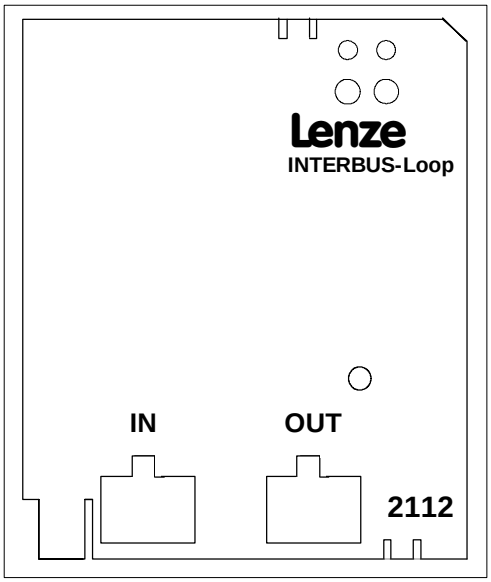
EDB2112UB
00414276

Lenze

Operating Instructions



Fieldbus module type 2112

INTERBUS-LOOP

These Operating Instructions are valid for fieldbus modules with the following nameplates:

2112	IB.	VA.	0.1		(INTERBUS-Loop)

In connection with the unit series as from the nameplate data:

820X	E.	2x.	1x.		(8201 - 8204)
820X	E./C.	2x.	1x.	Vxxx	(8201 - 8204)
821X	E.	2x.	2x.		(8211 - 8218)
821X	E./C.	2x.	2x.	Vxxx	(8211 - 8218)
822X	E.	1x.	1x.		(8221 - 8225)
822X	E.	1x.	1x.	Vxxx	(8221 - 8227)
82EV		VA	0x		8200 vector
82EV		1x	0x		8200 vector
93XX	E.	2x.	1x.		(9321 - 9333)
93XX	E./C.	2x.	1x.	Vxxx	(9321 - 9333)

Type

Design:
E = Built-in unit IP20
IB = Module

Hardware version and index

Software version and index

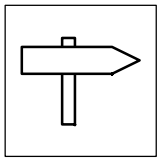
Variant

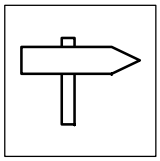
Explanation

Important:
These Operating Instructions are only valid together with the corresponding Instructions for 82XX, 8200 vector or 93XX controllers.

Version 1.0 03/00

Contents





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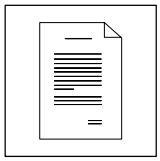


1 Preface and general information

1.1 About these Operating Instructions

- These Operating Instructions are intended for safety-relevant working on and with the 2112 fieldbus module. They contain safety information which must be observed.
- All personnel working on and with the 2112 fieldbus module must have these Operating Instructions available and observe the information and notes relevant for them.
- The Operating Instructions must always be complete and perfectly readable.

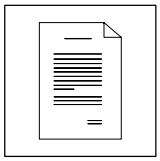
These Operating Instructions inform about the most important technical data and the installation of the 2112 fieldbus module. They are only valid in combination with the Operating Instructions of the corresponding controller.

1.1.1 Terminology used

Controller	In the following, the term ”controller” is used for ”93XX servo inverters” or ”82XX frequency inverters”.
Drive system	In the following the term ”drive system” is used for drive systems with fieldbus modules and other Lenze drive components.
Fieldbus module	In the following text, the term ”fieldbus module” is used for the fieldbus module type 2112 INTERBUS-Loop.
(📖xx-yyy)	Cross reference (chapter - page)

1.2 Items supplied

Items supplied	Important
• 1 2112 fieldbus module with housing (enclosure IP20) • 1 M3 fixing screw • 2 2-pole connection plugs for INTERBUS-Loop connection • 1 Mounting Instructions	After the delivered has been received, check immediately whether the items supplied match the accompanying papers. Lenze does not accept any liability for deficiencies claimed subsequently. Claim • visible transport damage immediately to the forwarder • visible deficiencies/incompleteness immediately to your Lenze representative.



1.2.1 Legal regulations

Labelling	**Nameplate**	**CE mark**	**Manufacturer**
	Lenze 2112 fieldbus modules are unambiguously identified by their nameplates.	Conforms to the EC Low Voltage Directive	Lenze GmbH & Co KG Postfach 101352 D-31763 Hameln
Application as directed	**2112 fieldbus module** • Operate the fieldbus module only under the conditions prescribed in these Operating Instructions. • The fieldbus module is an additional module and can be optionally attached to the Lenze controller series 82XX, 8200, and 93XX. The 2112 fieldbus module links Lenze controllers with the fast serial communication system INTERBUS. • The fieldbus module must be attached and electrically connected so that it complies with its function and does not cause any hazards when being attached and operated as instructed. • Observe all notes given in chapter “Safety information“ (📖 2-1)). • Please observe all information given in these Operating Instructions.This means: – Read these Operating Instructions carefully before you start to work with the system. – These Operating Instructions must always be available during operation of the fieldbus module. **Any other use shall be deemed inappropriate!**		
Liability	• The information, data, and notes in these instructions met the state of the art at the time of printing. Claims referring to drive systems which have already been supplied cannot be derived from the information, illustrations, and descriptions given in these Operating Instructions. • The specifications, processes, and circuitry described in these Operating Instructions are for guidance only and must be adapted to your own specific application. Lenze does not take responsibility for the suitability of the process and circuit proposals. • The indications given in these Operating Instructions describe the features of the product without warranting them. • Lenze does not accept any liability for damage and operating interference caused by: – disregarding these Instructions – unauthorized modifications to the controller – operating faults – improper working on and with the controller		
Warranty	• Warranty conditions: see Sales and Delivery Conditions of Lenze GmbH & Co KG. • Warranty claims must be made to Lenze immediately after detecting the deficiency or fault. • The warranty is void in all cases where liability claims cannot be made.		
Disposal	**Material**	**recycle**	**dispose**
	Metal	●	-
	Plastic	●	-
	Printed-board assemblies	-	●
	Short Instructions/Operating Instructions	●	

