procedure which, if not carefully followed, could result in damage to equipment or personal injury. The symbol is always located to the left of the tagged text.



The *note* symbol gives you tips and advice on hardware and software optimization. In addition, text marked in this way informs you of system-related conditions that must strictly be observed to achieve error-free operation. The symbol is also used to clarify terms.



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

Right and secure use of the product requires proper transport, storage, mounting and assembly, as well as, careful operation and installation. The use of this product is only allowed to qualified personnel authorized to start up, to ground and to mark devices, systems and electric circuits according to the standards of safety technology. Phoenix Contact assumes no liability for damage or personal injury resulting from disregard of notes and safety guidelines contained in this manual.

Please note that software/hardware designations and brand names of the companies mentioned are, as a rule, protected by copyright, trademark or patent.

Current Phoenix Contact product information is also available on the Internet at: **www.phoenixcontact.com**.

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Preface

Application

This Quick Start Guide helps you to start up and operate an INTERBUS system connected to an IBS S7 300 DSC-T controller board for Siemens SIMATIC[®] S7-300 PLC.

Purpose

This guide should make it possible to start up the INTERBUS system quickly and easily. In the user manual of the controller board (IBS S7 300 DSC UM E) you will find a complete description of all the features e.g., a detailed description of all possible services and error messages.

Content

This guide describes the easy startup of the INTERBUS system as follows:

1. Setting and installing the hardware
2. Testing the entire system
3. Configuring and loading system data to the parameterization memory
4. Controller board startup
5. Operating the INTERBUS system
Diagnostic and operating functions are described in addition to startup.

Hardware and Software Requirements

- Controller board
IBS S7 300 DSC-T Order No. 27 19 97 5
- Parameterization memory
IBS MC FLASH Order No. 27 51 77 1
- Connecting cable
IBS PRG CAB Order No. 28 06 86 2
- Driver software
(on the disk provided with the IBS S7 300 DSC UM E
User Manual)
- Configuration software (demo version)
IBS CMD SWT G4 DEMO E Order No. 27 22 22 1
or CMD software (full version)
IBS CMD SWT G4 E Order No. 27 21 44 2

Further Documentation



User manual for the controller board

IBS S7 300 DSC UM E Order No. 27 21 33 2

Installation and I/O Systems Manual

IBS SYS PRO INST UM E Order No. 27 43 80 2

Diagnostics Guide

IBS SYS DIAG DSC UM E Order No. 27 47 29 3

Trademarks

SIMATIC[®],

STEP 7[®] Registered trademarks of Siemens AG

WINDOWS[®] Registered trademark of Microsoft Corp.

Preparations

This section contains the basic settings which are necessary before installing the controller board in the PLC and which determine the operating behavior.

ESD Regulations



Persons who handle the controller board must protect it by observing the ESD instructions before packing or unpacking the board, opening control boxes or control cabinets and before touching the board.

Unpacking the Controller Board

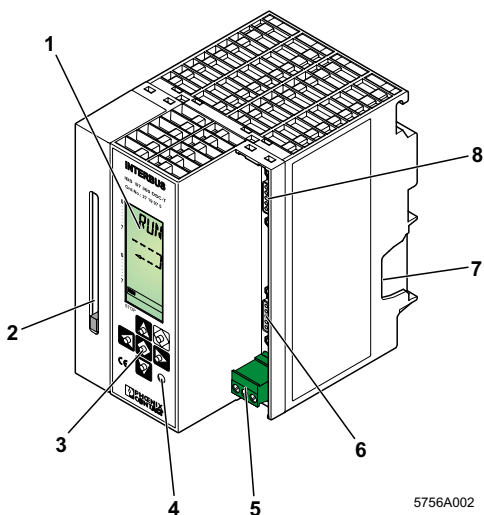
The controller board is supplied together with a package slip with installation instructions. Please read the complete installation instructions before unpacking the controller board.



Only qualified persons should pack, unpack and handle the controller board while observing the ESD instructions.

Structure of the Controller Board

Connecting and Operating Elements



5756A002

Figure 1 Front view

Key

- 1 LCD
- 2 Slot for the parameterization memory **
- 3 Operator's panel *
- 4 Test mode button
- 5 Connection for external power supply (24 V DC)
- 6 Remote bus interface (9-pos. D-SUB female connector)
- 7 Location for the outgoing SIMATIC[®] bus connector
- 8 Diagnostic interface
(9-pos. D-SUB male connector, for connection to a PC)

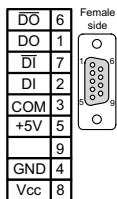
* Operation: see back cover or IBS SYS DIAG DSC UM E Diagnostics Guide

** The parameterization memory is not shipped together with the controller board.

Remote Bus Connection (REMOTE)

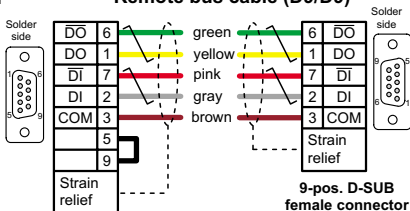
The remote bus interface connects the controller board with the INTERBUS devices (field devices). The remote bus connection on the front plate of the controller board has been designed as a 9-pos. D-SUB female connector. Phoenix Contact offers pre-assembled remote bus cables in common lengths. The pinout of the remote bus cable connector is shown in the figure below.

Remote bus connection



9-pos. D-SUB female connector

Remote bus cable (D9/D9)



9-pos. D-SUB male connector

9-pos. D-SUB female connector

5756A003

Figure 2 Remote bus connection and example of a remote bus cable (cable type D9/D9)

The IBS OPTOSUB... and OPTOSUB PLUS interface connectors enable you to fit your INTERBUS system with optical fibers. Interface connectors are available for different mounting positions. Please refer to "Connecting Cable" on page 62 in the Appendix of this Quick Start Guide.

Diagnostic Interface (RS-232)

The controller board's serial interface (RS-232) connects an IBM-compatible PC with the IBS CMD SWT G4 E software (Order No. 27 21 44 2). This software can be used to configure, parameterize, and diagnose the INTERBUS system. IBS CMD SWT G4 E is independent of the programming language or the operating system of the S7-300 PLC.

Parameterization and configuration information can be stored on the parameterization memory (available as an accessory part) with IBS CMD SWT G4 E. In addition, upgraded firmware for the controller board can be downloaded. The serial interface on the front plate of the controller board has

been designed as a 9-pos. D-SUB male connector. The board is connected to the PC with the RS-232 cable IBS PRG CAB (Order No. 28 06 86 2) shown below.

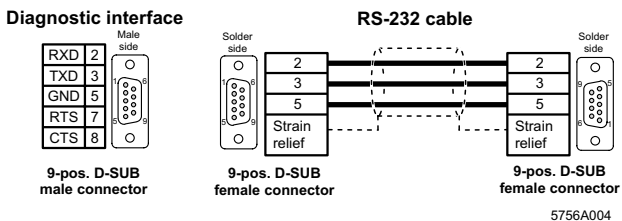


Figure 3 Diagnostic interface and RS-232 cable

Diagnostic Indicators

The LCD is used to indicate operating and error states of the controller board. For further information about the indicators on the display and their meanings, please refer to the back cover of this guide.

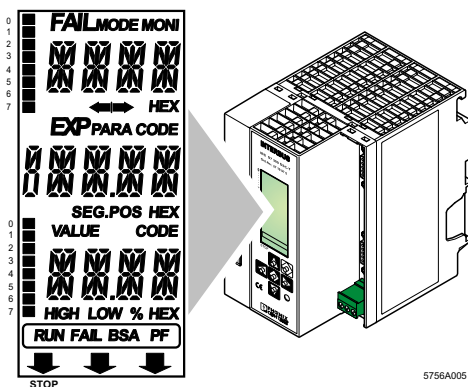


Figure 4 Diagnostic display with representation of the individual segments and lines



For further information about error messages, please refer to the IBS SYS DIAG DSC UM E Diagnostics Guide.

Keypad

The keypad consists of six keys and enables menu-driven operation of the controller board.

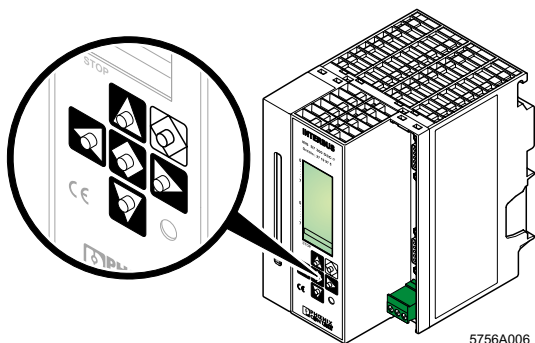


Figure 5 Controller board keypad

For information on the meanings of the individual buttons, please refer to the cover page at the end of this guide.

Test Mode Button

This button is on the bottom right of the keypad on the front plate of the controller board.

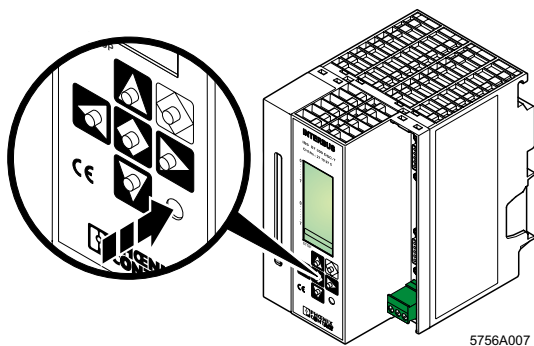
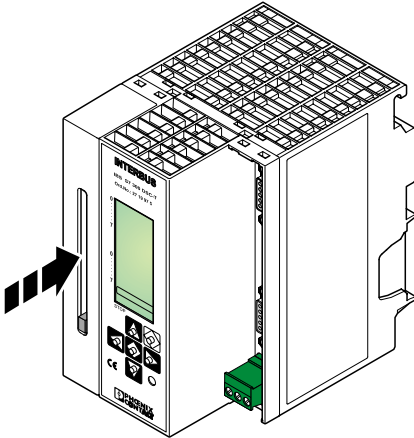


Figure 6 Test mode button

For information on the function of the test mode button, please refer to the Section "Startup for Testing the INTERBUS System" on page 24.

Slot for the Parameterization Memory

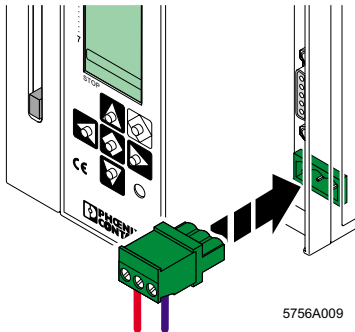


5756A008

Figure 7 Slot for the parameterization memory

A system-specific parameterization of the INTERBUS system and the controller board are stored on the plug-in parameterization memory.

