MOVIDRIVE®
Drive Inverters

Manual

INTERBUS DFI11A Fieldbus Interface

Edition 06/98

SEW EURODRIVE

Important Notes

- **Read this manual carefully before you start installation and commissioning work on MOVIDRIVE® drive inverters with INTERBUS.**
  This manual assumes that the user is familiar with and has at his disposal all relevant documentation on the MOVIDRIVE® system, in particular the Manual and the Installation and Operating Instructions.

- **Safety instructions:**
  Always follow the warnings and safety instructions contained in this Manual.
  Safety instructions are marked as follows:

   Electrical hazard, e.g. during live working

   Mechanical hazard, e.g. when working on hoists

   Important Instructions for the safe and fault-free operation of the driven machine / system, e.g. pre-settings before commissioning.

- **General safety instructions for bus systems:**
  The fieldbus option provides you with a communications system which allows you to match the MOVIDRIVE® drive inverter to the specifics of your application to a very high degree. As with all bus systems there is, however, the risk of a programming error in the program may result in unexpected (though not uncontrolled) system behaviour.

- In this manual, cross-references are marked with a →, e.g.,
  (→ MX_SCOPE) means: Please refer to the MX_SCOPE Manual for detailed information or information on how to carry out this instruction.
  (→ Section x.x) means: Further information can be found in Section x.x of this manual.

- Each unit is manufactured and tested to current SEW-EURODRIVE technical standards and specifications.
  The manufacturer reserves the right to make changes to the technical data and designs which are in the interest of technical progress.
  A requirement for fault-free operation and fulfilment of any rights to claim under guarantee is that these instructions and notes are followed.

Contents

1   Introduction

This DFI11A (INTERBUS) Option Manual describes the procedure for installing the DFI11A INTER-BUS option pcb in the drive inverter and for commissioning the MOVIDRIVE® drive inverter when connected to an INTERBUS fieldbus system.

In addition to describing all the settings on the fieldbus option pcb, this manual further discusses the various options for connecting the drive inverter to INTERBUS in the form of brief commissioning examples.

In addition to this INTERBUS Option Manual, we recommend that you familiarize yourself with the following more detailed documentation on fieldbuses, which will provide you with the necessary information for simple and efficient connection of the MOVIDRIVE® to the INTERBUS fieldbus system:

- MOVIDRIVE® Fieldbus Device Profile Manual (Pub. No. 0919 1615)
- MOVIDRIVE® Manual (Pub. No. 0919 119)

The MOVIDRIVE® Fieldbus Device Profile Manual gives a detailed description of the fieldbus parameters and their codes and discusses various control concepts and potential applications in the form of brief examples.

The MOVIDRIVE® Parameter List contains a list of all the drive inverter parameters that can be read or written via the various communications interfaces such as RS-232, RS-485 and via the fieldbus interface.

Thanks to this high-performance, universal fieldbus interface, the MOVIDRIVE® drive inverter with the DFI11 option can be connected to and controlled from higher-level control systems via the open and standardized INTERBUS serial sensor/actuator bus system.

MOVIDRIVE® and INTERBUS

The drive inverter device profile for INTERBUS mode, i.e. the way the drive inverter operates and responds when in INTERBUS mode, is independent of the type of fieldbus, and thus consistent for all fieldbus types. This allows the user to develop his drive applications independent of a particular fieldbus or change to another bus system, e.g. the PROFIBUS-DP/FMS (DFP11A option) fieldbus system without any problems.

MOVIDRIVE® offers digital access to all drive parameters and functions via the INTERBUS interface. The drive inverter is controlled by the high-speed cyclic process data. This process data channel provides the facility to specify setpoints such as setpoint speeds, ramp generator times for acceleration and deceleration etc., and allows various drive functions such as enable, controller inhibit, stop, rapid stop, etc. to be triggered. This channel can also be used to read back actual values from the drive inverter, such as actual speed, current, inverter status, fault number or reference messages.

Whereas process data are generally exchanged in cycles, the drive parameters can only be read and written acyclically via the READ and WRITE services. This exchange of parameter data enables applications where all major drive parameters are stored in the higher-level automation unit to be implemented, thus avoiding manual adjustment of parameters on the drive inverter itself, which can often be very time-consuming.
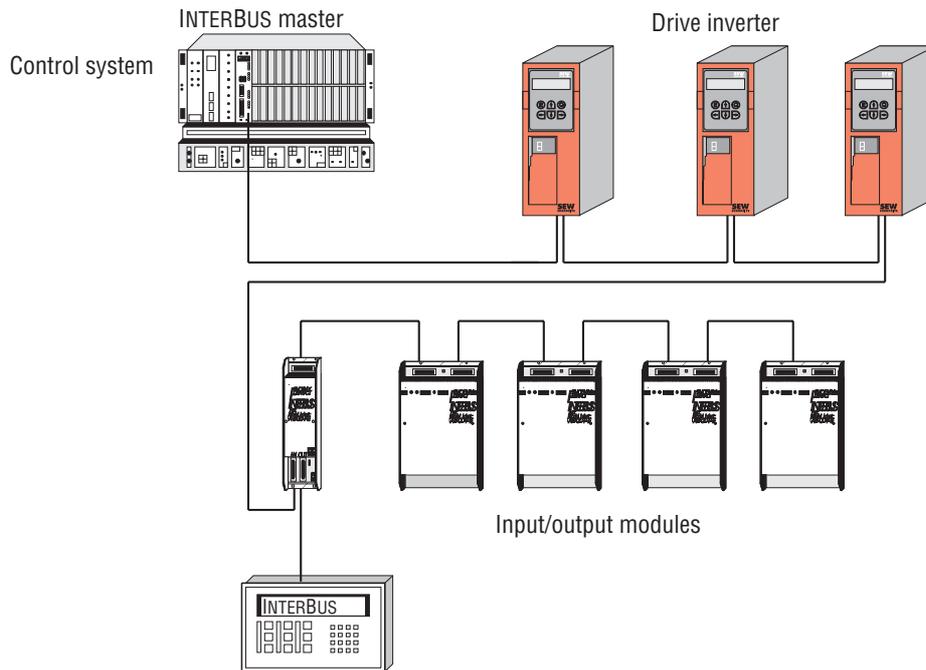
01045AEN

Fig. 1: INTERBUS with MOVIDRIVE®

The INTERBUS option pcb is designed so that all INTERBUS-specific settings, such as the process data length, can be made on the option pcb by means of a hardware switch. These manual settings enable the drive inverter to be integrated into the INTERBUS system and switched on in a very short space of time. Parameters can be set fully automatically by the higher-level INTERBUS control system (parameter download). This forward-looking version offers the benefits of a shorter commissioning period for the system as well as simpler documentation of the application program, as all major drive parameter data can now be recorded directly in the control program.

The use of a fieldbus system in drive technology requires additional monitoring functions, such as fieldbus timeout or special emergency stop concepts. The monitoring functions of the MOVIDRIVE® can be matched to the specific application for which it is to be used. This feature enables you, for instance, to specify which response the drive inverter should trigger if an error should occur in the bus. A rapid stop will be practical for many applications, but it is also possible to freeze the last setpoints, so that the drive can continue with the last valid setpoints (e.g. conveyor belt). As the functionality of the control terminals is also ensured when the drive inverter is operated in the fieldbus mode, fieldbus-independent emergency stop concepts can still be implemented via the drive inverter's terminals.

The MOVIDRIVE® drive inverter offers numerous diagnostic facilities for commissioning and servicing. For instance, both the setpoints transmitted from the higher-level control system as well as the actual values can be checked with the integrated fieldbus monitor. The MX_SHELL software offers even more convenient diagnostic facilities in that it provides a detailed display of the fieldbus and inverter status information as well as the facility to set all the drive parameters (including the fieldbus parameters).

2   Assembly / Installation Instructions

2.1   Supported Drive Inverter Types

The DFI11A option pcb for connection to an INTERBUS system can be used with all drive inverters of the MOVIDRIVE$^{®}$ family.

To set the fieldbus parameters you need the MX_SHELL user interface!

2.2   Fitting the Option PCB

Before you begin:

- Discharge yourself with appropriate measures (earthing band, conductive shoes, etc.) before touching the option pcb.

- Store the option pcb in the original package and only unpack immediately before installation.

- Do not touch the option pcb more often than necessary and hold only by the edges. Do not touch components.

Installation of the option pcb :

- Disconnect inverter from the supply. Switch off mains and, if applicable, 24 V supply.

- Take off the lower protective cover of the control unit.

- Untighten screws of the electronics shielding terminal.

- Remove black sheet metal cover.

- Insert option pcb into the guide rails of OPTION1 or OPTION2 slots.