2 Safety information

2.1 Persons responsible for safety

Operator

- An operator is any natural or legal person who uses the drive system or on behalf of whom the drive system is used.
- The operator or his safety personnel is obliged
  - to ensure the compliance with all relevant regulations, instructions and legislation.
  - to ensure that only skilled personnel works on and with the2102IB fieldbus module.
  - to ensure that the personnel has the Operating Instructions available for all corresponding work.
  - to ensure that all unqualified personnel are prohibited from working on and with the drive system.

Qualified personnel

Qualified personnel are persons who - because of their education, experience, instructions, and knowledge about corresponding standards and regulations, rules for the prevention of accidents, and operating conditions - are authorized by the person responsible for the safety of the plant to perform the required actions and who are able to recognize potential hazards.
(Definition for qualified personnel to VDE 105 or IEC 364)

2.2 General safety information

- These safety notes do not claim to be complete. In case of questions and problems please contact your Lenze representative.
- At the time of delivery the fieldbus module meets the state of the art and ensures basically safe operation.
- The indications given in these Operating Instructions refer to the stated hardware and software versions of the fieldbus modules.
- The fieldbus module is hazardous if:
  - unqualified personnel works on and with the fieldbus module.
  - the fieldbus module is used inappropriately.
- The processing notes and circuit sections shown in these Operating Instructions are proposals which cannot be transferred to other applications without being tested and checked.
- Ensure by appropriate measures that neither personal injury nor damage to property may occur in the event of failure of the fieldbus module.
- The drive system must only be operated when no faults occur.
- Retrofittings, modifications, or redesigns are basically prohibited.Lenze must be contacted in all cases.
- The fieldbus module is electrical equipment intended for use in industrial high-power plants. The fieldbus module must be tightly screwed to the corresponding controller during operation. In addition, all measures described in the Operating Instructions of the controller used must be taken. Example: Fasten covers to ensure protection against contact.

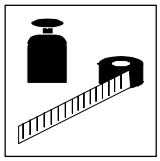
2.3 Layout of the safety information

- All safety information has a uniform layout:
  – The icon characterizes the type of danger.
  – The signal word characterizes the severity of danger.
  – The note text describes the danger and gives information on how to prevent dangerous situations.

Signal word

Note

	Icons used		Signal words	
Warning of damage to persons		Warning of hazardous electrical voltage	**Danger!**	Warns of **impending danger**. Consequences if disregarded: Death or severe injuries.
		Warning of a general danger	**Warning!**	Warns of **potential, very hazardous situations**. Possible consequences if disregarded: Death or severe injuries.
			Caution!	Warns of **potential, hazardous situations**. Possible consequences if disregarded: Light or minor injuries.
Warning of damage to material			**Stop!**	Warns of **potential damage to material**. Possible consequences if disregarded: Damage of the controller/drive system or its environment**.**
Other notes			**Tip!**	This note designates general, useful notes. If you observe it, handling of the controller/drive system is made easier.



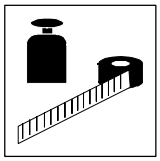
3 Technical data

3.1 Features

- Attachable additional module for Lenze controller series 82XX, 8200 vector, and 93XX
- Bus connection via remote bus to RS485 standard
- Maximum distance between participants: 20 m
- Max. loop length: 200 m
- Variable process data configuration

3.2 General data and application conditions

Field	Values
Order designation	EMF2112IB
INTERBUS participant	Slave
Drive profile	DRIVECOM profile 20
Baud rate	500 kbit/s
Ambient temperature	During operation: 0 °C to 55 °C Transport: -25 °C to 70 °C Storage: -25 °C to 60 °C
Permissible humidity	Class 3K3 to EN 50178 (without condensation, average relative humidity 85%)



3.3 Rated data

Field	Values	
Communication medium	ASIC LPCII	
Supply voltage	Voltage supply via INTERBUS-Loop.	
Insulation voltage - bus systems:		
• to PE	50 V AC	
• to external supply (terminal 39/59)	0 V	(no electrical isolation)
• to power stage		
– 820X / 821X	270 V AC	(single basic insulation)
– 822X / 93XX / 8200 vector	270 V AC	(double basic insulation)
• to the control terminals		
– 8200 vector	100 V AC	(single basic insulation)
– 820X	0 V	(no electrical isolation)
– 821X	50 V AC	(electrical isolation)
– 822X / 93XX	270 V AC	(single basic insulation)
• to external bus system	0 V	(no electrical isolation)
Degree of pollution	VDE 0110 part 2 pollution degree 2	