Connection for the External Power Supply



5756A009

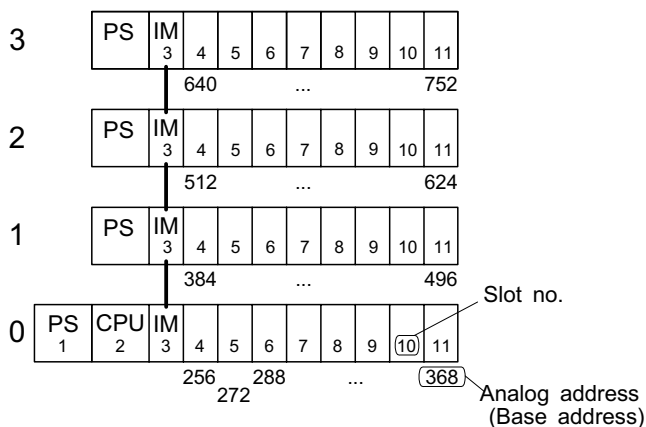
Figure 8 Power supply connection

The controller board requires an external power supply of 24 V DC for operation. This can be drawn from the power supply unit of the S7 PLC.

Installing the Controller Board

Possible Slots

The S7-300 PLC is row-oriented with a maximum of four rows (0 through 3). Each row has a maximum of eight slots for I/O modules.



5756A010

Figure 9 Structure of a SIMATIC[®] S7-300 PLC

Rules for the Use of the Controller Board

The controller board can be operated in rows 0 through 3 (rows 1 through 3 for C7, SINUMERIK 810D and 840D PLCs) in slots 4 through 11. The maximum number is two controller boards per row.



Current consumption of the controller board:

Maximum 300 mA at 24 V DC

Maximum 10 mA from the S7 backplane bus

The controller board occupies one slot in the analog PLC area (16 byte inputs and 16 byte outputs).



Please note that the limited system resources of the S7 CPU 312 prevent the controller board from being operated in a PLC with this type of processor.

Controller Board Installation In the PLC



Switch off the PLC supply voltage.

Insert the bus connector in the PLC component in front of the controller board (Figure 10).

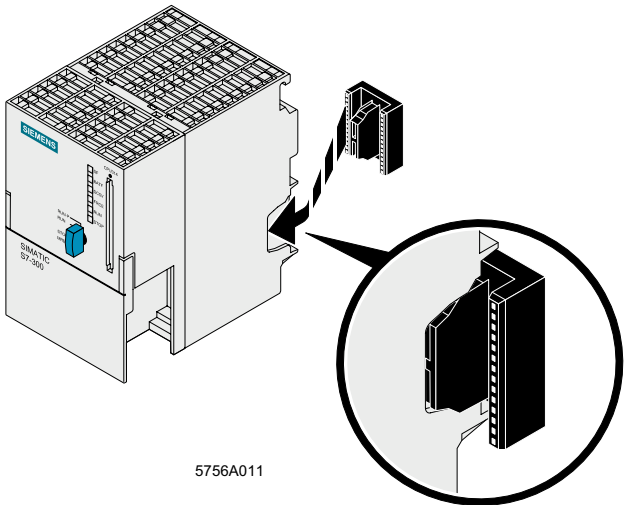


Figure 10 Inserting the bus connector

Hook the controller board onto the upper part of the mounting rail (A). Swivel the board downward in the bus connector to the mounting rail (B).

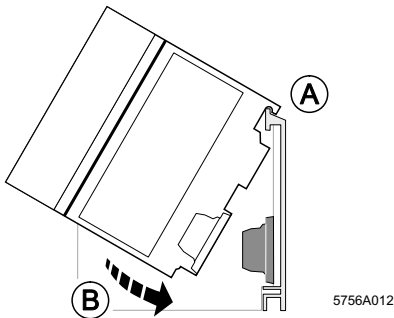
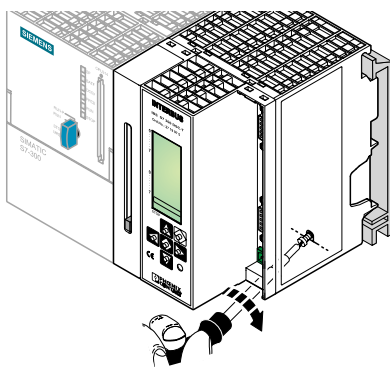


Figure 11 Installing the controller board

Lock the controller board to the mounting rail using the two slotted-head screws at the bottom of the board.



5756A013

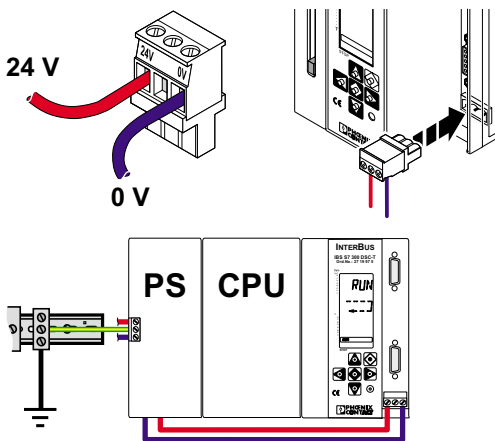
Figure 12 Locking the controller board



Make sure that the bus connector makes good contact and the controller board is securely placed and locked in the PLC.


Connecting the External Supply Voltage

Connect the external supply voltage according to the following diagram.




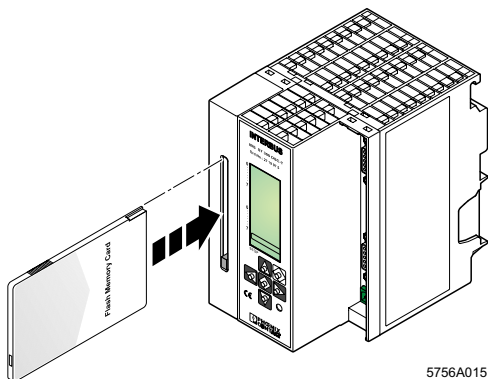
5756A014

Figure 13 Connecting the supply voltage

 Connect the controller board to the PLC power supply unit. In this case, the controller board will also be reset on a PLC POWER-UP.

Inserting the Parameterization Memory

 Please note that only the test mode enables the operation of the controller board without parameterization memory. During normal operation a parameterization memory must be inserted.




5756A015

Figure 14 Inserting the parameterization memory

Inserting the Parameterization Memory

Insert the parameterization memory into the slot provided, with the female connector to the front (see Figure 14). Make sure that when the parameterization memory is pressed lightly it clicks into place and the ejector moves out.

 As you insert the parameterization memory, make certain that the card is located in the guide rails on both sides of the card holder. Make sure that the parameterization memory is properly aligned.

Removing the Parameterization Memory

Press the ejector. The parameterization memory will be ejected from the slot. You can then remove it from the front.

Connecting the INTERBUS System

Connect the remote bus cable which goes to the first INTERBUS bus terminal module (BK module) to the remote bus interface (REMOTE) on the controller board. The connection to the controller board is via a 9-pos. D-SUB female connector, into which you can insert either the remote bus cable or an adapter for conversion to fiber optic cable. For further information on the bus cable assembly and optical fiber adapters, please refer to "Connecting Cable" on page 62 as part of the Appendix.



Use only metal-plated connector housings.

All Phoenix Contact connectors shown in the following meet these requirements.

Connecting the RS-232 Cable

Connect the RS-232 cable to the diagnostic interface (RS-232) of the controller board. It connects the controller board and your PC (COM1 to COM4).

Connection

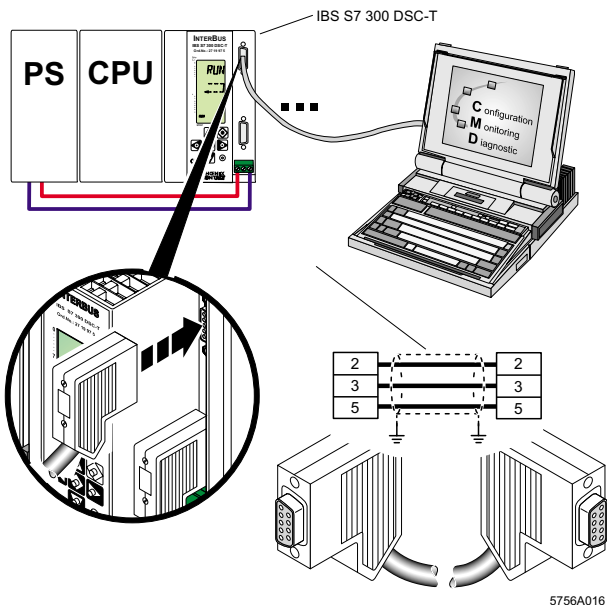


Figure 15 Cable connection between the PC and controller board



Ordering data:

Connecting cable between the controller board and your PC (RS-232), 3 m in length:

IBS PRG CAB

Order No. 28 06 86 2

Integrating INTERBUS Process Data Into the PLC

Driver blocks enable the transfer of the area of INTERBUS process data (input and output data of INTERBUS devices) to the S7-300 PLC. These driver blocks create a process image that reads the inputs prior to the application program and writes the outputs to the controller board or output devices after they were processed by the application program.

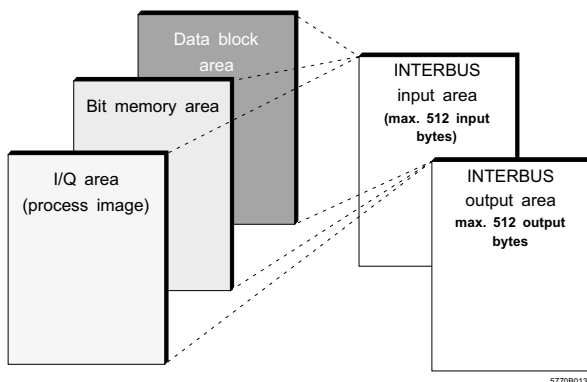



Figure 16 Addressable areas in the SIMATIC[®] S7-300 PLC

Driver blocks can transfer INTERBUS data into the I/Q area of the PLC, into bit memory areas and into data blocks, or out of these areas.

 Further information on the configuration of driver blocks and the settings required in STEP 7[®] and IBS CMD SWT G4 can be found in the following sections or in the IBS S7 300 DSC SWD UM E Driver Manual (Order No. 27 43 25 5).


INTERBUS Operating Modes

The INTERBUS operating modes essentially determine the time at when the driver software accesses INTERBUS data, while the INTERBUS data cycles are running. Any necessary interruptions are generated by the controller board. You can set the operating modes in IBS CMD SWT G4.

The following operating modes are available as standard:


Asynchronous Operating Mode


Asynchronous to the INTERBUS data cycles, the driver software accesses the I/O data stored in the controller board. This means that the driver software can just as easily access data from the current INTERBUS data cycles as it can from the previous data cycles. This can result in an inconsistency in the transferred data. Word limited data is always consistent, i.e. from one data cycle.

 Use this operating mode when a data consistency less than 16 bits is sufficient or when no time sequences must be kept.

Asynchronous Mode With Synchronization Pulse

Using this operating mode there exists the possibility of consistently transferring INTERBUS I/O data. The controller board generates a synchronization pulse after the completion of the INTERBUS cycle. From this time the INTERBUS process data can be consistently transferred from the driver block (read/write). In the PLC the driver software starts the next INTERBUS cycle with another synchronization pulse.