- Press the front plate carefully to plug in option pcb. The pcb is correctly inserted when the front is flush with the controller pcb.

- Fasten electronics shielding terminal.

- Replace the protective cover of the control unit.

- Depending on the D type connector used, it may not be possible to replace the protective cover. This does not effect the enclosure of the unit.

- **The DFI11A option pcb is now completely fitted.**
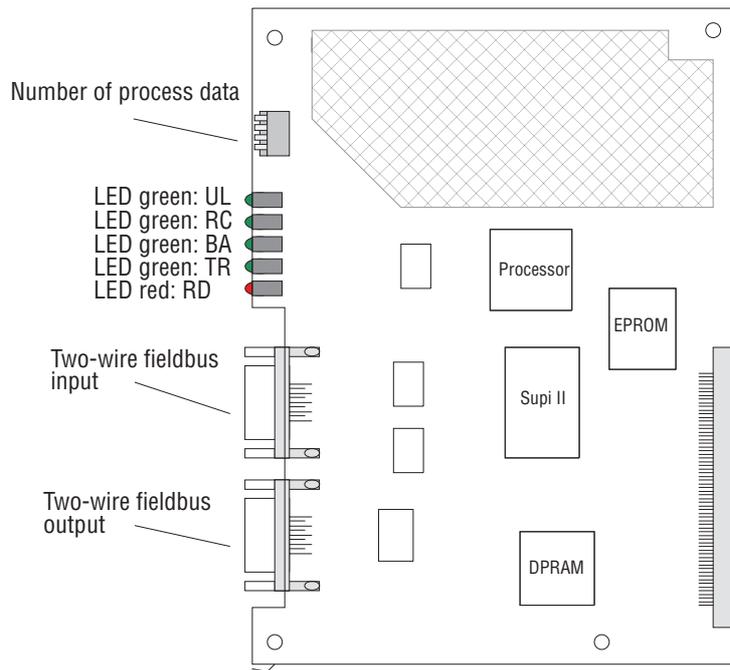
MD0338EN

Fig. 2: The DFI11A option

2.3 Pin Assignment

On the DFI11A option there is a 9-pin type D connector (male) for the incoming remote bus below which is a 9-pin type D connector (female) for the outgoing remote bus. The MOVIDRIVE® drive inverter is therefore connected to the INTERBUS sensor/actuator bus by a 9-pin type D connector on the remote bus cable. The onward remote bus cable is connected to the drive inverter by a 9-pin type D connector. Fig. 3 shows the pin assignment of the 9-pin type D coupler connector for the incoming and outgoing remote buses as well as the bus cable signal lead colours used for the INTERBUS.
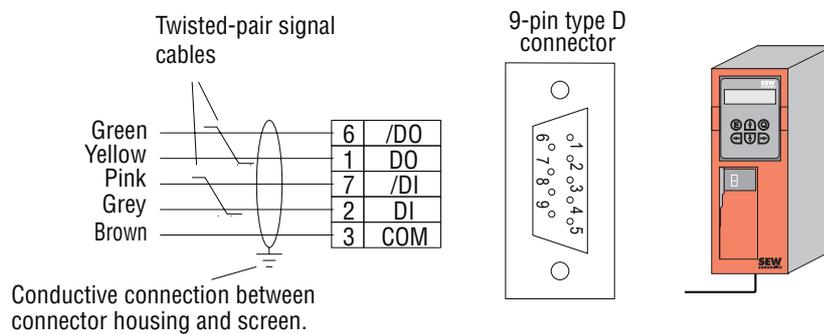
01046AEN

Fig. 3: Assignment of the 9-pin type D connector of the incoming remote bus cable

The MOVIDRIVE® drive inverter is connected to the INTERBUS system via the 2-wire remote bus by a 6-core shielded cable with twisted-pair signal leads. The 2-wire remote bus basically consists of an RS-485 Data Out channel (signal lines DO and /DO) as well as of the RS-485 Data In channel (signal lines DI and /DI).
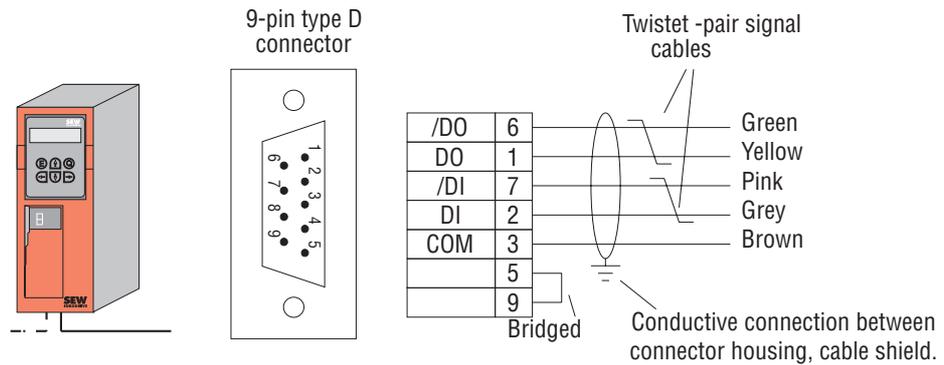
01047AEN

Fig. 4: Assignment of the 9-pin type D connector of the outgoing remote bus cable

2.4   Shielding and Laying of the Bus Cables

The DFI11A INTERBUS option pcb supports RS-485 transmission technology and requires as a physical medium the 6-core, shielded, two-wire twisted-pair cable specified for INTERBUS.

Technically correct shielding of the bus cable absorbs the electrical interference that can occur in an industrial environment. You will achieve the best shielding results if you adopt the following measures:

- Hand-tighten the fixing screws of plugs, modules and equipotential bonding conductors.
- Only use plugs with metal or metal-plated housings.
- Connect the shielding in the plug over as large an area as possible.
- Connect the shielding at both ends of the bus cable
- Do not lay signal and bus cables parallel to power cables (motor cables), but wherever possible in separate cable conduits.
- Use metallic, grounded cable trays.
- Run signal cables and the associated equipotential bonding conductor as close as possible to each other, using the shortest route.
- Avoid extending bus cables through the use of connectors.
- Run the bus cables close to existing grounded surfaces.

STOP

Important

In the event of fluctuations in the ground potential, a circulating current may flow through any shielding which may be connected at both ends and connected to the ground potential (PE). In this case, ensure there is adequate equipotential bonding in accordance with the relevant DIN VDE provisions.

Should you have further questions regarding the installation of the bus system, please refer to the INTERBUS installation manual IBS SYS INST UM (Order No. 2754286, PHOENIX CONTACT BLOM-BERG, GERMANY), from which the above points were taken.

2.5   Setting the Process Data Length

The MOVIDRIVE$^{®}$ drive inverter communicates via INTERBUS with the higher-level control system both via the rapid cyclical process data channel and via the acyclical parameter channel (PCP, Peripherals Communication Protocol). The number of process data words to be transferred in the process data channel is variable and can be adjusted using the DIP switches on the DFI11A option pcb. In general you have a choice between one, two and three process data words. In all three cases, the drive inverter can be parameterized at any time via the PCP channel.

1	2	
OFF	OFF	3PD
OFF	ON	2PD
ON	OFF	1PD
ON	ON	-----

Setting as supplied: 2PD
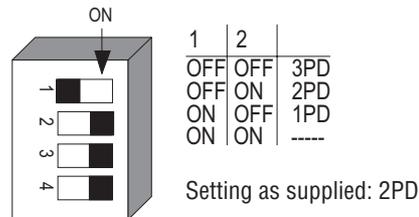
MD0341BE

Fig. 5: Setting the process data length in process data words

An example of the DIP switch settings for all three process data lengths is shown below. Switches S3 and S4 are not allocated. These DIP switches are only evaluated when the drive inverter is started up, i.e. connected to the supply (mains supply and external 24 V supply). This means that any change to the process data length will only become effective after the drive inverter has been switched off (mains and 24 V supply) and switched on again.

Setting:
1 process data word

Setting:
2 process data words

Setting:
3 process data words
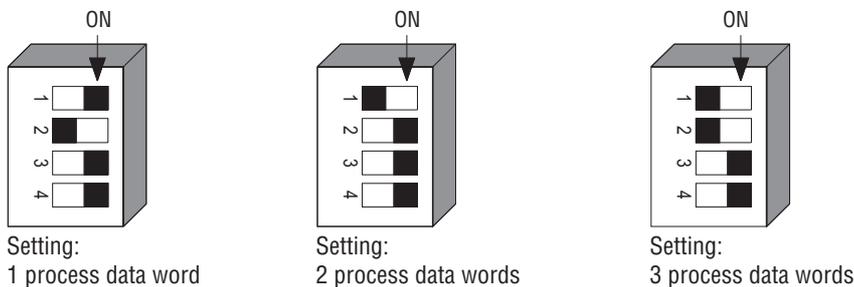
MD0342BE

Fig. 6: Examples for setting the process data length

2.6 Display Elements

The DFI11A option pcb has five LEDs for diagnosing the INTERBUS system. These LEDs provide information about the status of the INTERBUS system. The meaning of the LEDs is shown in the table below.