3.4 Dimensions

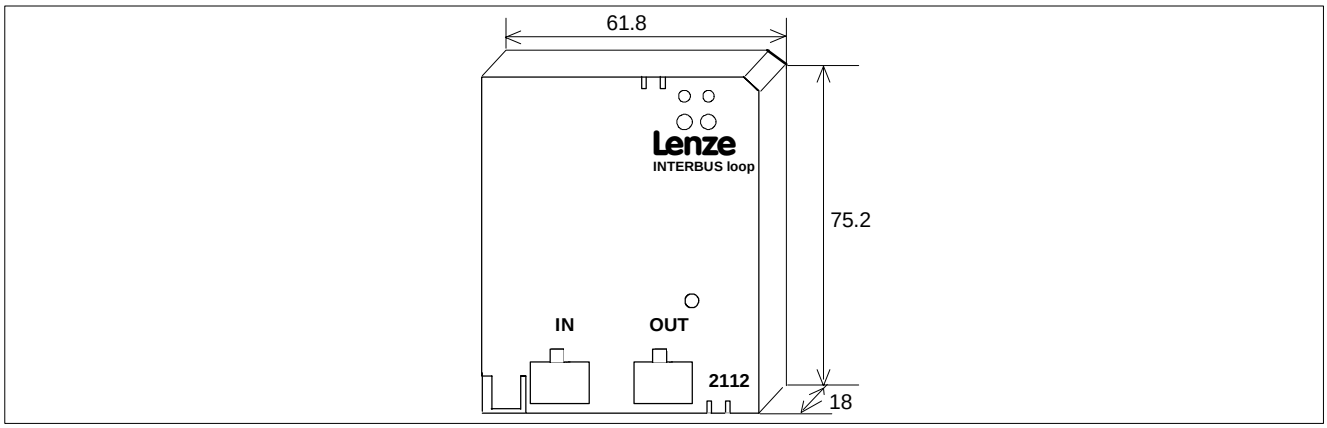
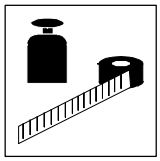


Fig. 3-1 Dimensions of the 2112 fieldbus module

3.5 Protocol data

Field	Values
Maximum number of controllers with InterBus-Loop 2112	36
Process-data words (PCD):	2 words (32 bit)
INTERBUS-Loop identification	179 (decimal) or B3 (hex)
Baud rate	500 kbit/s



3.6 Communication data

3.6.1 Processing time of the controller

The INTERBUS transfer time or cycle time is added to the processing time in the controller.

The processing time of the controller depends on the controller series and type. The cycle time of the bus system is independent of the processing time of the controller.

Processing time 820X

For the 820X series several processing steps are required. These steps are processed cyclically.

A processing cycle consists of:

- Writing the control word or setpoint, if the value has changed
- Alternating reading of status word and actual value

If the time tolerances caused by cyclic reading of the status word/actual value are too large, the alternating reading of the status word and the actual value can be suppressed. This is controlled by the bit 15 (PE inhibit) of the DRIVECOM control word:

- PE inhibit = 0: Status and actual-value update active
- PE inhibit = 1: Status and actual-value update inactive

In the following table you will find a list of the processing times:

Processing step	Max. processing time in ms	Processing tolerance in ms
Setpoint	35	-8
Control word		
Actual value		
Status word		
Setpoint + control word	70	-16
Setpoint + control word + actual value + status word	140	-32

Note:
A change of the setpoint signal results in writing the control word.

Processing time 821X / 8200 vector / 822X

- Process data: approx. 3 ms + 2 ms tolerance

Processing time 93XX

- Process data: approx. 3 ms + 2 ms tolerance

3.6.2 Number of participants

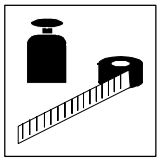
- The maximum number of participants in the INTERBUS-Loop is 63.

Tip!

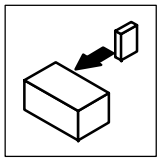
The maximum number of participants is not always possible. The number of fieldbus modules (participants) taking part in the communication is limited by the sum of their partial currents.
The sum current limit is I_{max} = 1.8 A.

Example

The INTERBUS-Loop is loaded with approx. 50 mA per controller connected.
Here the sum current of I_{max} = 1.8 A is reached when 36 controllers are connected.



Technical data



4 Installation

4.1 Connections of the fieldbus module 2112

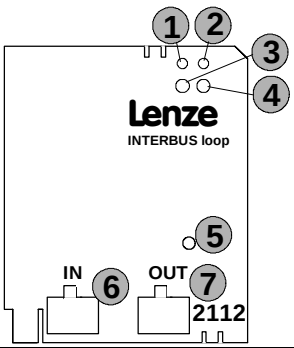
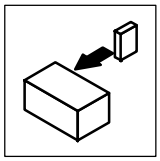


Fig. 4-1 Name/meaning of the module elements

No.	Name/Meaning	
1	**Yellow bus LED**	Status: Bus communication
	ON	Fieldbus module 2112 has been initialized INTERBUS communication with the master is possible.
	OFF	Fieldbus module 2112 is not supplied with voltage yet.
	BLINKING (4 Hz)	Peripheral fault/open circuit Voltage supply from the INTERBUS-Loop, but no INTERBUS communication.
	BLINKING (2 Hz)	Voltage supply if INTERBUS communication is active. Error telegrams caused by, e.g. open circuit, are generated. • Module not connected to the controller or • initialization active.
	BLINKING (0.5 Hz)	Voltage supply (5 V) from INTERBUS-Loop, but no INTERBUS communication.
2	**Green LED**	
	ON	2112 fieldbus module is supplied with voltage and is connected to the controller.
	OFF	The 2112 fieldbus module is supplied via INTERBUS-Loop.X
	BLINKING	2112 fieldbus module is supplied with voltage but is not connected to the controller. Controller is • switched-off, • being initialized or • not available
3 4	**Green LED** or **red LED** Operating status of the controllers 82XX, 8200 vector and 93XX. (See Operating Instructions for the controller)	
5	**Fixing screw for fieldbus module**	
6	**INTERBUS-Loop input (IN)**	
7	**INTERBUS-Loop output (OUT)**	



4.2 Mechanical installation

- If necessary, remove the keypad which was previously attached to the controller before.
- Plug the 2112 fieldbus module into the corresponding interface of the controller and fasten it with the fixing screw (see Fig. 4-1).
  Tighten the screws to ensure a good PE connection.