 Use this operating mode to consistently transfer data greater than 16 bits between the INTERBUS and the PLC.

 Take note that for the "Asynchronous With Synchronization Pulse" operating mode the FC 28 IB_SYNC driver block must be integrated into your application.

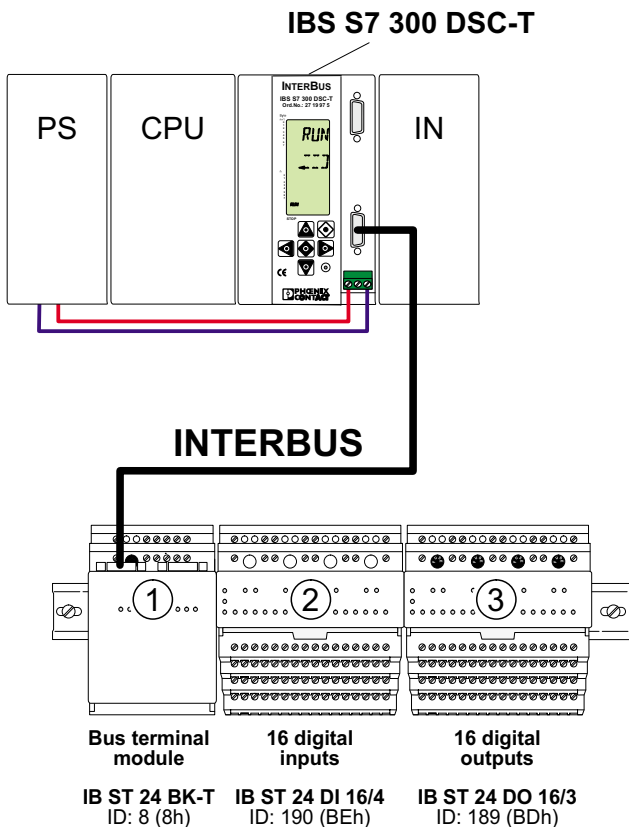


For further information on INTERBUS operating modes and the settings required for the FC 28, please refer to the IBS S7 300 DSC SWD UM E Driver Manual (Order No. 27 43 25 5).

Example of an INTERBUS and PLC Configuration

To make your introduction to working with the IBS S7 300 DSC-T controller board as straightforward as possible, the descriptions in later sections are based on the following INTERBUS and PLC configuration.

Example Configuration



5756A018

Figure 17 Example configuration

Integration of the Controller Board in STEP 7[®]

Integrate the controller board as a standard SIMATIC[®] component (FM 353 for Step Motor, S7 FM-POS).

To create the hardware configuration, select one of the following two options:

- Reading out the PLC configuration
- Linking the controller board manually

Reading Out the PLC Configuration

1. Start the STEP 7[®] SIMATIC[®] software.
2. In the "PLC" menu, select the "Display Accessible Nodes" option using the mouse. Then you can choose the MPI address for the CPU.
3. In the "PLC" menu, select the "Diagnose Hardware" option.

After reading out the PLC configuration, the IBS S7 300 DSCT controller board now declares itself as S7 FM-POS (FM 353 for Step Motor) in the analog area with 16 byte inputs/outputs.

4. In the "Hardware Configuration" window, double-click with the left mouse button on the "FM 353 for Step Motor" item. This opens the "Properties - FM 353 Step ..." dialog box (Figure 18).
5. Click on the "Properties... Addresses" tab (Figure 18). This displays the base address of the controller board specified by the slot.



Enter this address in IBS CMD. The procedure for this is described in the section "Startup With IBS CMD SWT G4 Configuration Software" on page 27.

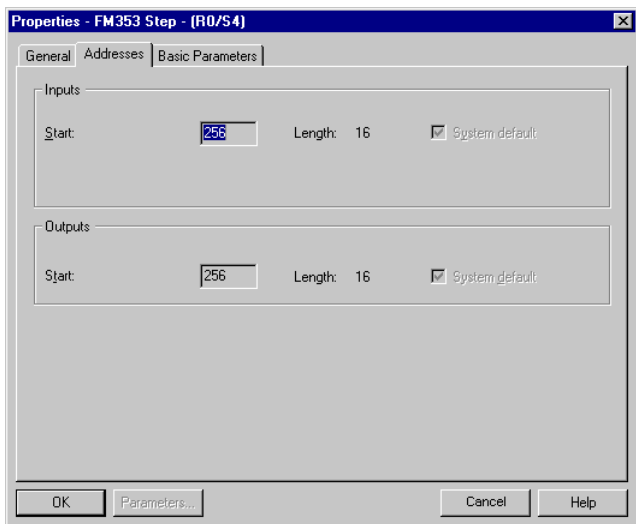



Figure 18 "Properties... Addresses" tab

 The controller board occupies 16 byte inputs and 16 byte outputs in the analog PLC area starting from the base address. The INTERBUS standard registers are located in this area (see also "Position of the INTERBUS Standard Registers" on page 43).

For further controller board settings, please refer to "Startup With IBS CMD SWT G4 Configuration Software" on page 27 (e.g., setting the operating mode, assigning addresses).

Integrating the Controller Board Manually

During manual configuration, the controller board must be linked as "FM 353 for Step Motor" item (6ES7 353-1AH00-0AE0):

1. Start STEP 7®.
2. Create a new project and start the hardware configuration for SIMATIC S7 300.
3. Open the "Hardware Catalog" dialog box and select the "SIMATIC 300" subdirectory (see Figure 19).

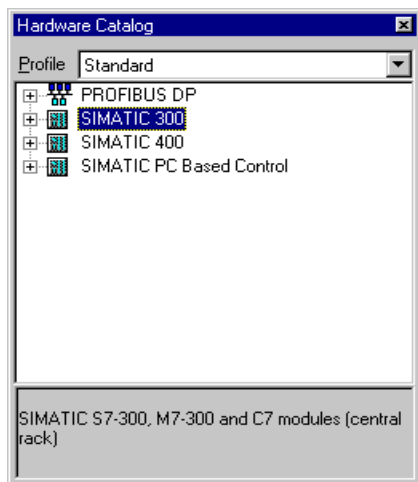


Figure 19 "Hardware Catalog" dialog box

4. To integrate the controller board, select the "FM-300" subdirectory and then the "FM 353 for Step Motor" module. Link the module to your project.

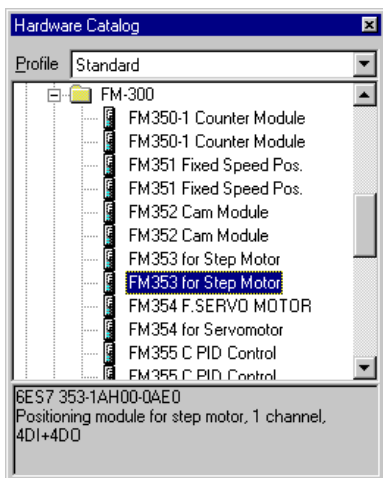


Figure 20 Selecting the FM 353 for Step Motor module

The IBS S7 300 DSC-T controller board is emulated as S7 FM-POS (FM 353 for Step Motor) in the analog area with 16 byte inputs/outputs.

5. In the "Hardware Configuration" window, double-click with the left mouse button on the "FM 353 for Step Motor" item. This opens the "Properties - FM 353 Step ..." dialog box (Figure 21).
6. Click on the "Properties... Addresses" tab (Figure 21). This displays the base address of the controller board specified by the slot.



Enter this address in IBS CMD. The procedure for this is described in the Section "Startup With IBS CMD SWT G4 Configuration Software" on page 27.

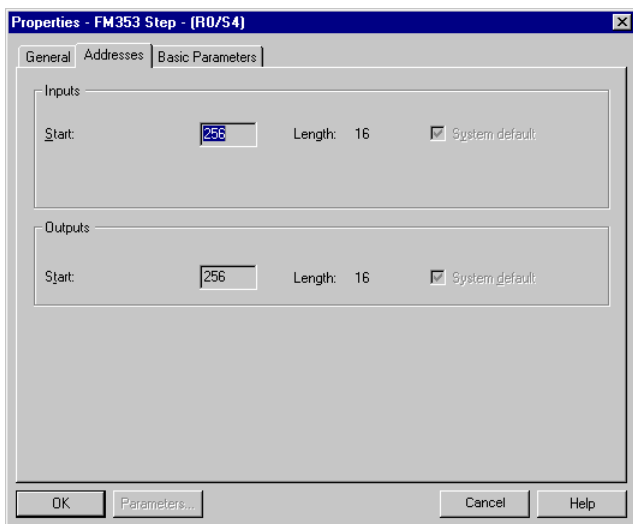



Figure 21 "Properties... Addresses" tab

 The controller board occupies 16 byte inputs and 16 byte outputs in the analog PLC area starting from the base address. The INTERBUS standard registers are located in this area (see also "Position of the INTERBUS Standard Registers" on page 43).

For further controller board settings, please refer to "Startup With IBS CMD SWT G4 Configuration Software" on page 27 (e.g., setting the operating mode, assigning addresses).

Startup for Testing the INTERBUS System

The controller board offers a simple method of testing the entire system during the plant/machine installation phase, which does not demand any knowledge of the system. This "test mode" is only used for testing the connected INTERBUS devices. No outputs are set.

In the test mode, the controller board automatically reads in the data of the connected I/O devices after a board reset, checks the components connected and starts the entire system. The diagnostic display provides you with information about the system during operation. In this mode the PLC cannot set outputs.

Activate the test mode (PLC in STOP state) by keeping the button depressed during the POWER-UP phase of the controller board.

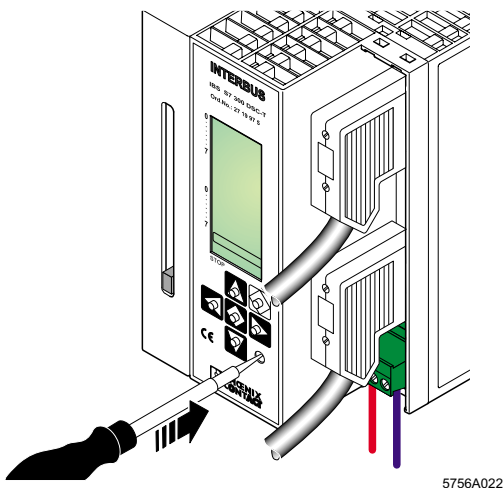


Figure 22 Test mode button

The controller board will now automatically try to start up the entire INTERBUS system.

The button can be released when the "RDY" status is displayed.

The display "RUN / TEST" indicates that the INTERBUS system has been installed correctly.