01241ADE

Fig. 7: Diagnostic LEDs for INTERBUS

LED name	Colour	Status	Meaning
UL	Green	On	Logic voltage DFI11A option pcb
RC	Green	On	Incoming remote bus ready for operation (remote bus link ok)
BA	Green	On	Bus in operation
TR	Green	On / flickering	Parameter data exchange via PCP channel
RD	Red	On	Onward remote bus off

Table 1: Meaning of the diagnostic LEDs for INTERBUS

3 Configuration and Commissioning

This Section shows you how to configure and commission the MOVIDRIVE® drive inverter with the DFI11A option pcb in the higher-level control system with INTERBUS interface.

3.1 Commissioning the Drive Inverter

After installing the fieldbus option pcb the MOVIDRIVE® drive inverter can be immediately parameterized via the fieldbus system without any further adjustment. This means, for example, that after switching on the drive inverter, all parameters can be downloaded directly from the higher-level control system.

To control the drive inverter via INTERBUS, however, it must first be switched to control and setpoint source = FIELDBUS. With the FIELDBUS parameter setting, the drive inverter is programmed to accept setpoints from the INTERBUS. The MOVIDRIVE® drive inverter now responds to process data sent from the higher-level control system.

The activation of the FIELDBUS control and setpoint sources is signalled to the higher-level control system by the Fieldbus Mode Active bit in the status word.

For safety reasons, the drive inverter must also be enabled via the terminals to permit control via the fieldbus system. The terminals are therefore to be wired or programmed in such a way that the drive inverter is enabled via the input terminals. The easiest way of enabling the drive inverter via the terminals is, for example, to connect input terminal DIØØ (function /CONTROLLER INHIBIT) to a +24 V signal and program input terminals DIØ1 ... DIØ3 to NO FUNCTION. Fig. 8 shows an example of the commissioning procedure for the MOVIDRIVE® drive inverter with a fieldbus interface.

Commissioning procedure for the MOVIDRIVE® drive inverter

1. Enable the output stage via the terminals
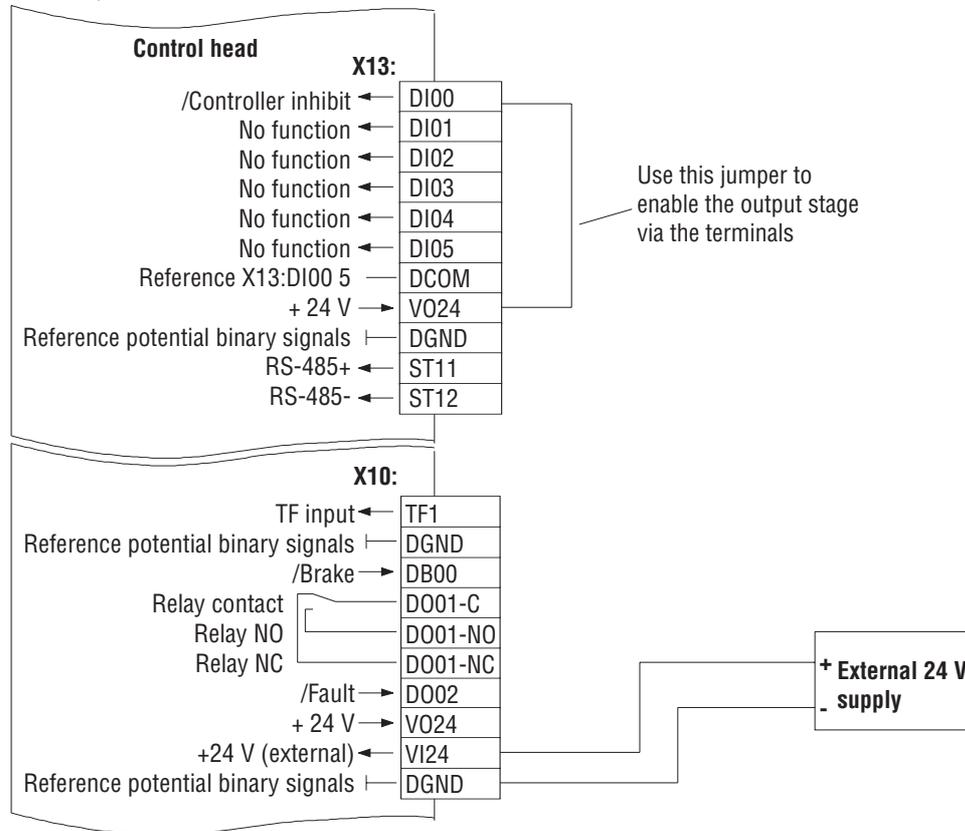   Apply a +24 V signal on input terminal DIØØ / X13.1 (function /CONTROLLER INHIBIT) (e.g. via jumper).

```
               Control head
                                X13:
        /Controller inhibit ←   DI00 ┐
             No function    ←   DI01 │
             No function    ←   DI02 │
             No function    ←   DI03 │
             No function    ←   DI04 │      Use this jumper to
             No function    ←   DI05 │      enable the output stage
     Reference X13:DI00 5    ──  DCOM │      via the terminals
                  + 24 V    →   VO24 ┘
Reference potential binary signals ├─ DGND
                 RS-485+    ←   ST11
                 RS-485-    ←   ST12

                                X10:
               TF input     ←   TF1
Reference potential binary signals ├─ DGND
                  /Brake    →   DB00
           Relay contact        DO01-C ┐
               Relay NO          DO01-NO │
               Relay NC          DO01-NC
                  /Fault   →   DO02
                  + 24 V   →   VO24                    + External 24 V
          +24 V (external) ←   VI24                    -  supply
Reference potential binary signals ├─ DGND
```

01234AEN

Fig. 8: Enabling the output stage via jumper

2. Switch on the 24 V supply.
   Switch on the external 24 V supply only (not the mains supply!) to program the drive inverter.

3. Setpoint source = FIELDBUS / control source = FIELDBUS.
   Set the setpoint source and the control source to FIELDBUS to control the drive inverter via fieldbus. .

P100 Setpoint source = FIELDBUS
P101 Control source = FIELDBUS

4. Input terminals DIØ1 ... DIØ3 = NO FUNCTION
   Program the input terminals X13.2, X13.3 and X13.4 to NO FUNCTION.

P600 Programming terminal DIØ1 (X13.2) = NO FUNCTION
P601 Programming terminal DIØ2 (X13.3) = NO FUNCTION
P602 Programming terminal DIØ3 (X13.4) = NO FUNCTION

For more information on commissioning and controlling the MOVIDRIVE® drive inverter please refer to the Fieldbus Communications Profile Manual.

3.1.1 Bus Topologies with MOVIDRIVE®

The DFI11A option pcb enables the MOVIDRIVE® drive inverter to be integrated directly into the INTERBUS two-wire remote bus. This results in much easier installation of the drive inverter in the switch cabinet, for as the maximum remote bus length is 400 metres (1312 ft), the drives can be installed further apart from each other without difficulty. As a result, the connecting costs are significantly reduced in comparison with an INTERBUS local bus interface, since no bus terminals are required any more for connecting the drive inverter.

For historical reasons, the INTERBUS sensor/actuator bus distinguishes between two types of remote buses, both of which are still in use today: the 8-wire and the 2-wire remote buses. The essential difference between the (older) 8-wire remote bus and the newer 2-wire remote bus is in the number of signal lines in the remote bus cable. Whereas there was a relatively large amount of wiring work required in preparing the 8-wire remote bus cable with its 25-pin connectors, 9-pin type D connectors can now be used with the 2-wire remote bus. With only 5 signal lines, these connectors can be quickly fitted to the remote bus cable.

The IBS BK LC/2 bus terminal was developed to ensure as simple a transition as possible between these two types of remote buses. This terminal provides a simple and user-friendly way of converting from one type of remote bus to the other.

3.1.2 Direct Connection to Master units

The INTERBUS master units are always equipped with the 2-wire remote bus. Thus the drive inverter can be connected directly to the DCB master unit as shown in Fig. 9.