4.3 Electrical installation

Tip!

The communciation of 820X and 821X controllers may be disrupted by electromagnetic radiation.

If necessary, use an additional PE screen cable.

4.3.1 Voltage supply

No special or external voltage supplies necessary. The 2112 fieldbus module is supplied via INTERBUS-Loop.

4.3.2 Features:

Communication medium	INTERBUS-Loop	
Network topology	Ring	
Possible number of controllers	– Max. load capacity of the loops:	1.8 A
	– Current consumption per 2112 fieldbus module:	50 mA
	→ Max. number of participants:	36
Max. loop length	200 m	
Distance between fieldbus modules	20 m	
Maximum baud rate	500 kbit/s	

For an example of the INTERBUS structure, see the drawing (Fig. 4-2). The accessories required (INTERBUS Loop terminal) are listed in chapter 8.

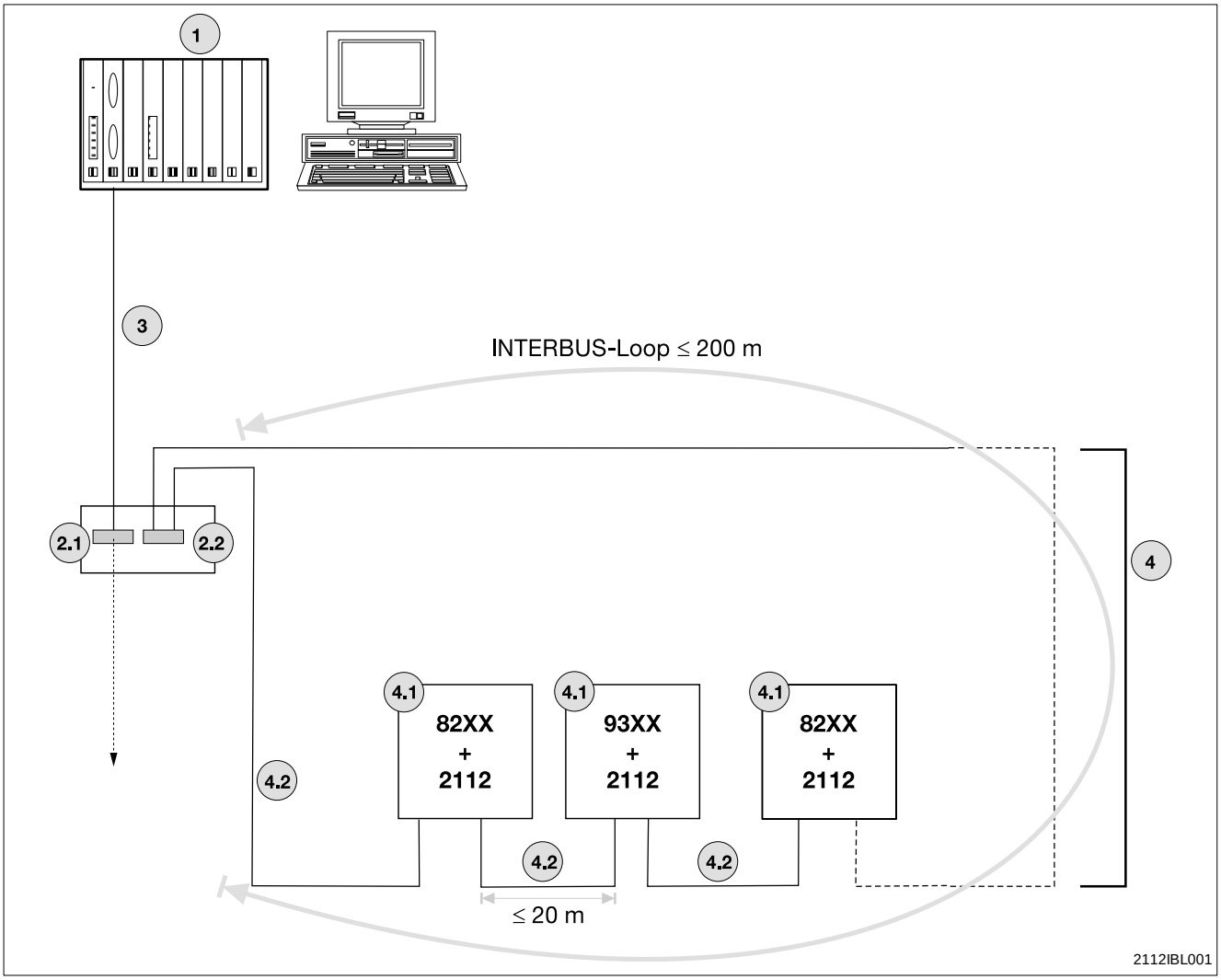
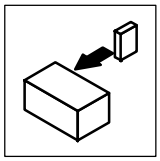
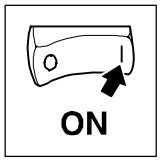


Fig. 4-2 Wiring example for the bus system INTERBUS-Loop

Pos.	Element	Function
1	Host (e.g. PC or PLC) with INTERBUS master interface module	Master
2.1	Bus terminal	Connects a remote bus to the INTERBUS-Loop terminal
2.2	INTERBUS-Loop terminal	Start / end of INTERBUS-Loop
3	Remote bus	Connects the INTERBUS master module with the bus terminal and/or other remote bus modules.
4	INTERBUS-Loop	INTERBUS-Loop terminal and peripheral bus participants (Max. number of participants: 63, max. sum current <1.8 A)
4.1	INTERBUS-Loop fieldbus module	Bus participant in the INTERBUS-Loop; e.g. Lenze controller with INTERBUS-Loop module 2112
4.2	INTERBUS-Loop cable	Connection in the loop



Installation



5 Commissioning

Stop!