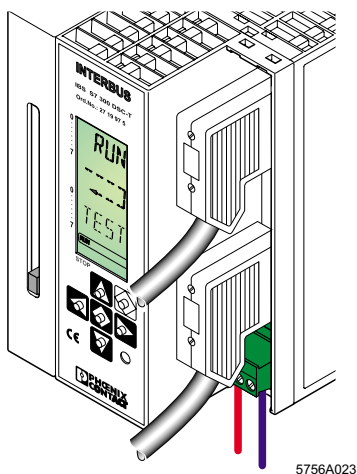


Figure 23 INTERBUS in the RUN state

If an installation error prevents the system from starting normal operation, the LCD backlighting will change to red and an appropriate error message will appear.



Please refer to the IBS SYS DIAG DSC UM E Diagnostics Guide or the Appendix for the meanings of error messages.



During test mode, the application program cannot access the INTERBUS outputs. Any parameterization which may be stored on the parameterization memory is not activated during test mode.

Checking the Connected INTERBUS Configuration

If the controller board was able to start up the system successfully, all connected INTERBUS devices are correctly installed (however, this does not mean that all of the I/O signals were wired correctly). Please check if the desired configuration agrees with the one being read-in. The controller board can be used to check the ID code (identification code), the position, the device number and the process data length of each connected INTERBUS device from the menu-controlled LCD. In addition, you can check the wiring of inputs. This requires knowledge of how to use the keypad on the controller board.



Please refer either to the IBS SYS DIAG DSC UM E Diagnostics Guide or the Appendix to this Quick Start Guide for further information.



Set the PLC to the STOP state before activating the test mode.

Please note that the RUN LED on the CPU continues to flash if you try to set the CPU to the RUN state. In this case, the controller board does not indicate to the CPU that it is "ready".

The CPU then starts a monitoring time for ready signal from modules internally. During this time, the CPU behaves as described above.

During controller board test mode, the CPU cannot be accessed via the MPI interface. Once the system has undergone another POWER-UP without activation of the INTERBUS test mode, the diagnostic buffer of the CPU indicates that the modules are not ready for operation.

Any parameterization which may be stored on the parameterization memory is not activated during test mode.

To return to normal system mode, start the controller board without pressing the test mode button using a PLC POWER-UP.

Startup With IBS CMD SWT G4 Configuration Software

In this section you will learn how to start up the INTERBUS system with the aid of the IBS CMD SWT G4 configuration software (referred to below as IBS CMD).



For configuring your controller board, use IBS CMD software version 4.50 or later.

The aim is to illustrate the steps needed to set up and start INTERBUS operation on this controller board with IBS CMD in a logical sequence.



The online help or the IBS CMD SWT G4 UM E User Manual (Order No. 27 22 25 0) show you how to use IBS CMD.

Creating a Configuration File


1. Start IBS CMD.
2. Create a new project using IBS CMD.
3. Select **IBS S7 300 DSC-T** as the controller board type.

4. In the "Controller Board Settings Slot/Addresses" dialog box, enter the controller board row and slot.


The screenshot shows a dialog box titled "Controller Board Settings" with a close button (X) in the top right corner. The dialog is divided into several sections:

- Controller Board** (top left) and **IBS Data Records** (top right) are the main categories.
- Under **Controller Board**, there are three sub-tabs: **Standard Register**, **Bus Operation**, and **Slot / Addresses** (which is currently selected).
- Board slot** section: Contains two dropdown menus. "Line:" is set to "0". "Slot:" is set to "4".
- Base address of the controller board** section: Contains an "Address:" dropdown menu set to "256" and a "System Default" checkbox which is checked (marked with an 'X').
- Coupling Area** section: Contains an "Area:" dropdown menu.
- Information** section: Contains two rows of input fields. The first row is "Inputs: [] Bytes" and the second row is "Outputs: [] Bytes".
- At the bottom, there are three buttons: **OK**, **Cancel**, and **Help**.

Figure 24 "Controller Board Settings... Slot/Addresses" dialog box

 Ensure that the "System Default" option is selected. This setting ensures that the base address of the board is calculated from the board slot entered.

5. Compare the base address of the board with the entry in STEP 7[®] (see Section "Integration of the Controller Board in STEP 7[®]" on page 19). If the addresses displayed are not identical, correct the module slot data accordingly.

 If a type of CPU that enables the base address to be changed manually in STEP 7[®] is being used, this address can also be set in IBS CMD by deselecting the "System Default" option. In this case, the "Address" field is enabled for entries.

To transmit INTERBUS process data between the controller board and the PLC, you can parameterize data records in IBS CMD. These data records define data blocks which belong together and can be transferred in the application program using driver blocks.

- In the "Controller Board Settings... IBS Data Records" dialog box, store the parameters required for the optimum integration of the controller board in the PLC.

Figure 25 "Controller Board Settings... IBS Data Records" dialog box

The following parameters can be set in the input and output area:

- Record** Select the number of the data record for which the parameters are being set. To set the parameters for a data record, select the corresponding checkbox next to the destination/source pointer in the bottom part of the dialog box. You may define a maximum of four input and four output data records.
- Area** Set the destination area (E, DB or M) or the source area (A, DB or M) in the PLC.
- Data block** Enter the number of a destination or source data block if you have selected DB as the area.

Offset (Byte) Enter the start address of the data to be transmitted in the selected destination/source area of the PLC.

Length (Byte) Enter the length of the data to be transmitted.

Destination/ Source These fields indicate the corresponding destination or source pointer for activated data records. Activate a data record by selecting the checkbox next to the display.

7. Data consistency:

To provide consistent data of more than one word (16 bits), use the "Asynchronous With Synchronization Pulse" operating mode. This can be set in IBS CMD (see Figure 26) or in the driver blocks.

If you set "Asynchronous With Synchronization Pulse" operating mode in the "Controller Board Settings... Bus Operation" dialog box, you must also call the "Bus Operation...Options" dialog box.

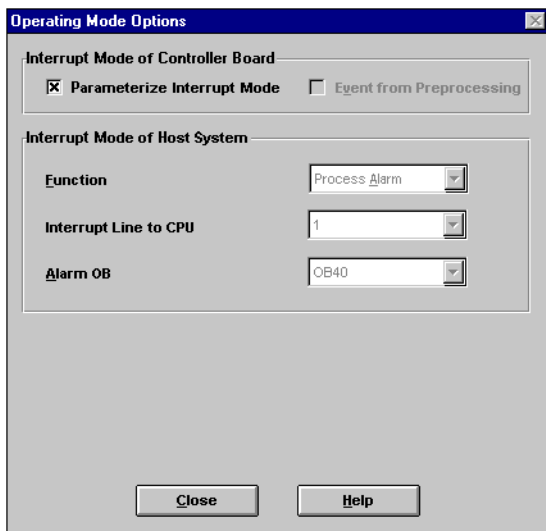


Figure 26 "Bus Operation Operating Mode Options" dialog box

In this dialog box, check the "Parameterize Interrupt Mode" box. This is required to provide the program with additional data on the INTERBUS operating mode set

above. In this case, the parameters for the Interrupt mode are transferred to the PLC. The following parameters are preset and cannot be modified:

- Function: Process Alarm
- Interrupt Line to CPU: 1
- Alarm OB: OB 40

Use these settings to specify that the INTERBUS is running synchronously with the PLC, controlled by process alarms which trigger OB 40 as an Alarm OB via Interrupt Line 1 on the backplane bus.



For further information on data record and bus mode settings, please refer to the IBS S7 300 DSC SWD UM E Driver Manual (Order No. 27 43 25 5) or the online help for IBS CMD software.

8. Configure the INTERBUS devices. You can select either automatic or manual configuration of the INTERBUS devices of your project:
 - IBS CMD reads in the connected bus structure, creates the complete configuration **automatically**, and addresses all the INTERBUS devices.

Advantage: Highly simplified INTERBUS configuration, requiring little system knowledge.

Disadvantage: All the INTERBUS devices must be fully installed and powered up. Incorrectly connected devices (e.g., devices whose connection cable is not plugged in) will not be included. Automatic addressing means that in the event of later extensions to the plant (e.g., the addition of a new device) all the following addresses in the application program will change.


- You generate the configuration yourself and allocate the addresses allowing for any existing software standards.

Advantage: You can optimize the system to meet your specifications or the structure of your PLC program. You can also reserve free addresses in the used PLC I/O areas for later expansion of the system.

9. Check the configuration.
10. Save the configuration on the parameterization memory.
11. Save the IBS CMD file on your local drive.

Once the configuration has been saved successfully on the parameterization memory, reset the controller board with IBS CMD or with a POWER-UP of the control system, in order to check the proper execution of the saved configuration.

After successfully activating the stored configuration, the controller board displays "RUN". If the configuration could not be started, an appropriate error message appears on the display (see back cover). When the INTERBUS system is activated, the defined inputs and outputs of the controller board become available. This completes the configuration and startup of the INTERBUS system.

 Save the configuration file on the parameterization memory by activating write protection (slide switch on the parameterization memory).

Starting the Entire System

To start the controller board in normal mode, POWER-UP the control system. If installation has been completed correctly, the INTERBUS system will start with the preset configuration.

Function Blocks of the Controller Board

Installing Function Blocks

The disk included in the IBS S7 300 DSC UM E User Manual contains function blocks in the programming language STEP 7[®]. Aside from these driver blocks designed for the operation of the controller board, you will find sample programs that can be directly linked to your application program. Functionalities of the controller board are described in a pre-programmed way, using these sample programs.



For further information concerning the examples and drivers, please refer to the IBS S7 300 DSC SWD UM E User Manual (Order No. 27 43 34 7), the text files or the data pre-header in the examples given on disk.

Contents of the Disk:

- IBSWD312.EXE Self-unpacking file
- README.TXT Documentation file

Copy the IBSWD312.EXE file to the **main directory** of the selected target drive.


Start this file with a double-click under Windows[®] 95/NT. The file creates the following structure in the target drive:

(Drive): \INTERBUS.S7 \S7300DSC \ENGLISH

In the ENGLISH directory you will find the following folders and files:

```
\ENGLISH  \IBSWD312  \IBSWD312.S7P
          \EXAMPLE  \IOASYNCH   \Step 7®
                   \IOASYIMP   example files
                   \PCPFC25    (.S7P)
                   \PCPFC27
                   \CMD example
                   files (.BG4)
                   \Text files for the
                   blocks
                   (FCXX.TXT)
```

The IBSWD312 directory includes a STEP 7[®] project file (IBSWD312.S7P). This file contains all driver blocks of the controller board. Example applications for I/O data transport in Asynchronous and Asynchronous With Synchronization Pulse operating modes and for PCP mode can be found in the EXAMPLE directory.

 Please note that the CMD files (*.BG4) must be copied into your IBS CMD project directory so that you can use the examples.

Example for Asynchronous Data Transfer

The section below describes an example of asynchronous data transfer between INTERBUS and the S7-300 PLC (see also the graphic representation of the entire configuration on page 18).