.
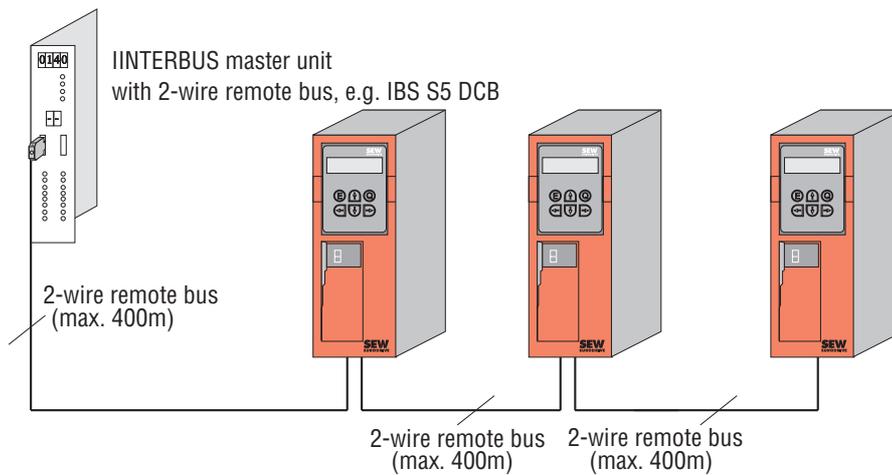
01048AEN

Fig. 9: Direct connection of the drive inverter to DCB units with the 2-wire remote bus

Since these DCB master units generally support up to 256 remote bus stations, they are very well suited for high-performance drive applications with many drive inverters.

3.2 Drive Inverter Module Identity

With the DFI11A option, the MOVIDRIVE$^®$ is assigned the following Identity Code.

Module Identity: $227_{dec} = E3_{hex}$

You must enter this Identity Code into the configuration list of the INTERBUS master unit.

3.3 Configuring the Master Module

To initialize the INTERBUS master unit, you must draw up various lists containing all the modules connected to the INTERBUS. These lists are made up of the following entries.

- Process data length with Module Identity Code
- Peripheral bus address
- Input address
- Output address
- Group number (optional)
- Communications reference (optional)

The modules are shown in the configuration list in the order corresponding to their physical position in the INTERBUS. During the initialization of the bus system, the master module checks the designed bus configuration against the INTERBUS configuration read-in. If these configurations are different, the bus system will not start. This situation is indicated by an appropriate error message on the master module.

There are three initialization options for a MOVIDRIVE$^®$ drive inverter with the DFI11A option. Which option is used depends on the process data length selected.

While configuring, bear in mind that process data length 3 provides the most powerful application potential for the MOVIDRIVE$^®$ drive inverter with INTERBUS. As a consequence of the direct insertion of process data into the I/O and/or peripheral area of the control system, you should generally select process data length 3 if your application concept is not yet complete and if you do not know for definite yet with which process data length the drive inverter is to be controlled.

3.3.1 Configuring for 1 Process Data Word

Setting the DIP switches on the option pcb to give process data length 1 requires that 1 process data word is specified in the ID Code list. Fig. 10 shows examples of entries in the ID Code list.
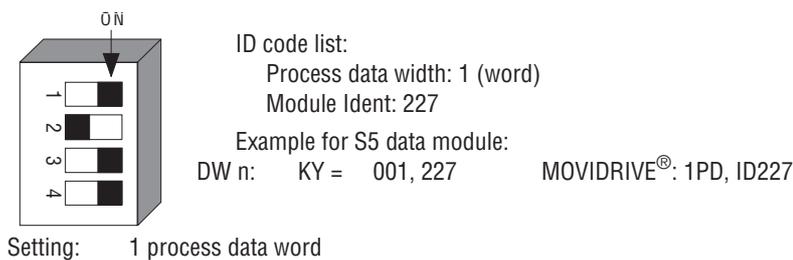

ID code list:
    Process data width: 1 (word)
    Module Ident: 227

Example for S5 data module:
DW n: KY =   001, 227   MOVIDRIVE$^®$: 1PD, ID227

Setting: 1 process data word

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Fig. 10: Example of ID Code list with process data length set at 1

INTERBUS master modules for programmable logic controllers (e.g. IBS S5 DAB/DCB for Simatic S5) map the process data to the I/O and/or peripheral area of the control system. You must therefore specify the start addresses for the input and output data in the I/O address list of the INTERBUS master unit.

Fig. 11 shows an example of how the process data word transferred via INTERBUS is mapped in the control system.
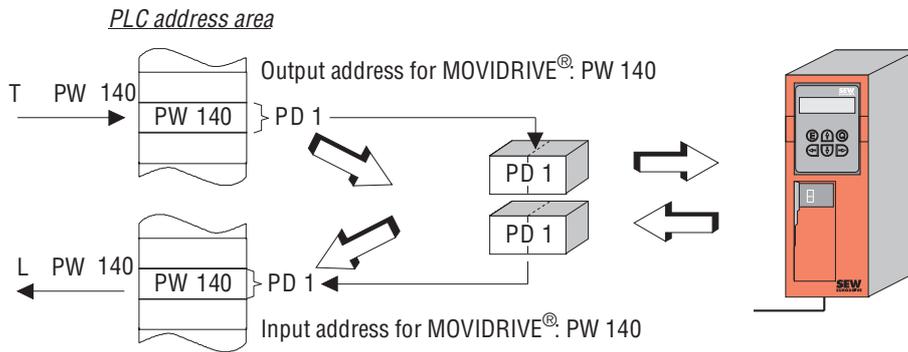
01051AEN

Fig. 11: Process data word mapping in the PLC peripheral area

In this example, only one process data word is exchanged between the higher-level control system and the drive inverter. With this configuration, for example, the drive inverter could be controlled using Control Word 1 and Status Word 1 (see SEW Fieldbus Device Profile Manual documentation). By specifying address 140 in both the input and output address lists, the process data word is mapped to the peripheral word PW 140. The PLC access command will decide in this case whether the process input data word (e.g. Status Word 1 of the drive inverter) is to be read with the load command L PW 140 or whether the process output data word (e.g. Control Word 1) is to be written with the transfer command T PW 140.
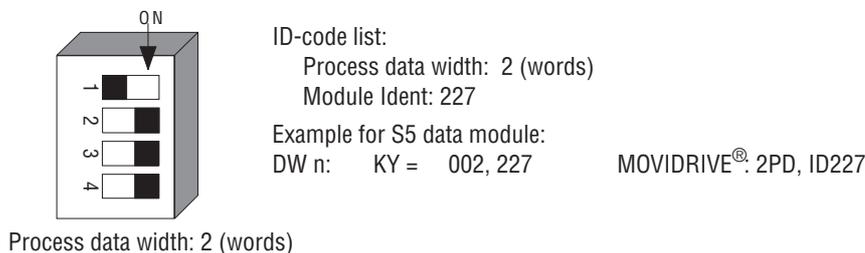
You can read out the current process data configuration in the drive inverter in the P090 PD Configuration menu item of the MX_SHELL user interface at any time. The MX_SHELL P090 parameter will then read

090 Fieldbus PD Configuration   PARAM + 1 PD

and thereby indicate that the current process data length is set at 1 PD and that the drive inverter can be parameterized via the PCP channel of the INTERBUS (Identification PARAM).

3.3.2 Configuring for 2 Process Data Words
Setting the DIP switches on the option pcb to give process data length 2 requires that 2 process data words are specified in the ID Code list. Fig. 12 shows the requisite entries in the ID Code list.


ID-code list:
    Process data width: 2 (words)
    Module Ident: 227
Example for S5 data module:
DW n: KY =   002, 227   MOVIDRIVE®: 2PD, ID227

Process data width: 2 (words)

01057BEN

Fig. 12: Example of ID Code list with process data length set at 2

With this setting, the drive inverter uses two words in the peripheral area of the PLC.