- Before switching on the mains voltage, check the wiring for completeness, earth fault and short circuit.
- **Keep to the switch-on sequence!** (Chapters 5.1 to 5.4)

5.1 Configuration of the host for communication with the 2112 fieldbus module

With INTERBUS-Loop the master does not have to be configured. Please observe that a 4th generation master is used for the communication between host and 2112 fieldbus module.

5.2 Commissioning of 2112 fieldbus modules

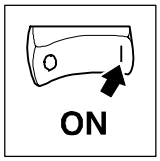
1. Plug the 2112 fieldbus module into the front automation interface (AIF) of the controller (see Operating Instructions for the controller)
2. Supply INTERBUS-Loop terminal (see Fig. 4-2, pos. 2.2) with voltage.
   – The green LED for voltage supply (📖 4-1) pos.1) must be on or blinking.
   – An internal initialization between controller and 2112 fieldbus module follows as soon as the fieldbus module is connected to the controller. The initialization time is up to 3s.
3. Initialization is completed when
   – the green LED (📖 4-1) , pos. 1) is on permanently
4. Activate INTERBUS
   – the yellow bus LED is on permanently
5. It is now possible to communicate with the drive.

If the LED is not on or blinking, see chapter 7 ”Troubleshooting and fault elimination”.

Tip !

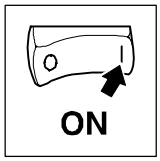
(If the DRIVECOM-Profile (C0009 ≠ 11, 12 (📖 5-4)) is selected under C009)

When attaching the fieldbus module to the 93XX controller, the controller is inhibited and the DRIVECOM status switch-on inhibit is set. For enabling the controller, the status OPERATION ENABLE must be set once with the DRIVECOM control word. (📖 5-3) . Afterwards, the controller can be controlled as usual, e.g. via terminals.



5.3 Drive control via INTERBUS-Loop

82XX / 8200 vector	1. For drive control via INTERBUS, change the setting of the Lenze parameter operating mode (C0001) from 0 to 3. 2. Determination of the control mode – DRIVECOM control (C0009 ≠ 11, 12) – Unit control (C0009 = 11) – User defined control profile (C0009 = 12) Note: Impermissible for 82XX controllers, see 🕮 5-5 ! 3. Terminal 28 (ctrl. enable) is always active and must be set to HIGH level during INTERBUS operation (see the Operating Instructions for the controller). – Otherwise, the controller cannot be enabled by the INTERBUS (DRIVECOM/standard unit status "OPERATION ENABLED"). – With 821x and 822x the QSP function (quick stop) is always active. If QSP is assigned to an input terminal (default setting: not assigned), this terminal must be at HIGH level during INTERBUS-Loop operation (see the corresponding Operating Instructions). The controller now accepts control data from the InterBus-Loop.
93XX	1. For drive control via INTERBUS set the Lenze parameter Signal Configuration (C0005) to a value xxx3 using the 9371 keypad. For the first commissioning, select the signal configuration 1013. 2. Determination of the control mode – DRIVECOM control (C0009 ≠ 11, 12) – Unit control (C0009 = 11) – User defined control profile (C0009 = 12) 3. Set the parameter Start Option (C0142) to 0. 4. Terminal 28 (ctrl. enable) is always active and must be set to HIGH level during INTERBUS operation (see the Operating Instructions for the controller). – Otherwise, the controller cannot be enabled by the INTERBUS (DRIVECOM/standard unit status "OPERATION ENABLED"). – With the signal configuration C0005=1013, the QSP function (quick stop) and the CW/CCW changeover are assigned to the input terminals E1 and E2, and are thus always active. For INTERBUS operation E1 must be set to HIGH level (see Operating Instructions 93xx). The controller now accepts control data from the INTERBUS-Loop.



5.4 Enable controller via INTERBUS-Loop

The 2112 fieldbus module offers the user the possibility to operate the controller with different control modes:

- Standard unit control
- DRIVECOM control
- User defined control profile

The bit assignment of the control and status word depends on the control mode selected. The selection between the control modes “Standard unit control” and “DRIVECOM control” is effected via the paramter C0009 of the basic unit and can be adjusted directly at the controller by means of the corresponding keypad.

A user defined control profile can be generated by setting C0009 = 12. It is thus possible to map the 2 process data words of the INTERBUS-Loop to the words W1 and W2 of 93XX and 8200 vector controllers.

C0009	Type	Status	Process data assignment	
			PCD 1	PCD 2
11	82XX / 8200 vector / 93XX	DRIVECOM: off	Unit control word C0135 or unit status word C0150	AIF-IN.W1 or AIF-OUT.W1
12	93XX / 8200 vector		AIF-IN.W1 or AIF-OUT.W1	AIF-IN.W2 or AIF-OUT.W2

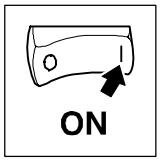
How to enable the controller depends on the control mode selected and is decribed in the following.

5.4.1 Standard unit control

1. Controller settings as described in chapter 5.3
2. Preselection of standard unit control: Parameter C0009 = 11
3. Input for unit control word: “0000 0000 0000 0000_{bin} (0_{hex})”
   → Status change to: “OPERATION ENABLED“
4. The controller is enabled.

Danger!

If a speed has been selected in process data word 2, the drive starts immediately when the module is being attached.



5.4.2 DRIVECOM control

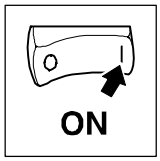
Tip !