INTERBUS Configuration Example (IOASYNCH.BG4):

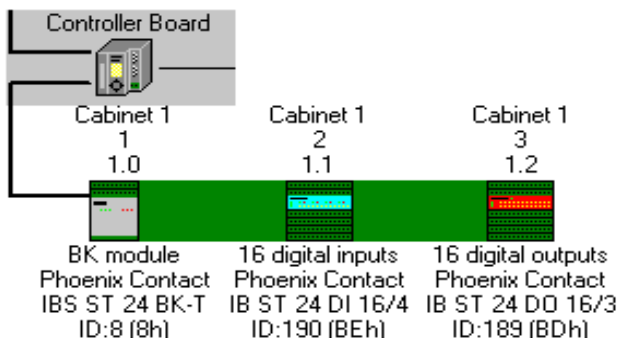


Figure 27 Example of a bus structure

Example of a PLC Configuration:

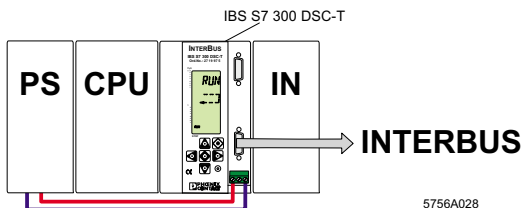




Figure 28 Example of a PLC configuration

 If you want to use the example provided without making any changes, please ensure that your configuration matches the configuration of the example.

Integrating the Example Into Your PLC

In the example, the data from the input module is copied to the output module.

 Ensure that:

- the controller board is locked in the PLC,
- the connecting cable is connected to INTERBUS and to the PC
- the power supply of the S7-300 PLC is switched on.

1. Start IBS CMD and load the IOASYNCH.BG4 example file.

In the example the base address of the controller board is address 256. The address of the input data word (16-bit input module for the INTERBUS) is DB2.DBB0 and the address of the output data word (16-bit output module for the INTERBUS) is DB3.DBB0.



If your bus configuration does not correspond to the example bus configuration, parameterize your bus configuration and allocate the addresses for input and output data in accordance with the example. Please note that the default setting in the "Controller Board Settings... IBS Data Records" dialog box is "E" for the input area and "A" for the output area. Following the example the data blocks (DB) must be set as input / output areas.

2. After formatting the parameterization memory, save your configuration there.
3. Switch the power supply to the S7-300 PLC off and back on (POWER-UP). The controller board transfers the current data from the parameterization memory and enters RUN state, if the configuration was parameterized following the instructions. In case of error please check you configuration.
4. Call your STEP 7[®] programming package and load the IOASYNCH.S7P example file.
5. Perform an overall reset of the S7 CPU.
6. Load the hardware configuration for the example (see Figure 28 on page 35) as described in "Integration of the Controller Board in STEP 7[®]" on page 19 into the PLC.
7. Load the example project to the PLC.
8. Start the PLC.

The data from the INTERBUS input or output modules is available to you in the data record parameterized in IBS CMD.

Input data word	DB2.DBW0
Output data word	DB3.DBW0

If the input data can be seen on your output module (displayed by the LEDs on the module), you have started PLC and INTERBUS operation without error.

Description of the Function Blocks in the Example

The following section describes the driver blocks used in the example which control the interaction between the controller board and the PLC.

Initialization Function FC 20:

When switching on the power supply, the controller board is started via the pluggable parameterization memory. This process is independent of the PLC and must be synchronized with the application program. Driver block FC 20, called during the PLC startup (OB 100), is responsible for synchronization.

Call Description:

The initialization function (FC 20) is called during the PLC startup (OB 100). Its task is to synchronize the PLC and the controller board. In addition, it enters operating parameters required by other functions (FC) in the INTERBUS data block (e.g., transfer of base addresses). When the controller board and the INTERBUS system have been started, the function will be terminated. After parameterizing the controller board and starting the INTERBUS system, the function resets the activation bit (BUSY = 0). The RET bit indicates the result. With RET = 0, the INTERBUS system has been started and is ready for operation. If the RET bit is set (RET = 1), an error occurred. The diagnostic display and IBS CMD show the cause of error.



For further information please refer to the IBS SYS DIAG DSC UM E Diagnostics Guide.

Program Sequence of FC 20

```
AN  M10.0
S   M10.0
CALL FC20           // Call initialization function
IBDB      := DB20   // INTERBUS data block
COM_ADR   := 256    // S7 base address of the controller
                board
DIAG_STATE := 0     // Not used
DIAG_PARA  := 0     // Not used
FKN_START  := 0     // Not used
FKN_PARA   := 0     // Not used
FKN_STATE  := 0     // Not used
MEM_READ   := 21    // Number of the "Read" driver
MEM_WRITE  := 22    // Number of the "Write" driver
LOAD       := 0     // Setting: Loading the configuration
BOOT       := 0     // INTERBUS startup
MODE       := 0     // Controller board operating mode
TIMER_NR   := T1    // Occupied timer
SOURCE     := 0     // Not used
CONFIGURA- := DW#16 // Basic settings
TION       := #80000
                00F
RET        := M10.1 // Result bit
BUSY      := M10.0 // Activate FC 20
```

```

AN  M100.7      // Setting the START_UP bit.
S   M100.7      //
//AN M10.0      // If the FC 20 cannot be
//AN M10.1      // processed correctly, the
//BEC           // program can be
//CALL SFC 46   // stopped here.

```

Describing Example Parameters

Parameter	Value	Meaning
IBDB	DB 20	Global INTERBUS data block
COM_ADR	256	S7 base address of the controller board
DIAG_STATE	0	Not used
DIAG_PARA	0	Not used
FKN_START	0	Not used
FKN_PARA	0	Not used
FKN_STATE	0	Not used
MEM_READ	21	Numbers of the driver blocks
MEM_WRITE	22	MEM_READ and MEM_WRITE for internal processes.
LOAD	0	Loads the configuration from the parameterization memory.
BOOT	0	INTERBUS startup from the configuration.
MODE	0	The INTERBUS cycle on the controller board runs asynchronously to the PLC.
Timer_NR	T1	Timer used by this driver function.
SOURCE	0	Not used
CONFIGURATION	DW#16#8 000000F	Configurations bits reserved for INTERBUS blocks.
RET	M10.1	= 0: The function was executed without errors. = 1: An error occurred.
BUSY	M10.0	Activate FC 20

Functions Called in the OB 1

Functions FC 21 to read I/O data and FC 22 to write I/O data are called in the OB 1.

Read Function FC 21 MEM_READ

Call Description:

Function FC 21 MEM_READ reads consistent data blocks (data records) from the controller board buffer and copies them to the selected address area of the PLC.

Program Sequence of FC 21:

```
AN      M10.0
S       M10.0
CALL    FC21                // Call read function
IBDB    := DB20             // INTERBUS data block
MODE    := 1                // Function operating mode
SOURCE  := 0                // Not used
DEST_AREA := 0              // Not used
DEST_AREA_NR := 0          // Not used
DEST_OFFSET := 0           // Not used
DEST_LENGTH := 0           // Not used
RET     := M10.1           // Result bit
BUSY    := M10.0           // Activate FC 21
```

Parameter Descriptions:

Parameter	Value	Meaning
IBDB	DB 20	Global INTERBUS data block
MODE	1	Read data record 1 (set in IBS CMD)
SOURCE	0	Not used
DEST_AREA	0	Not used
DEST_AREA_NR	0	Not used
DEST_OFFSET	0	Not used
DEST_LENGTH	0	Not used
RET	M10.1	= 0: The function was executed without errors. = 1: An error occurred.
BUSY	M10.0	Activate FC 21

Write Function FC 22 MEM_WRIT

Call Description:

Function FC 22 MEM_WRIT copies consistent data blocks (data records) from the selected address area of the PLC and writes them to the controller board buffer.

Program Sequence of FC 22:

```
AN      M11.0
S       M11.0
CALL   FC22           // Call write function
IBDB           := DB20 // INTERBUS data block
MODE           := 1   // Function operating mode
SOURCE_AREA    := 0   // Not used
SOURCE_AREA_NR := 0   // Not used
SOURCE_OFFSET  := 0   // Not used
SOURCE_LENGTH  := 0   // Not used
DESTINATION    := 0   // Not used
RET           := M11.1 // Result bit
BUSY          := M11.0 // Activate FC 22
```

Parameter Descriptions:


Parameter	Value	Meaning
IBDB	DB 20	Global INTERBUS data block
MODE	1	Write data record 1 (set in IBS CMD)
DESTINATION	0	Not used
SOURCE_AREA	0	Not used
SOURCE_AREA_NR	0	Not used
SOURCE_OFFSET	0	Not used
SOURCE_LENGTH	0	Not used
RET	M11.1 = 0:	The function was executed without errors.
	= 1:	An error occurred.
BUSY	M11.0	Activate FC 22



For further information on the driver blocks and examples, please refer to the IBS S7 300 DSC SWD UM E Driver Manual (Order No. 27 43 25 5).

INTERBUS System Operation From the PLC

The controller board has a standard register set for diagnostics and for basic control of the bus system. The registers are mapped in input and output memory areas of the PLC depending on the base address of the controller board. You can read from or write to the registers using direct I/O commands.

 In STEP 7[®] and IBS CMD, the base address must be set according to the slot of the board in the S7 system (see Figure 29 on page 43 and "Possible Slots" on page 10).

If a type of CPU that enables the base address to be changed manually in STEP 7[®] is being used, this address can also be set in IBS CMD.

The standard registers can be addressed either directly through load or transfer instructions, or through a driver block.

The standard register set consists of three diagnostic registers:

- Diagnostic status register (input word)
- Diagnostic parameter register (input word)
- Expanded diagnostic parameter register (input word)

Three standard function registers:

- Standard function start register (input/output word)
- Standard function parameter register (input/output word)
- Standard function status register (input word)

Position of the INTERBUS Standard Registers

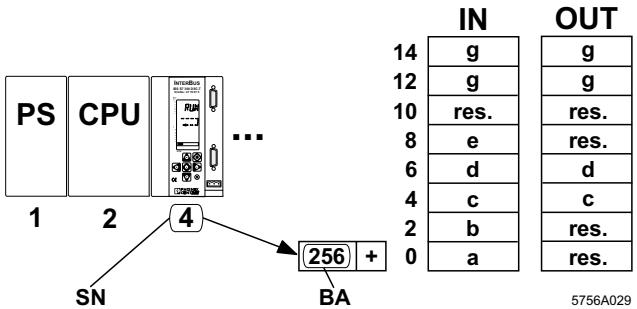


Figure 29 Position of the INTERBUS standard registers

Key:

SN = Slot number (here: 4)

BA = Base address (here: 256)

res. = Reserved

a = Diagnostic status register (2 bytes)

b = Diagnostic parameter register (2 bytes)

c = Standard function start register (2 bytes)

d = Standard function parameter register (2 bytes)

e = Standard function status register (2 bytes)

g = Communication register (4 bytes)

The Communication Register

The controller board communication register is used as an interface for the driver blocks. This register must not be overwritten.