Fig. 13 shows an example of how the process data words transferred by INTERBUS are mapped in the control system.
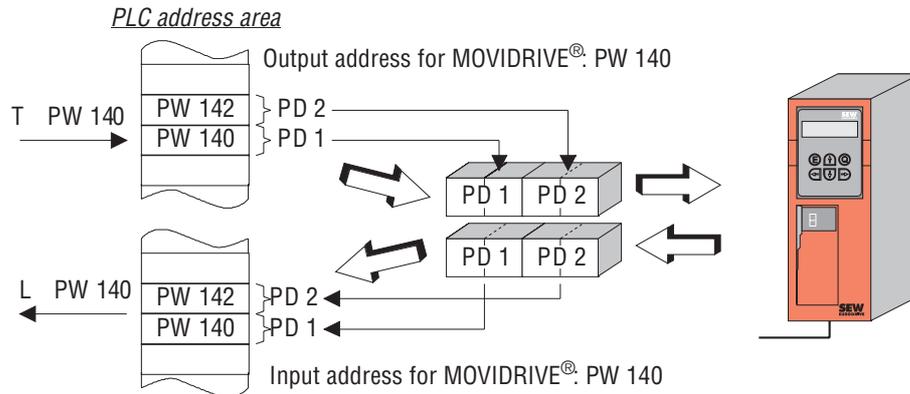
01052AEN

Fig. 13: Process data word mapping in the PLC peripheral area

In this example, two process data words are exchanged between the higher-level control system and the drive inverter. With this configuration, for example, the higher-level control system could send the process output data Control Word 1 and Speed Setpoint to the drive inverter and read the process input data Status Word 1 and Speed Actual Value (see SEW Fieldbus Device Profile Manual documentation). By specifying address 140 in both the input and output address lists, the process data words are mapped from peripheral word PW 140 onward. The PLC access command will again decide whether the process input data words (e.g. Status Word and Speed Actual Value) are to be read or whether the process output data words (e.g. Control Word and Speed Setpoint) are to be written. The MX_SHELL P090 parameter will then read

090 Fieldbus PD Configuration   PARAM + 2 PD

and thereby indicate that the current process data length is set at 2 PD and that the drive inverter can be parameterized via the PCP channel of the INTERBUS (Identification PARAM).

3.3.3 Configuring for 3 Process Data Words

Setting the DIP switches on the option pcb to give process data length 3 requires that 3 process data words are specified in the ID Code list. This configuration will allow you to implement very powerful drive applications. Fig. 14 shows the requisite entries in the ID Code list.
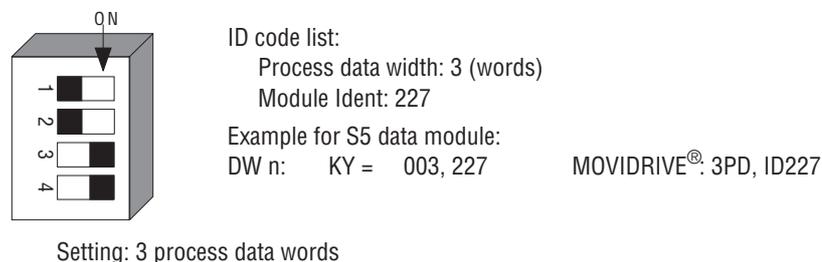

ID code list:
    Process data width: 3 (words)
    Module Ident: 227
Example for S5 data module:
DW n: KY =   003, 227   MOVIDRIVE®: 3PD, ID227

Setting: 3 process data words

01058BEN

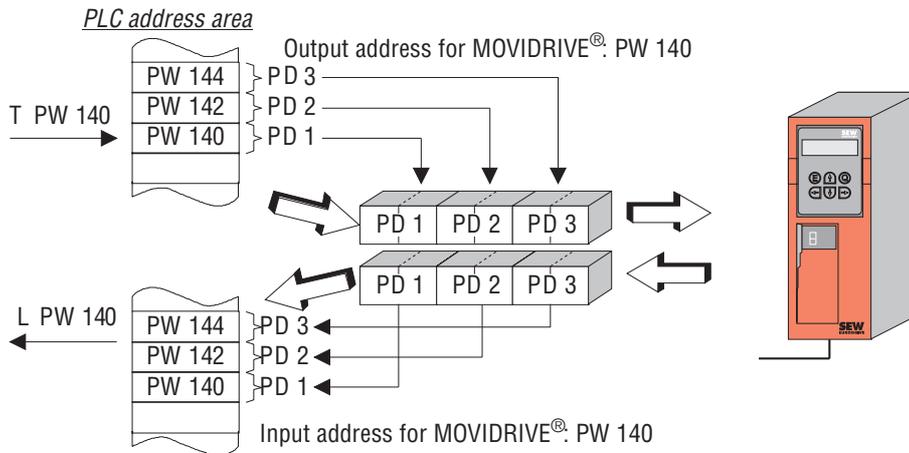*Fig. 14: Example of ID Code list with process data length set at 3*

With this setting, the drive inverter uses three words in the peripheral area of the PLC.

Fig. 15 shows an example of how the process data words transferred by INTERBUS are mapped in the control system.

Fig. 15: Process data word mapping in the PLC peripheral area

01053AEN

In this example, three process data words are exchanged between the higher-level control system and the drive inverter. With this configuration, for example, the higher-level control system could send the process output data Control Word 1, Speed Setpoint and Process Ramp to the drive inverter and read the process input data Status Word 1, Speed Actual Value and Output Current.

By specifying address 140 in both the input and output address lists, the process data words are mapped from peripheral word PW 140 onward. The PLC access command will again decide whether the process input data words are to be read or whether the process output data words are to be written.

The MX_SHELL P090 parameter will then read

090 Fieldbus PD Configuration   PARAM + 3 PD

and thereby indicate that the current process data length is set at 3 PD and that the drive inverter can be parameterized via the PCP channel of the INTERBUS (Identification PARAM).

4   The PMS Interface

With the DFI11A option, the MOVIDRIVE® drive inverter offers a PMS (Peripherals Message Specification) interface conforming to DIN 19245 Part 2. You can fully access all the drive parameters of the MOVIDRIVE® via this INTERBUS communications channel.

4.1   PMS Services

With the DFI11A option, the MOVIDRIVE® drive inverter supports the PMS services shown in Fig. 16. For the adjustment of the drive inverter parameters, only the services INITIATE (establish link), READ, WRITE and ABORT (abort link) are of importance. Therefore, the remaining services will not be discussed here. For further information please refer to the respective manuals for the INTERBUS master.
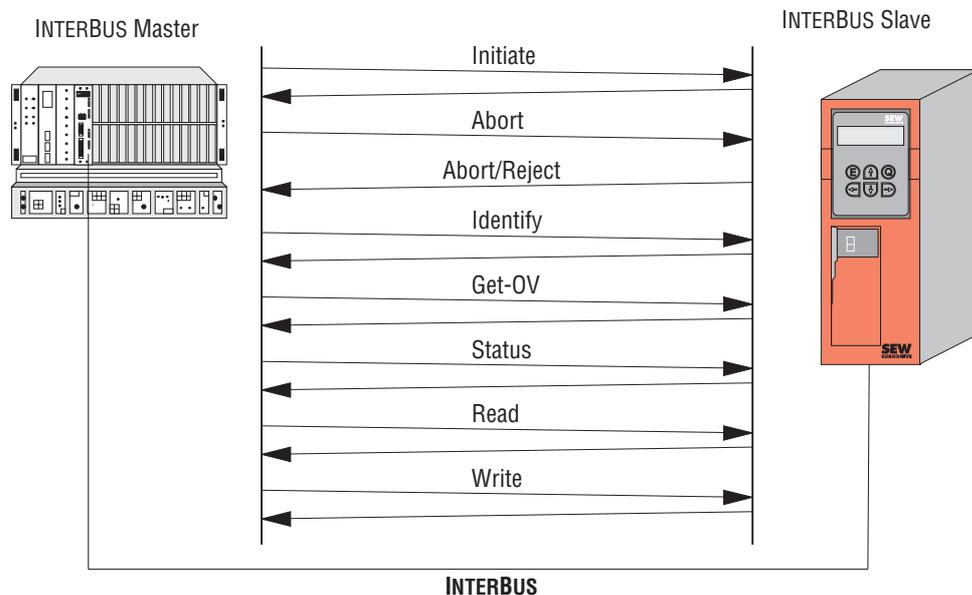

Fig. 16: PMS services supported by the MOVIDRIVE® drive inverter

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4.1.1   Initiate

With the PMS service Initiate (establish link), a communications link is established between an INTERBUS master and the MOVIDRIVE® drive inverter.

The establishment of the link is always performed by the INTERBUS master. As the link is being established, various conventions regarding the communications link are checked, e.g. PMS services supported, user data length, etc. If the link is successfully established, the drive inverter will answer with a positive Initiate Response.

If the link could not be established, then the conventions regarding the communications link between the INTERBUS master and MOVIDRIVE® drive inverter do not match. The drive inverter will answer with an Initiate Error Response. In this event, compare the configured communications relationship list of the INTERBUS master with that of the drive inverter (see Appendix A).

The attempt to establish an already existing communications link again generally leads to Abort. The communications link will then no longer exist so the PMS service Initiate will have to be performed a third time to reinstate the communications link.

4.1.2 Abort

An existing communications link between the INTERBUS master and the MOVIDRIVE® drive inverter is cleared using the PMS service Abort. Abort is an unacknowledged PMS service and can be initiated both by the INTERBUS master as well as by the MOVIDRIVE®.

The attempt to establish an already existing communications link again generally leads to Abort. The communications link will then no longer exist so the PMS service Initiate will have to be performed a third time to reinstate the communications link.