- As soon as the fieldbus module is attached to the 93XX controller, the controller is inhibited. DRIVECOM sets the status SWITCH-ON INHIBIT.
- Points 1. to 5. (see below):
  – For enabling the controller, the status OPERATION ENABLE must be set once through the DRIVECOM control word.
  – The controllers 821X, 8200 vector and 822X need a speed setpoint to be enabled. These controllers should therefore have a speed setpoint preselected via the corresponding process data assignment before they are enabled through $7E_{hex}$ or $7F_{hex}$.

1. Controller settings as described in chapter 5.3
2. DRIVECOM unit control preselection under parameter C0009 $\neq$ 11, 12
3. Change to status „READY FOR SWITCH ON“
   DRIVECOM control word = 0000 0000 0111 1110_{bin} ($7E_{hex}$).
4. Change to the status „OPERATION ENABLED“
   DRIVECOM control word = 0000 0000 0111 1111_{bin} ($7F_{hex}$)
   (waiting for OPERATION ENABLED)
5. The controller is enabled.

5.4.2.1 Create DRIVECOM compatibility (C0009 $\neq$11, 12)

The unit control is described in the DRIVECOM profile 20. In the following, you will find the changes required for the Lenze controllers.	
820X	-
821X, 8200 vector and 822X	The automatic DC-injection brake must be deactivated in all parameter sets, i. e. • C0106=0 • C2106=0 • C4106=0 (only 8200 vector) • C6106=0 (only 8200 vector) If the automatic DC-injection brake is not deactivated (holding time of the DC-injection brake C0106 unequal 0), the controller automatically switches from the status ”OPERATION ENABLED” to the status ”SWITCHED ON” when the speed is 0 and the holding time of the DC-injection brake is elapsed. If the setpoint is higher than 0, the controller is automatically reset to the status ”OPERATION ENABLED”.
93XX	Set a DRIVECOM speed signal configuration under code C0005, e. g.: • C0005=1013 This configuration corresponds to the signal configuration 1000 with the following changes: • Setpoint selection via INTERBUS-Loop • Unit control via INTERBUS-Loop • Output X5.A1 is selected as voltage output for the internal supply of the digital inputs. • Actual values and status signals for INTERBUS-Loop For the detailed description of the signal configuration, see 93XX Manual.



5.4.3 User defined control profile

The controllers 93XX and 8200 vector offer the possibility to link the process data words 1 and 2 through the AIF block (see Process Data Assignment for 93XX and 8200 vector):

1. Controller settings as described in chapter 5.3
2. Selection of user defined control profile with C0009 = 12
3. Automatic enabling.

Danger!

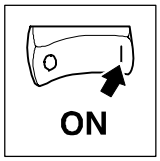
User-defined control is only allowed for 93XX and 8200 vector controllers!

If a speed has been selected via the corresponding process data word, the drive starts immediately when the module is being attached.

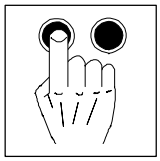
5.5 Special features with 82XX, 8200 vector und 93XX

Please note
- For safe operation it is absolutely necessary to observe the notes for the controllers given in this chapter.

820X	• Parameter setting only by using the keypad and when the controller is inhibited (DRIVECOM controller status not "OPERATION ENABLED"). • A TRIP must only be reset through INTERBUS Loop: If the controller is set to the status TRIP while being operated with INTERBUS control (C0001 = 3) and if the TRIP is reset via terminal 28, the drive might start for a short time. When resetting a fault via INTERBUS, this does not occur. • After the command „TRIP reset" the 820X controller is basically initialized. During this time the controller does not accept any services. • Always send the direction of rotation with a low setpoint before the new setpoint: If the setpoint and the direction of rotation are changed at the same time via the DRIVECOM speed setpoint, the speed can change to the wrong direction or rotation for a short time. This is because the setpoint is sent to the controller as unipolar value before the information about the direction of rotation is sent.
8200 vector	• Digital and analog input and output signals can be freely configured (see Operating Instructions for 8200 vector; codes C0410, C0412, C0417 and C0421) • Process data words are preconfigured in the controller with C0001 = 3
93XX	• Instead of operating mode L-C0001, set signal configuration C0005=xxx3. • A change of code C0005 to xxx3 starts the preconfiguration of the process data words in the controller • Set the parameter C0142 = 0 (auto start lock), to avoid a brief start of the drive during the initialization phase.



Commissioning



6 Parameter setting

Tip!

PCP communication is not supported.
Parameter data (= Lenze codes) can be changed through a keypad which can be attached to the controller.

6.1 Process data

6.1.1 Process data assignment

6.1.1.1 General information

Process data are cyclically exchanged between the controller and the master.

They are subdivided into

- Process output data (PO data)
- Process input data (PI data)

Here the data flow starts from the master, i.e. the PO data of the master are input data for the controller.

The controller gets the control information from the master and returns status information.

Control word and status word

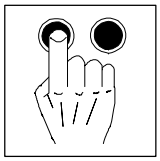
The controller status, such as READY FOR OPERATION, OPERATION ENABLED, etc. are controlled and monitored via the control and status words. The ranges are subdivided as follows:

- Control word
  – The control word is sent from the master to the controller. It includes status information such as OPERATION ENABLED (see chapter 5.4).
- Status word
  – The status word is sent from the controller to the master. It provides all actual controller states, such as ERROR.

INTERBUS-Loop can transfer a maximum of 32 bit, which are interpreted by the 2112 fieldbus module as two process data words. The assignment of the process data words can be preselected under code C0009.