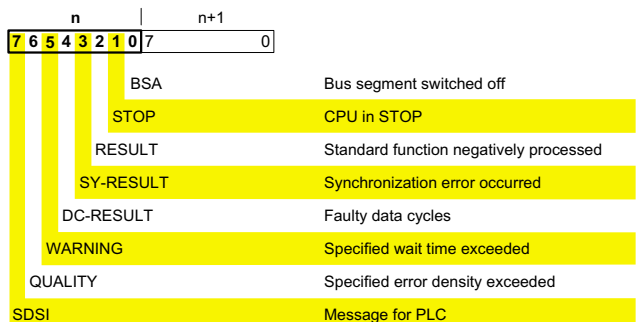
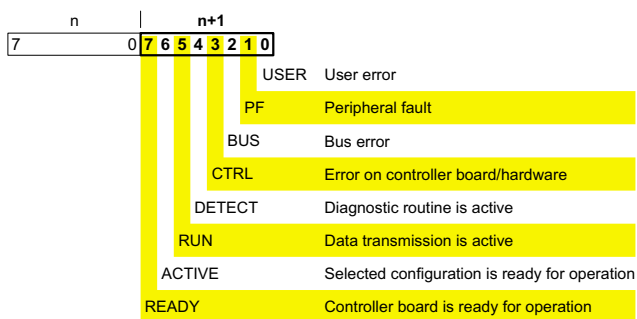
Description of the Diagnostic Registers

The diagnostic display is mapped to the PLC by the diagnostic status register and diagnostic parameter register. These registers inform the PLC about the current state of the INTERBUS system. In the application program, operating states, errors, and other information are represented as inputs.

The extended diagnostic parameter register contains additional diagnostic information about the INTERBUS system (e.g., Inline devices). In case of error this register is mapped using the diagnostic function FC 24 in DBW 168 of the IBDB.

Diagnostic Status Register

In the diagnostic status register, information is available as input bits. A state is assigned to each bit, which is further defined by the diagnostic parameter register.



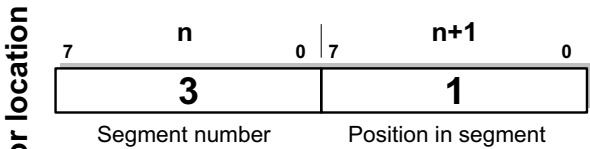
5756B045

Figure 30 Diagnostic status register

Diagnostic Parameter Register

The diagnostic parameter register provides additional information about the error that is indicated in the diagnostic status register. This is either

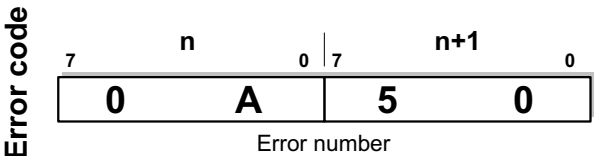
the error location (in the case of bus errors) or



Example: Device 3.1

5770B032


the error code.



Example: Address overlap, code 0A50_{hex}

5260B047

Figure 31 Diagnostic parameter register

 Special case: If a local bus error cannot be located, byte n+1 of the diagnostic parameter register (error location) indicates the value 128 or bit 7 is set. The error is in the local bus segment indicated.

Whenever an error bit is set, the 16-bit diagnostic parameter register is rewritten. If no error bit is set, the register has the value 0.



For further information please refer to the IBS SYS DIAG DSC UM E Diagnostics Guide.

Diagnostic Register Indicators

Operating indicators (READY, ACTIVE, and RUN)

The operating indicators display the current status of the INTERBUS system. The parameter register is not used.

After the POWER-UP and self test (display: TEST...) the controller board is ready for operation (READY bit = 1). After that the system is parameterized over the parameterization memory (display: BOOT...) and the INTERBUS configuration to be addressed is selected. The system now indicates that it is active (display: ACTV: flashing; BA LED for the device flashes; ACTIVE bit = 1) After the system start (display: RUN, BA LED active, RUN bit = 1) INTERBUS data cycles are run, and the control program can be started (bits READY, ACTIVE and RUN = 1).

Error Indication With Bus Disconnection (DETECT and BUS)

The active DETECT signal (DETECT = 1) indicates that an error does not enable further bus operation. All outputs are set to 0, and the diagnostic routine looks for the cause of the error. When the cause has been identified, the DETECT bit is reset (DETECT = 0) and the error is indicated.

CTRL = 1: Error on the controller board/hardware fault. The parameter register shows an error code*.

BUS = 1: The error involves a remote bus or local bus segment (consisting of a device and the INTERBUS path in front of it).
The parameter register indicates the type of error:

Remote bus error:

Device number of the bus terminal module
(e.g., 1.0: Bus segment 1. Device 0)

Local bus error:

Device number of the local bus device
(e.g., 1.3: Bus segment 1. Device 3)

Error Indication Without Bus Disconnection (PF and USER)

Errors are indicated by setting the PF (**P**eripheral **F**ault) and USER bits:

PF = 1: Fault** within the periphery of an INTERBUS device.

- Short circuit at the output
- No sensor/actuator power supply

USER = 1: User operating error

* For further information please refer to the IBS SYS DIAG DSC UM E Diagnostics Guide.


** Depending on messages given by the device (see data sheet or device user manual).

Description of Standard Functions

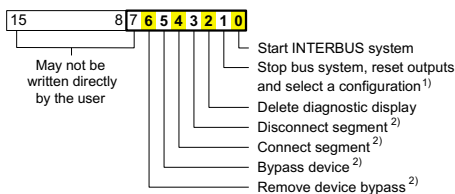
In addition to the dedicated diagnostic display, the application program can directly influence the bus system. The basic functions required for this are provided by the standard registers. Predefined and frequently used functions can be executed by setting an output bit.

Standard Function Start Register

This register includes the start bits of the standard functions. When the corresponding bit is set (bit = 1), the associated standard function will be started.

 New functions can only be carried out after the preceding function has finished.

The following functions are assigned to the individual standard function start bits:



5756A030

Figure 32 Assignment of frequently used functions in the standard function start register

In order to execute the functions marked ¹⁾ or ²⁾, additional parameters are required, which must be transferred to the separate standard function parameter register.

- 1) Frame reference of the configuration stored on the parameterization memory (default setting: frame reference = 1)
- 2) INTERBUS device number:
Byte n (bits 0 ... 7): Bus segment
Byte n+1 (bits 0 ... 7): Position in segment (see Figure 33)



When writing directly bits 7 to 15 of the standard function start register, there might be errors in the INTERBUS system leading to damage or personal injury.

Standard Function Status Register

The processing sequence can be controlled using the corresponding standard function status bit. As soon as the controller board recognizes the function request in the start bit, the corresponding status bit will be set in the status register, and will remain active during processing. The assignment of the status bits corresponds to the assignment of the start bits.

After processing, the standard function start bit must be reset. Irrespective of whether or not it was possible to execute the service successfully, the standard function status bit is reset to 0 after processing.

The standard function result bit in the diagnostic status register indicates whether or not the function was completed successfully.

Standard function result bit = 1:	Function not completed successfully
Standard function result bit = 0:	Function completed successfully



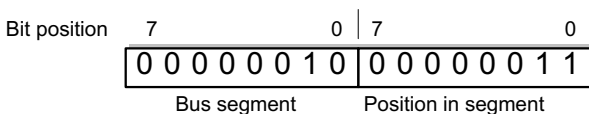
If the function was not completed successfully, an appropriate error message is placed in both the diagnostic status register and in the diagnostic parameter register. For the meanings of error messages, please refer to the IBS SYS DIAG DSC UM E Diagnostics Guide.

Standard Function Parameter Register

Some standard functions require the entry of a parameter for function execution. In general, this parameter is the number of the bus device. The device number consists of the **bus segment** and **position**. The device number file is given in binary in the 16-bit standard function parameter register.

Example: Device number 2.3

Bus segment:	2 _{dec}	00000010 _{bin}
Position in the segment:	3 _{dec}	00000011 _{bin}



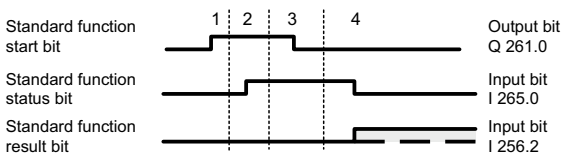
5469A012

Figure 33 Transferring the device number in the standard function parameter register

System Control

Initiating, monitoring, and terminating a function must be integrated into the application program.

The two following diagrams illustrate the sequence of a function execution with and without parameter transfer.

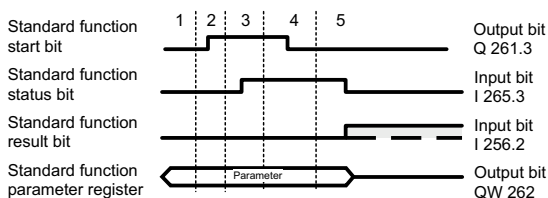


5756A031

Figure 34 Sequence of a function execution without parameter transfer

1. The control program activates the function using the standard function start bit.


- The standard function status bit indicates the function execution.
- Resetting the standard function start bit, terminates the function activation.
- After the standard function status bit has changed to "0", the standard function result bit shows the result of the function execution (RESULT = 1: function not completed successfully).




5756A032

Figure 35 Sequence of a service execution with parameter transfer

- Enter the parameter in the standard function parameter register.
- The control program activates the standard function using the standard function start bit.
- The standard function status bit indicates the function execution.
- Resetting the standard function start bit terminates the function activation.
- After the standard function status bit has changed to "0", the standard function result bit shows the result of the function execution. (RESULT = 1: function not completed successfully).

 The diagnostic status register includes the standard function result bit.

 After setting the standard function status bit, the standard function start bit must be reset within 8 s.

Automatic Diagnostic Functions

Diagnostic Data Evaluation

Diagnostic and Acknowledgment Functions

The INTERBUS system offers automatic diagnostics. It is automatically activated in the event of an error, and the diagnostic result is communicated to the user and the PLC program via the LCD and the diagnostic registers. The user and the PLC program can now react to the error. The reaction can take place directly via the standard function register. The functions stored there, such as "Update diagnostic display" (PF display) and "Start INTERBUS system" (for a bus error) are used to acknowledge the error (bits 0 and 2 of the register). The sample program includes a standard diagnostic and acknowledgment driver. It evaluates the diagnostic result (via the diagnostic status register or diagnostic parameter register) and gives a controlled acknowledgment of the error (with the standard function registers) automatically or via an acknowledge input.

Functions used by the standard function start register:

- Bit 0: Starts the INTERBUS system
- Bit 2: Updates the diagnostic display.

Diagnostic and Acknowledgment Function FC 24 IB_DIAG

Call Description:

A driver (FC 24) operating in the cyclic program (OB 1) acknowledges error messages and starts the INTERBUS system. Acknowledgment is time-controlled or executed by means of a separate control input (in the example I4.0) or bit memory.



The diagnostic block described below is part of the driver example for I/O data transfer on the disk in the user manual.