4.1.3 Read

With the PMS service Read, the INTERBUS master can read all the communications objects (drive parameters) of the MOVIDRIVE® drive inverter. All drive parameters as well as their codes are listed in detail in the MOVIDRIVE® Parameter List documentation.

4.1.4 Write

With the PMS service Write, the INTERBUS master can write all the drive parameters of the MOVIDRIVE®. If a drive parameter is assigned an invalid value (e.g. value too high), the drive inverter generates a Write Error Response giving the precise cause of the error.

4.2   Object List

With the PMS services Read and Write, the INTERBUS master can access all the communications objects defined in the object list.

All drive parameters that can be accessed via the bus system are described as communications objects in the static object list. All objects in the static object list are addressed via a fieldbus index. Table 2 shows the structure of the object list of the MOVIDRIVE® drive inverter.

The index area is divided into three logical areas. The drive parameters are addressed with indices from 8300 ... 9999_{dec}. The parameter index can be obtained from the SEW MOVIDRIVE® Parameter List documentation. Indices below 8300_{dec} are handled directly by the option pcb and should not be regarded as drive parameters of the inverter.

Parameter index (decimal)	Designation of the communications object
8296	Download Parameter Block
8298	MOVILINK® parameter channel, cyclic
8299	MOVILINK® parameter channel, acyclic
8300 ... 9999	Drive paramter for MOVIDRIVE® (can be addressed directly with READ/WRITE; parameter index see SEW MOVIDRIVE® Parameter List documentation)
> 10 000	Table, program and variable memory addresses (these parameters can only be addressed via the MOVILINK® parameter channel)

Table 2: Structure of the MOVIDRIVE® static object list

4.2.1 Object Description of the Drive Parameters

The drive parameters of the MOVIDRIVE® drive inverter are described in detail in the SEW MOVIDRIVE® Parameter List documentation. In addition to the parameter index, i.e. the number with which you can address the appropriate parameter via the communications interfaces of the drive inverter, you will find further information about the coding, range of values and meaning of the parameter data.

The object description in the object list is identical for all drive parameters. Even parameters that can only be read are given the attribute Read All/Write All in the object list, as the drive inverter itself carries out the appropriate testing and if necessary supplies a return code. Table 3 shows the object descriptions of all drive parameters.

Index:	8300 ... 9999
Object code:	7 (Simple variable)
Data type index:	10 (Octet string)
Length:	4
Local address:	-
Password:	-
Access groups:	-
Access rights:	Read all / Write all
Name[16]:	-
Extension length:	-

Table 3: Object description of the MOVIDRIVE® drive parameters

4.2.2 "Download Parameter Block" Object

The "Download Parameter Block" object enables a maximum of 38 MOVIDRIVE® drive parameters to be written at the same time with a single Write service. This means you can use this object to parameterize the drive inverter in the start-up phase with only one Write service call. Since, as a rule, only a few parameters have to be altered, this parameter block with a maximum of 38 parameters is adequate for almost all applications. The user data area is fixed at 38 x 6 + 2 bytes = 230 bytes (octet string type). Fig. 17 shows the structure of the "Download Parameter Block" object.
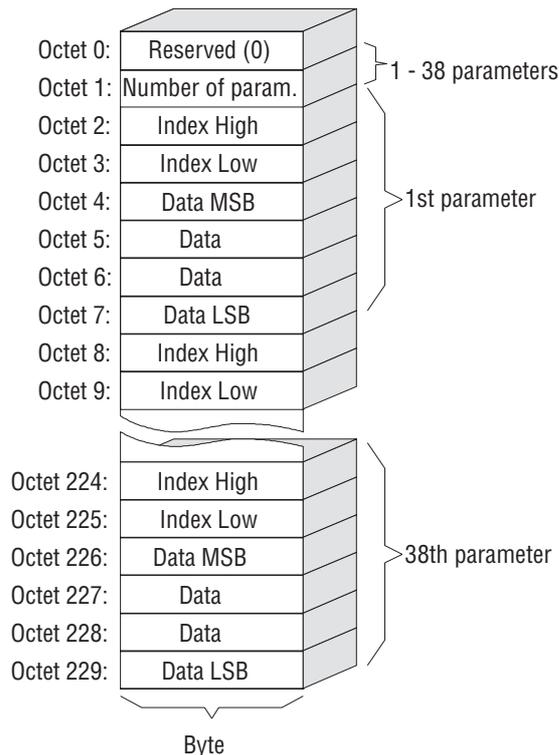

Fig. 17: Structure of the "Download Parameter Block"

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The "Download Parameter Block" object is only handled locally on the fieldbus option pcb and is defined as shown in Table 4.

Index:	8296
Object code:	7 (Simple variable)
Data type index:	10 (Octet string)
Length:	230
Local address:	-
Password:	-
Access groups:	-
Access rights:	Write all
Name[16]:	-
Extension length:	-

Table 4: Definition of the "Download Parameter Block" object

With the WRITE service to the "Download Parameter Block" object, a parameterization mechanism is started in the fieldbus option pcb that successively sends all the parameters in the user data area of the object to the DPRAM, thus parameterizing the drive inverter.

After successfully processing the Download Parameter Block, i.e. all parameters transferred from the INTERBUS master have been written, the Write service is ended with a positive Write Response. In the event of an error, a negative Write Response is returned. In this event, the return code will contain more precise details about the type of error and, in addition, the parameter number (1–38) where the error occurred (see example).

```
     Example : Error writing the 11th parameters
Write Error-Response:
Error Class:          8        Other
Error Code:           0        Other
Additional Code High:  11dec    Error writing parameter 11
Additional Code Low:   15hex    Value too large
```

When using the Download Parameter Block, note the following:

1. Do not activate a factory setting within the Download Parameter Block.
2. After activating the parameter lock, all parameters subsequently written will be rejected.

4.2.3 "MOVILINK Cyclic Parameter Channel" Object

This object is 8 bytes long and comprises the cyclic MOVILINK® parameter channel. All MOVILINK® communications services can be executed by Reading and Writing to this object in alternating cycles. The communications service is executed only when the handshake bit is toggled in the management byte. The MOVILINK® parameter channel permits access to all indices, including the IPOS^{plus} variable and program memory.

Fig. 18 shows the structure of this communications object. For the structure of the parameter channel please refer to the "MOVILINK® Communications Device Profile" Manual.
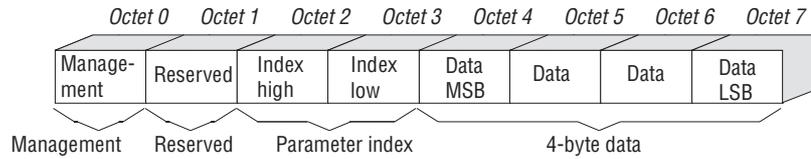
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Fig. 18: Structure of the "MOVILINK Cyclic Parameter Channel" object

The "MOVILINK Cyclic Parameter Channel" object is only handled locally on the fieldbus option pcb and is defined as shown in Table 5.

Index:	8298
Object code:	7 (Simple variable)
Data type index:	10 (Octet string)
Length:	8
Local address:	-
Password:	-
Access groups:	-
Access rights:	Read all/Write all
Name[16]:	-
Extension length:	-

Table 5: Definition of the "MOVILINK Cyclic Parameter Channel" object

Fig. 19 shows the sequence of parameter access via the cyclic MOVILINK® parameter channel. The inverter will only start executing the service when the master has toggled the handshake bit in the parameter channel. To do this, the master has to read the parameter channel at the beginning of the parameter adjustment in order to maintain the present status of the handshake bit in the inverter. The master can now initiate the evaluation of the parameter channel in the inverter by toggling the handshake bit. The inverter will then execute the service coded in the parameter channel and enter the service acknowledgement in the parameter channel. The master will receive the service acknowledgement with the next Read access to the "MOVILINK Cyclic Parameter Channel".
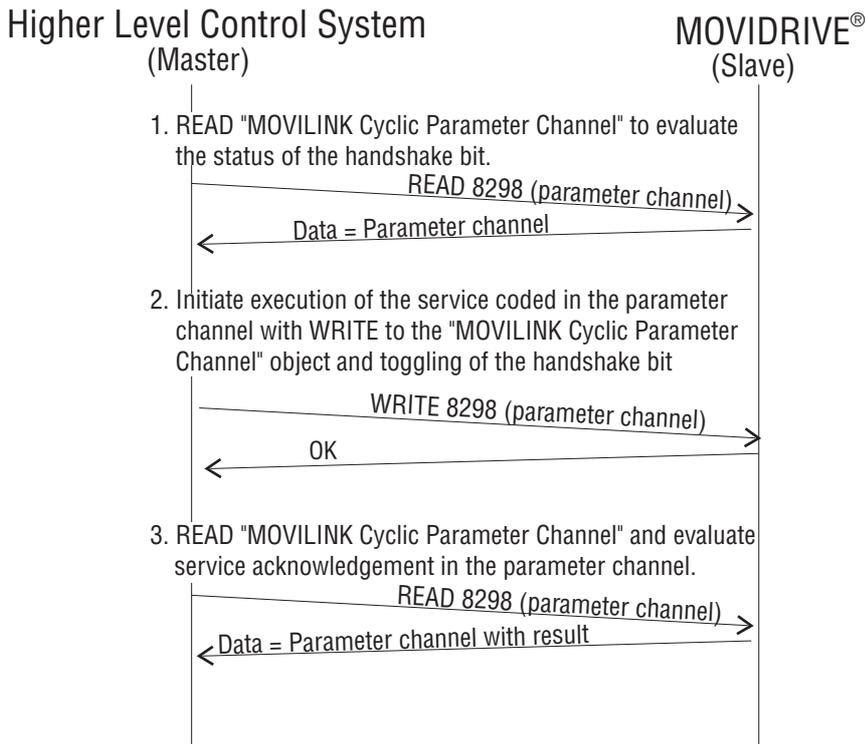