Assignment of process output data words

Byte No.			Unit control C0009 = 11	DRIVECOM control C0009 ≠ 11, 12	User defined control profile C0009 = 12 (only 8200 vector and 93XX)
1	HIGH byte; bit 8-15	POW1	Unit control word C0135	DRIVECOM control word	Link: W1 to AIF-IN
2	LOW byte; bit 0-7				
1	HIGH byte; bit 8-15	POW2	82XX / 8200 vector: Speed setpoint 93XX: Freely configurable		Link: W2 to AIF-IN
2	LOW byte; bit 0-7				



Assignment of process input data words

Byte No.			Meaning for		
			Unit control C0009 = 11	**DRIVECOM control** C0009 ≠ 11, 12	**User defined control profile** C0009 = 12 (only 8200 vector / 93XX)
1 HIGH byte; bit 8-15	PIW1		DRIVECOM status word	DRIVECOM status word	Link: W1 to AIF-OUT
2 LOW byte; bit 0-7					
1 HIGH byte; bit 8-15	PIW2		82XX / 8200 vector: Actual speed 93XX: Freely configurable		Link: W2 to AIF-OUT
2 LOW byte; bit 0-7					

6.1.1.2 Process-data assignments for 82XX

Structure of the PO-data response (data to drive)

Byte 1	**Byte 2**	**Byte 3**	**Byte 4**
Control word High byte	Control word Low byte	Setpoint High byte	Setpoint Low byte

Control word: see chapter 6.1.3.2

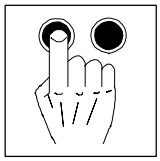
Setpoint: frequency setpoint
Here the frequency setpoint is preselected as process data word. The normalization is here indicated as signed value with ±24000 = ±480 Hz.

Structure of the PI data response (data from drive)

Byte 1	Byte 2	Byte 3	Byte 4
Status word High byte	Status word Low byte	Actual value High byte	Actual value Low byte

Status word: see chapter 6.1.3.3.

Actual value: act. frequency value
The actual frequency value is provided as signed normalization ±24000 = ±480 Hz.



6.1.1.3 Process-data assignment for 8200 vector

Digital and analog input and output signal can be configured freely (see Operating Instructions "8200 vector": Codes C0410, C0412, C0417 and C0421).

The change of the code C0001 to 3 starts the preconfiguration of the process data words in the controller (see chapter 5.3, (📖 5-2)).

Structure of the PO-data response (data to drive)

Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**
Control word High byte	Control word Low byte	AIF-IN.W1 High byte	AIF-IN.W1 Low byte	AIF-IN.W2 High byte	AIF-IN.W2 Low byte

Control word: see chapter 6.1.3.2.

AIF-IN.Wx see C0412.

Structure of the PI data response (data from drive)

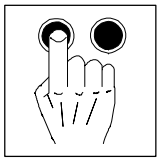
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Status word High byte	Status word Low byte	AIF-OUT.W1 High byte	AIF-OUT.W1 Low byte	AIF-OUT.W2 High byte	AIF-OUT.W2 Low byte

Status word: see chapter 6.1.3.3.

AIF-OUT.Wx see C0421.

Tip!

- Frequency and speed are normalized with ±24000 ≡ ±480 Hz.
- Torque is normalized with 16384 ≡ 100%.



6.1.1.4 Process-data assignment for 93XX

With the 93XX controller the process data assignment can be changed by reconfiguring the function blocks AIF-IN and AIF-OUT.

Structure of the PO data response

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
Control word High byte	Control word Low byte	AIF-IN.W1 High byte	AIF-IN.W1 Low byte	AIF-IN.W2 High byte	AIF-IN.W2 Low byte

AIF-IN.W1 to AIF-IN.W2 depend on the signal configuration selected under C0005.

For detailed description of the 93XX signal configuration see the Operating Instructions for 93XX (only the main configurations: 1000, 4000, 5000, etc.) or the Manual 93XX.

In the controller, other signals can be assigned to AIF-IN.W1 to AIF-IN.W2. For this, the function-block configuration - described in the Manual 93XX - is used. The function block AIF-IN determines the input data of the controller as data interface for the 2112 fieldbus module.

For more detailed information about the function block AIF-IN, see the Manual 93XX.

Signal configuration (C0005)		AIF-IN.W1	AIF-IN.W2
Speed control	1003 / 1013 / 1113	NSET-N Speed setpoint 100 % = 16383	Reserved
Torque control	4003 / 4013 / 4113	MCTRL-MADD Torque setpoint 100 % = 16383	Reserved
DF master	5003 / 5013 / 5113	NSET-N Speed setpoint 100 % = 16383	Reserved
DF-slave bus	6003 / 6013 / 6113	DFSET-A-TRIM Phase trimming	DFSET-N-TRIM Speed trimming
DF-slave cascade	7003 / 7013 / 7113	DFSET-VP-DIV DF factor	DFSET-A-TRIM Phase trimming
Cam profiler	1xxx3	YSET1-FACT	Reserved
Positioning	2xxx3	Reserved	Reserved
vector control	1xx3 / 2xx3 / 3xx3 / 5xx3 / 100x3	NLIM-IN1	Reserved
vector control	4xx3	NCTRL-MADD	Reserved
vector control	6xx3	DFSET-A-TRIM	DFSET-N-TRIM
vector control	7xx3 / 8xx3 / 9xx3	DFSET-VP-DIV	DFSET-A-TRIM
vector control	100x3	NLIM-IN1	Reserved
vector control	110x3	Reserved	Reserved