Call Structure of FC IB_DIAG in OB 1:

CALL FC24 // Call diagnostic function

IBDB	:= DB20	// INTERBUS data block
ACTIVATE	:= I4.0	// Acknowledgment button
AUTO_START	:= M100.0	// Automatic restart
RUN	:= M100.1	// Message: INTERBUS active
PF	:= M100.2	// PF (Peripheral fault)
BUS_QUALITY	:= M100.3	// Determined error density exceeded
DETECTION	:= M100.4	// Diagnostic routine is active
BUSY_STATE	:= M100.5	// FC IB_DIAG display active
RET	:= M100.6	// Result bit
START_UP	:= M100.7	// INTERBUS start after PLC startup (OB100)

**** Application program ****

BE

Parameter Descriptions:

IBDB	Global INTERBUS data block (in the example: DB 20).
ACTIVATE	This parameter is controlled by a button which must be connected externally and acknowledges an existing error. After a bus error, the INTERBUS system is restarted. The diagnostic display is refreshed in the event of a peripheral fault.
AUTO_START	= 1: If an error occurred, the function of bit 0 or 2 of the standard function start register will automatically be activated. If the error cannot be removed, the function of bit 0 or 2 will be re-called (see DBW98 in IBDB) at a certain interval. = 0: Only the "ACTIVATE" (or START_UP) parameters enable activation of the function of bit 0 or 2.
RUN	Status message: INTERBUS is active. = 1: INTERBUS is in RUN = 0: INTERBUS is in STOP

PF Status message: **P**eripheral **F**ault on a device.
= 1: INTERBUS is indicating a peripheral fault. The device number is stored in the diagnostic parameter register.
= 0: INTERBUS does not indicate a peripheral fault.

BUS_QUALITY Evaluation of transmission quality

= 1: Quality is not achieved.
= 0: Quality is achieved.



The "BUS_QUALITY" bit provides additional service information for the user, thus increasing system availability. When this bit is set (BUS_QUALITY = 1), transmission errors have occurred. Check the transmission links using the IBS CMD diagnostic software (evaluation of the transmission statistics) to avoid long-term system errors.

Example:

Use the "BUS_QUALITY" bit to detect aging effects in your system at an early stage (e.g., increased optical fiber cable attenuation or wear of trailing cables and slip rings). You can take appropriate measures in good time.


DETECTION Trouble-shooting is indicated.
= 1: A bus error occurred and the diagnostic routine is activated. Error indications in the diagnostic status register are not possible. ("RUN" bit deactivated and "Diagnostic Routine is Active" bit (DETECT) activated.)
= 0: After error localization, the "DETECTION" bit will be reset. Any bus error is indicated in the diagnostic status register.

BUSY_STATE Indicates that a standard function is active. During normal operation i.e., no error occurred and the bus is in RUN state, this message bit is set to "0". If this function is active over several PLC cycles, the bit is set to "1".

RET	This bit memory bit shows whether the function was carried out without errors. If an error occurred, the function is exited and the parameter is set to "1".
START_UP	This parameter activates and starts the INTERBUS system once. In the event of an error, the INTERBUS system is started automatically after a cold or warm restart of the PLC. However, this requires the bit memory bit to be set during PLC startup.

Appendix

Replacing the Controller Board

-  Only qualified persons should pack, unpack and handle the controller board while observing the ESD instructions.

Proceed as follows to replace the controller board:

1. Put the PLC into the STOP state, and switch off the PLC power supply.
2. Unplug the RS-232 cable, if installed.

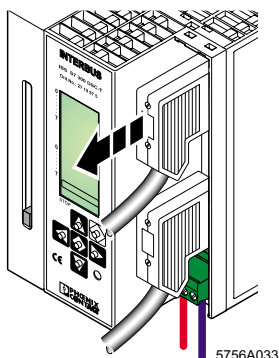


Figure 36 Unplugging the RS-232 cable

3. Unplug the remote bus cable.

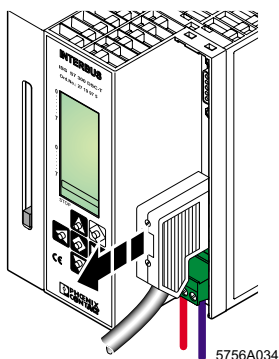


Figure 37 Unplugging the remote bus cable

- Unplug the COMBICON connector for the external power supply.

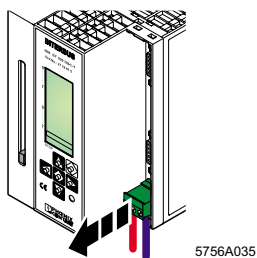


Figure 38 Removing the COMBICON connector

- Unscrew the fixing screws on the bottom of the controller board with a flat-bladed screwdriver (A). Swivel the controller board upward (B) and remove it from the mounting rail (C).

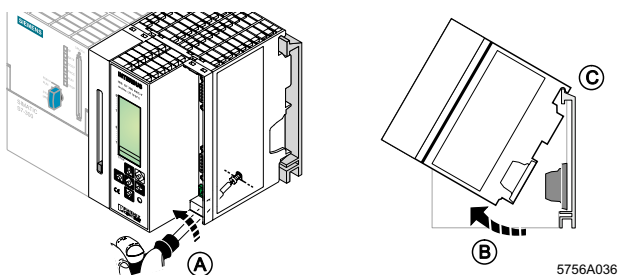
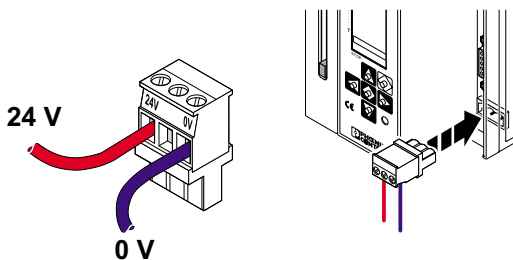


Figure 39 Removing the controller board

- Take the controller board to be fitted out of its packaging.
- Install the new controller board in the PLC and tighten the mounting screws. Make sure that the bus connector makes good contact and the controller board is securely placed and locked on the mounting rail.
- Remove the parameterization memory from the replaced controller board and insert it into the new board.

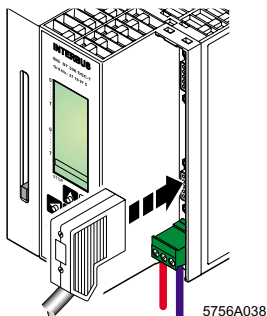
9. Plug the COMBICON connector used to connect the external power supply into the controller board.



5756A037

Figure 40 Connecting the COMBICON connector

10. Plug in and lock the remote bus connector.



5756A038

Figure 41 Connecting the controller board to the remote bus

11. Plug in the RS-232 cable (if applicable) and lock it.



Observe the operating instructions for your system before switching the PLC on.

12. Switch on the power supply of the PLC.

Replacing the Parameterization Memory

Put the PLC into the STOP state, and switch off the PLC power supply.



The parameterization memory must not be removed or inserted during normal operation.

Removing the Parameterization Memory

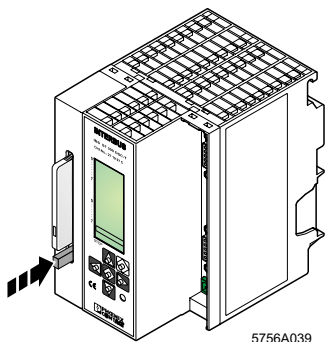


Figure 42 Removing the parameterization memory

The parameterization memory comes out of the slot when you press lightly on the ejector. You can then remove it from the front.

Inserting a New Parameterization Memory

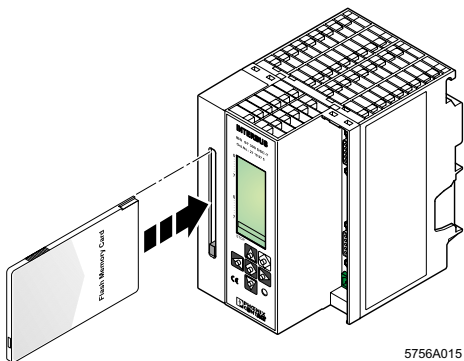


Figure 43 Inserting the parameterization memory

Insert the parameterization memory (type: IBS MC FLASH Order No. 27 51 77 1) into the slot provided with the female connector towards the front. Make sure that when the parameterization memory is pressed lightly, it clicks into place and the ejector moves out.



As you insert the parameterization memory, make certain that the card is located in the guide rails on both sides of the slot. Make sure that the parameterization memory is properly aligned.

Writing the Parameterization Memory



When writing the parameterization memory, make certain that the write protection is disabled (**Write Protect to OFF**).

1. Set the PLC to STOP and switch on the power supply.
2. Start the IBS CMD SWT G4 software on your PC.
3. Select the **Open ...** command from the **File** menu to select the current project for the system.
4. Confirm with **OK**.
5. Select the parameterization memory with the left mouse button.
6. Press the right mouse button, and select **Write** from the context menu. After a warning dialog, the parameterization data is written to the parameterization memory.

Starting the PLC



Observe the operating instructions for your system before switching the PLC on.

Start the PLC with POWER-UP. Switch the PLC from STOP to RUN.

Upgrading the Controller Board Firmware

The firmware (integrated software on the controller board) can be upgraded using the serial diagnostic and configuration interface "RS-232" (for the connection of a PC). Such firmware updates are used exclusively for the addition of new functions that are implemented within the scope of continuous product improvement. No update is required for normal system operation.

When updating the controller board, please refer to your nearest Phoenix Contact representation.

Connecting Cable

Connect the remote bus cable to the remote bus interface of the controller board using a 9-pos. D-SUB female connector. An adapter for converting to optical fibers as the transmission medium can also be connected in this way. The following pages provide further information about connector assembly and possible optical fiber connections.

Remote Bus Connector With Solder Connection

Designation: IBS DSUB 9/L, Order No. 27 58 47 3

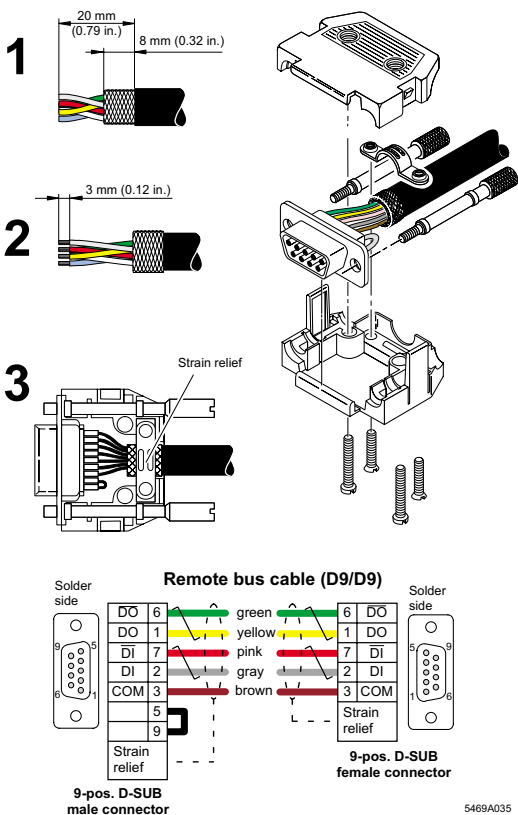


Figure 44 D-SUB connector cabling

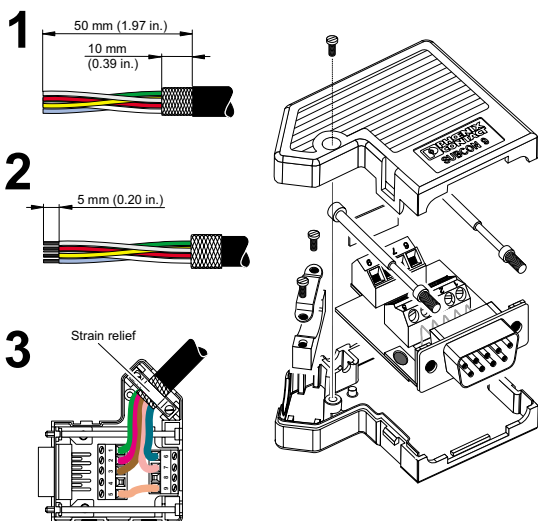
- Strip 20 mm off the cable sheath, and shorten the braided shield to 8 mm.
Strip 3 mm off the wire ends, and connect the signal lines in accordance with the drawing.
- Fold the braided shield back over the cable sheath.
- Clamp the shield under the strain relief, so that a conductive connection to the metal-plated connector housing is created.