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Fig. 19: Sequence of the cyclic FMS services for parameter access with "MOVILINK Cyclic Parameter Channel"

4.2.4 "MOVILINK Acyclic Parameter Channel" Object

The "MOVILINK Acyclic Parameter Channel" object is 8 bytes long and comprises the MOVILINK® parameter channel. This object can be used for acyclic parameter access, i.e. the drive inverter will execute the service coded in the parameter channel each time it receives a WRITE service to this object. The handshake bit is not evaluated. Fig. 20 shows the structure of the "MOVILINK Acyclic Parameter Channel". communications object. For the structure of the parameter channel please refer to the "MOVILINK® Communications and Device Profile" documentation.
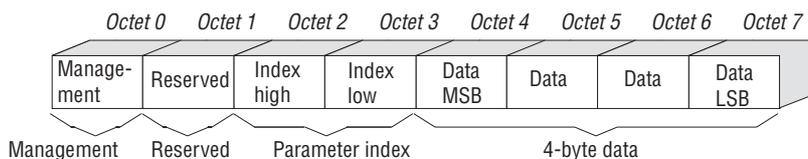

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Fig. 20: Structure of the "MOVILINK Acyclic Parameter Channel" object

When the drive inverter is parameterized via the acyclic MOVILINK$^{®}$ parameter channel, a distinction is made between the following two operations:

1) Parameter channel executes a Write service.

2) Parameter channel executes a Read service.

1) Parameter channel executes a Write service

If a Write service is executed via the acyclic parameter channel (e.g. Write Parameter, Write Parameter Volatile) the inverter will return the service acknowledgement for this service after it has executed the service. If the Write access produces a fault, the corresponding fault code is returned.

This variant has the advantage that by sending one WRITE MOVILINK$^{®}$Parameter Channel the Write services can be executed and the service be acknowledged by the evaluation of the FMS confirmation (Fig. 21).
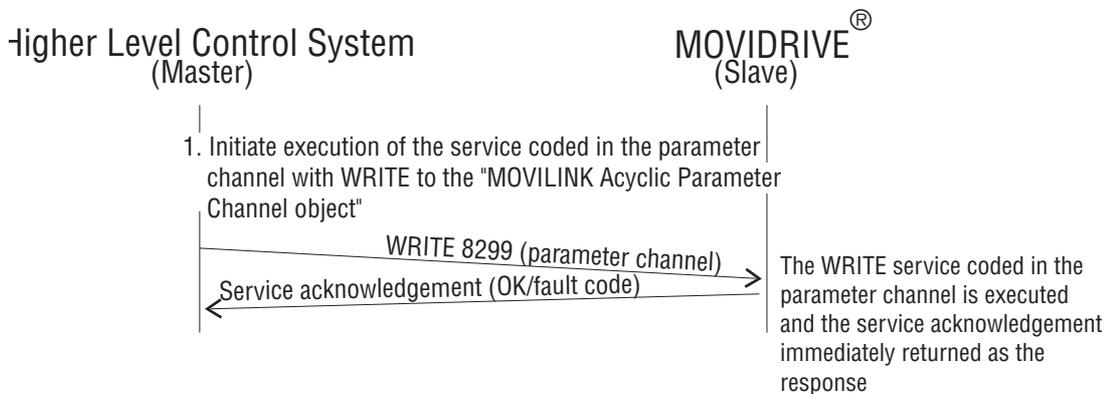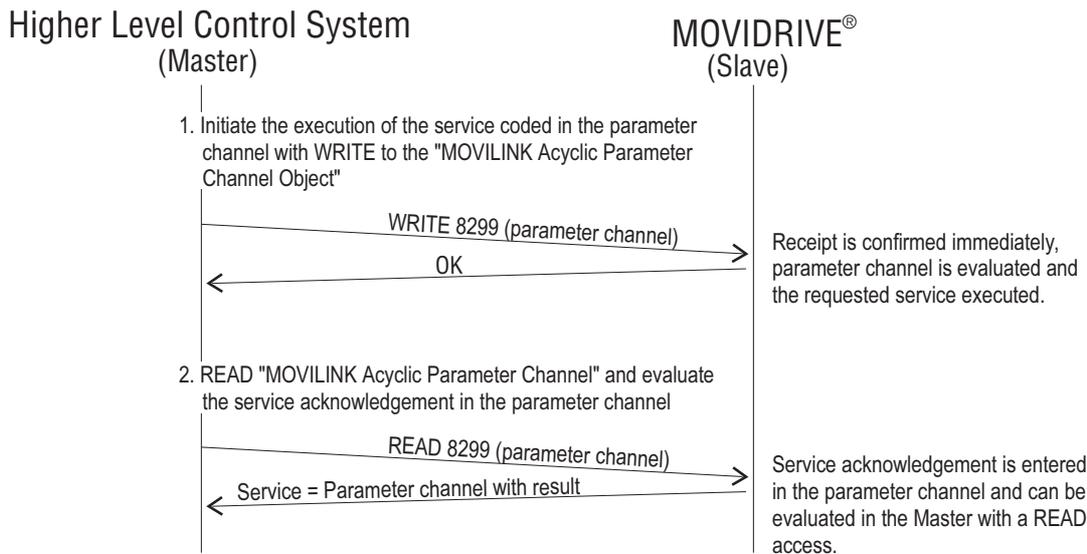
Higher Level Control System   MOVIDRIVE$^{®}$
        (Master)   (Slave)

1. Initiate execution of the service coded in the parameter
   channel with WRITE to the "MOVILINK Acyclic Parameter
   Channel object"

            WRITE 8299 (parameter channel)   The WRITE service coded in the
            Service acknowledgement (OK/fault code) parameter channel is executed
                                                     and the service acknowledgement
                                                     immediately returned as the
                                                     response

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Fig. 21: Execution of Write services via the acyclic MOVILINK$^{®}$ parameter channel

2) Parameter channel executes a Read service

If a Read service is executed via the acyclic parameter channel, (e.g. Read Parameter, Read Default, etc.) the inverter will enter the read data in the parameter channel together with the service acknowledgement after the service has been executed. For the master to receive these data a PMS-READ access to the acyclic parameter channel must be executed. Therefore, to carry out Read services via the parameter channel, a PMS-WRITE service followed by a PMS-READ service are required. Fig. 22 shows this sequence.

Higher Level Control System
(Master)

MOVIDRIVE®
(Slave)

1. Initiate the execution of the service coded in the parameter channel with WRITE to the "MOVILINK Acyclic Parameter Channel Object"

WRITE 8299 (parameter channel)
OK

Receipt is confirmed immediately, parameter channel is evaluated and the requested service executed.

2. READ "MOVILINK Acyclic Parameter Channel" and evaluate the service acknowledgement in the parameter channel

READ 8299 (parameter channel)
Service = Parameter channel with result

Service acknowledgement is entered in the parameter channel and can be evaluated in the Master with a READ access.

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Fig. 22: Execution of the Read services via the acyclic MOVILINK® parameter channel

The "MOVILINK® Acyclic Parameter Channel" object is only handled locally on the fieldbus option pcb and is defined as shown in Table 2.

Index:	8299
Object code:	7 (Simple variable)
Data type index:	10 (Octet string)
Length:	8
Local address:	-
Password:	-
Access groups:	-
Access rights:	Read all / Write all
Name[16]:	-
Extension length:	-

Table 6: Definition of the "MOVILINK Acyclic Parameter Channel" object

5 Parameter Setting Return Codes

The return codes sent back by the drive inverter in the event of incorrect parameter setting are described in detail in the Fieldbus Device Profile Manual and are not part of this documentation. However, the following special cases can arise in connection with INTERBUS.