Use only the metal-plated connectors recommended by Phoenix Contact.

Remote Bus Connector With Screw-Clamp Connection

Designation: SUBCON 9/M-SH, Order No. 27 61 50 9



Remote bus cable (SUBCON 9/SUBCON 9)

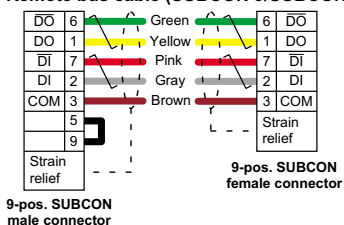


Figure 45 SUBCON connector cabling

- Strip 50 mm off the cable sheath, and shorten the braided shield to 10 mm.
Strip 5 mm off the wire ends, and connect the signal lines in accordance with the drawing.
- Fold the braided shield back over the cable sheath.
- Clamp the shield under the strain relief, so that a conductive connection to the metal-plated connector housing is created.



Use only the metal-plated connectors recommended by Phoenix Contact.

Optical Fiber Connector for Polymer Fibers

Designation: OPTOSUB-MA/M/R-LK

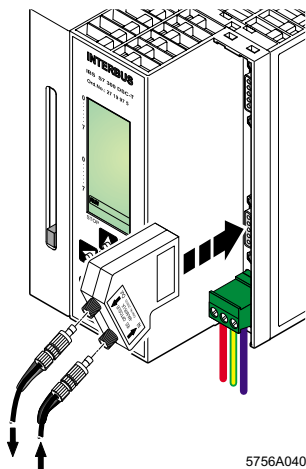


Figure 46 IBS OPTOSUB cabling



Refer to the package slips of the following items when assembling your own optical fiber cables, or order pre-assembled cables from Phoenix Contact.

Ordering data:

IBS OPTOSUB-MA/M/R-LK	Order No. 27 50 12 5
F-SMA/4 connector set with bending protection (4 connectors)	
PSM-SET-FSMA/4	Order No. 27 99 72 0
Polishing set	
PSM-SET-FSMA-POLISH	Order No. 27 99 34 8
Optical Fiber Installation Guidelines	
IBS SYS FOC ASSEMBLY	Part No. 94 23 43 9



Make sure that the power supply of the PLC is switched off when plugging the OPTOSUB connector in the controller board.

Optical Fiber Connector for

a) Glass fiber (OPTOSUB-PLUS-G/OUT)

b) Polymer fiber (OPTOSUB-PLUS-K/OUT)

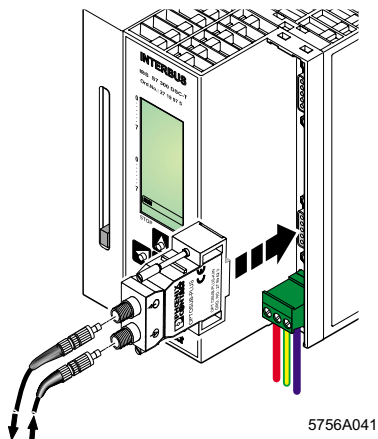


Figure 47 OPTOSUB PLUS cabling



In the case of glass fiber cables, only pre-assembled cables from Phoenix Contact should be used.

Ordering data:

OPTOSUB-PLUS-G/OUT

Order No. 27 99 63 6



Refer to the package slips of the following items and the Optical Fiber Installation Guidelines when assembling your own polymer fiber cables, or order pre-assembled cables from Phoenix Contact.

Ordering data:

OPTOSUB-PLUS-K/OUT

Order No. 27 99 61 0

F-SMA connector set with bending protection
(4 connectors)

PSM-SET-FSMA/4-KT

Order No. 27 99 72 0

F-SMA polishing set

PSM-SET-FSMA-POLISH

Order No. 27 99 34 8

Optical Fiber Installation Guidelines

IBS SYS FOC ASSEMBLY

Part No. 94 23 43 9



Make sure that the power supply of the PLC is switched off when plugging the OPTOSUB connector in the controller board.



The OPTOSUB connector does not require an additional power supply.

Optical Fiber Connector for Glass Fibers

Designation: PSM-EG-RS422/LWL-G

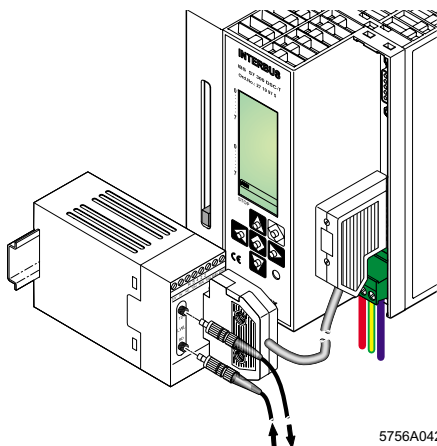


Figure 48 Cable connection with interface converter



In the case of glass fiber cables, only pre-assembled cables should be used.

Ordering data:

Interface converter

PSM-EG-RS422/LWL-G

Order No. 27 61 33 4

Pre-assembled remote bus cable

IBS DSUB 9/15-KONFEK/SO

Order No. 27 53 35 5

Controller Board Messages (examples) (* see IBS SYS DIAG DSC UM E Diagnostic Guide)

Message	Parameter	Extended parameter	Description/Remedy
USER	09DE	code*	Parameterization memory was activated but is not inserted. Insert the IBS MC FLASH parameterization memory in the controller board.
RBUS	X.Y	code*	A remote bus error occurred in bus segment X. Check device X.Y, its power supply and the remote bus cable leading to the device.
LBUS	X.Y	code*	A local bus error occurred in bus segment X. Check the local bus device X.Y and the local bus cabling leading to the device.
OUT2	X.Y	code*	A remote or local bus error occurred in bus segment X. Check the local bus branching off from device X.Y.
OUT1	X.Y	code*	A remote bus error has occurred after device X.Y. Check the remote bus connection branching off from device X.Y, the power supply of the following device or the device itself.

Message	Parameter	Extended parameter	Description/Remedy
PF	X.Y	--	A fault has been registered within the I/O area of device X.Y. Check the I/O voltage for short circuits or voltage dips, and, if present, the outputs, for short circuits.
USER	0A50	code*	Error when assigning process data. Check the assignment of the device addresses (double addressing).
EVNT	0B8F	--	Overflow of the INTERBUS input buffer. Check the accessing of the I/O data for consistency.
LOOK FOR FAIL			The bus system has been interrupted by a fault, and the controller board is looking for the error location. The display will then indicate the error (see Diagnostics Guide).
SCAN DISC			When a new parameterization memory is installed, the controller board performs a one-time formatting of the memory.

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We review and consider all comments for inclusion in future documentation.

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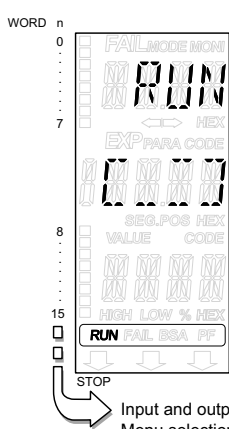
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Menu MODE; Operating, service, system indicators
MONI; Input and output monitoring

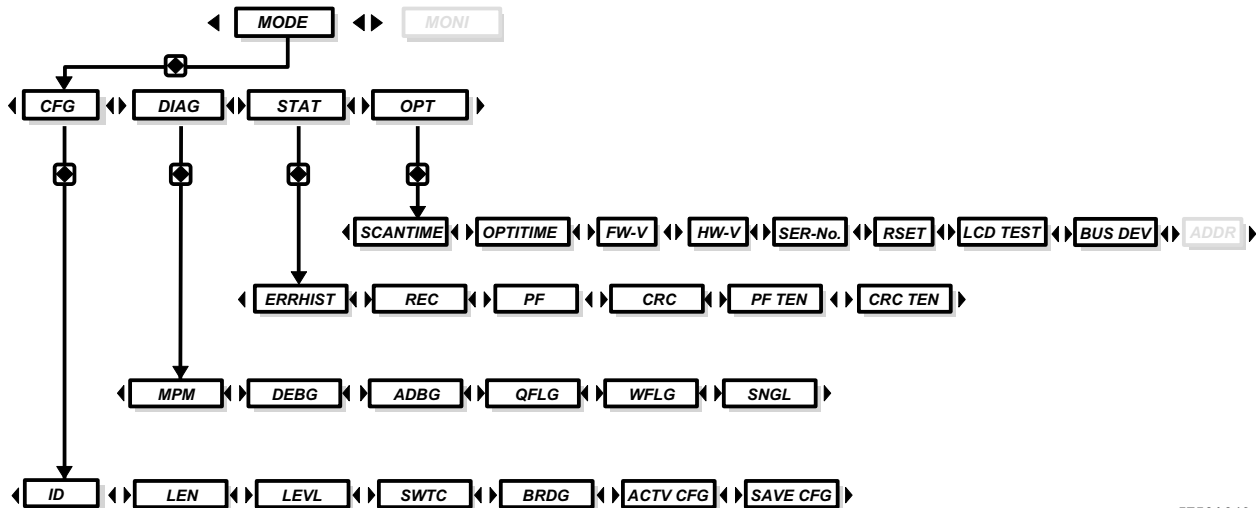
Message	RBUS Remote bus error	LBUS Local bus error	PF Peripheral fault	USER User error	DEVICE Device error
Parameter	Bus segment no. location	Bus segment no./ device no. location	Device no. location	Error code	Device no. location.
Extended parameter	Info	Info	---	Info	Info

Input and output status

Menu selection: ►► MONI ◆ S7 ◆ Input/Output level ◄◄

I/O data Bit in word 15 8 7 0

- ◀ Cursor left or select menu item
- ▶ Cursor right or select menu item
- ▲ Cursor up
- ▼ Cursor down
- ◊ ESCAPE (Exit menu items)
- ◆ ENTER (Confirm selection)



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