5.1 Internal Communications Error

The return code shown in Table 7 is returned if a communications error has occurred between the option pcb and the drive inverter system. It may be that the PMS service transferred via the fieldbus was not executed and should be repeated. If this error recurs the drive inverter must be switched off and then on again to reinitialize the unit.

	Code (dec)	Meaning
Error class:	6	Access
Error code:	2	Hardware fault
Add. code high:	0	-
Add. code low:	0	-

Table 7: Return code if an internal communications error has occurred

Error Rectification:

Repeat the Read or Write service. If the error recurs, you should briefly disconnect the drive inverter from the mains supply and then switch it on again. If the error persists, consult the SEW Service Department.

6 Technical Data of the DFI11A Option

Part no.: 822 723 3

Module Identity: 227 $_{dec}$ = E3 $_{hex}$

Number of process data words:
Selectable via DIP switches: 1, 2 or 3 process data words
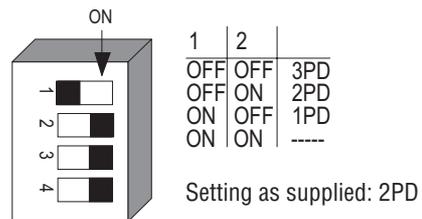Setting as supplied: 2 process data words

1	2	
OFF	OFF	3PD
OFF	ON	2PD
ON	OFF	1PD
ON	ON	-----

Setting as supplied: 2PD

MD0341BE

Fig. 23: Process data length setting in process data words

PCP channel:
Parameter adjustment is supported with one PCP (Peripherals Communication Protocol) word.
PDU (Process Data Unit) size: 243 bytes

Connection system:
2-wire remote bus interface, with 9-pin type D connectors
Pin assignment to INTERBUS-S specification

Commissioning tools:
MX_SHELL software
DBG11 control keypad

Appendix A

Table 8 shows the communications relationship list (CRL) for the MOVIDRIVE®drive inverter. When configuring the INTERBUS master (client) remember to adjust the **PDU size Send LoPrio = 243** entry. For an explanation of the individual CRL data please refer to DIN 19245 Part 2.

KR	Type	ATTR	RADR	SCC	RCC	SAC	RAC	ACI/CCI
0	MMAZ	D	0	1	1	1	1	0

Max PDU Size:		Features supported	Supported PMS service
Send HiPrio	0	00 00 00 00 80 30	Get-OV.indication
Send LoPrio	243		Read.indication
Rec. HiPrio	0		Write.indication
Rec. LoPrio	243		

Max. number of outstanding client services:	1
Max. number of outstanding server services:	1
Type of communication:	Connection oriented

Table 8: INTERBUS CBL for MOVIDRIVE® with DFI11A option

Appendix B

Connection to DAB Master Units

First generation INTERBUS-S diagnostics interfaces (DAB), e.g. the IBS S5 DAB module for Simatic S5, only support the old 8-wire remote bus with a 25-pin type D connector. MOVIDRIVE$^{®}$ drive inverters are connected by using an IBS BK LC/2 bus terminal. This bus terminal facilitates the conversion from the old 8-wire remote bus to the new 2-wire system. Fig. 24 shows the connection of the MOVIDRIVE$^{®}$ drive inverters to the DAB units. A standard cable for the 8-wire remote bus is employed from the DAB master unit to the bus terminal. The connection from the bus terminal to the drive inverter is made by means of an adapter cable from 25-pin type D to 9-pin type D.
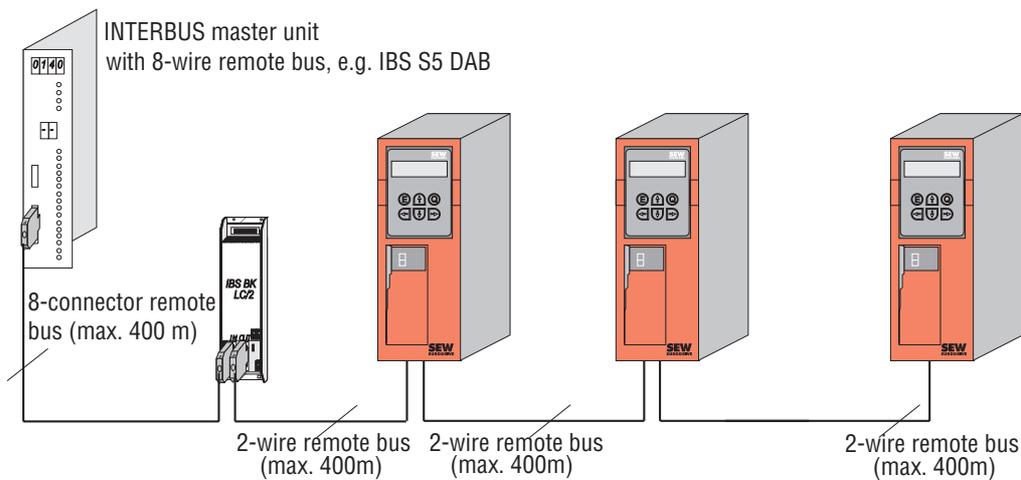
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Fig. 24: Connection of the drive inverter to DAB master units via the IBS BK LC/2 bus terminal

When using DAB master units, care should be taken not to exceed the maximum number of remote bus stations. These master modules with their 8-wire remote bus interface generally support up to 64 remote bus stations. For more detailed information please refer to the master unit documentation.

Integration in 8-Wire Remote Bus Systems

Conversion from both the 8-wire to the 2-wire remote bus, as well as from the 2-wire to the 8-wire remote bus, is achieved using the IBS BK LC/2 bus terminal. This means, for example, that MOVIDRIVE® drive inverters can be integrated into existing INTERBUS networks employing the old 8-wire remote bus. Fig. 25 shows the integration options in an already existing system with an 8-wire remote bus.
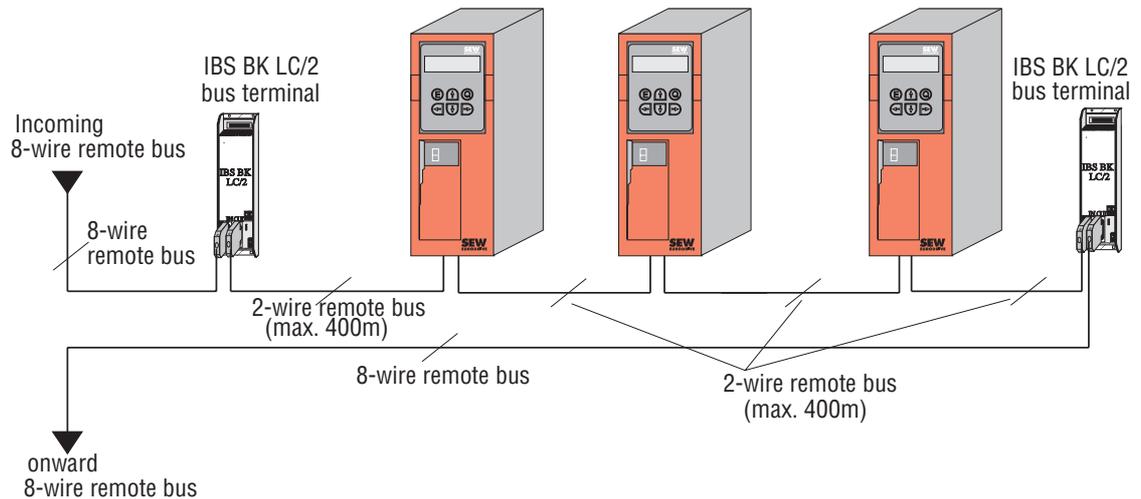

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Fig. 25: Integrating MOVIDRIVE® drive inverter into existing 8-wire remote bus systems

MOVIDRIVE® drive inverters can be integrated into the existing INTERBUS system at any point by splitting the 8-wire remote bus. This is done by feeding the incoming 8-wire remote bus to an IBS BK LC/2 bus terminal. Using an appropriate adapter cable, you can now connect the first MOVIDRIVE® drive inverter to the bus terminal and then network all the other drive inverters using the standard 2-wire remote bus cable.

A further IBS BK LC/2 bus terminal must then be connected following the last drive inverter. This handles the conversion back to the 8-wire remote bus. The two local bus interfaces of the newly inserted bus terminals may also be used, of course.

When extending an already existing INTERBUS 8-wire remote bus system, bear in mind that master units with 8-wire remote bus interfaces generally support only 64 remote bus stations. For more detailed information please refer to the master unit documentation.

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