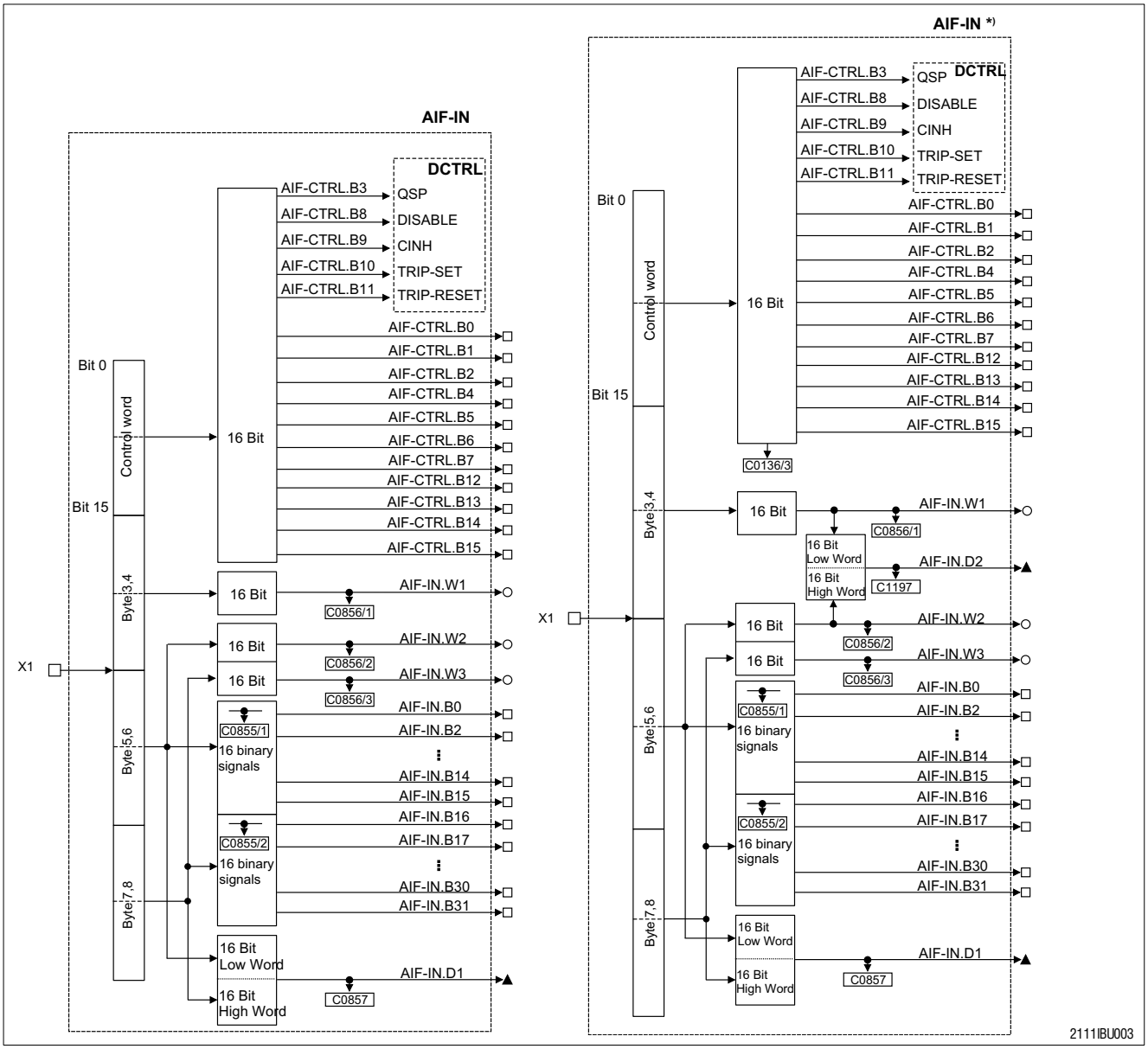
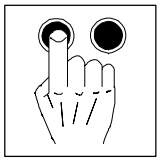


Fig. 6-1 Function block AIF-IN and AIF-IN*)

AIF-IN*) is available for the 9300 technology variants: servo inverter, positioning controller and cam profiler as of software version 2.0). AIF-IN.D2 is new.

Tip!

Please observe that bytes 7 and 8 shown in the diagram above cannot be accessed via INTERBUS-Loop.



Parameter setting

Structure of the PI data response (data from drive)

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6
DRIVECOM Status word High byte	DRIVECOM Status word Low byte	AIF-OUT.W1 High byte	AIF-OUT.W1 Low byte	AIF-OUT.W2 High byte	AIF-OUT.W2 Low byte

AIF-OUT.W1 to AIF-OUT.W2 depend on the signal configuration selected under C0005.

For detailed description of the 93XX signal configuration see the Operating Instructions for 93XX (only the main configurations: 1000, 4000, 5000, etc.) or the Manual 93XX.

In the controller, other signals can be assigned to AIF-OUT.W1 to AIF-OUT.W2. For this, the function-block configuration - described in the Manual 93XX - is used. The function block AIF-OUT determines the controller output data as data interface for the 2112 fieldbus module.

For more detailed information about the function block AIF-OUT, see the Manual 93XX.

Signal configuration (C0005)		AIF-OUT.W1	AIF-OUT.W2
Speed control	1003 / 1013 / 1113	MCTRL-NACT Actual speed 100 % = 16383	MCTRL-MSET2 Torque display 100 % = 16383
Torque control	4003 / 4013 / 4113	MCTRL-MSET2 Torque display 100 % = 16383	MCTRL-NACT Act. speed in % 100 % = 16383
DF master	5003 / 5013 / 5113	MCTRL-NACT Actual speed 100 % = 16383	MCTRL-MSET2 Torque display 100 % = 16383
DF-slave bus	6003 / 6013 / 6113	MCTRL-NACT Actual speed 100 % = 16383	MCTRL-PHI-ACT Actual phase
DF-slave cascade	7003 / 7013 / 7113	MCTRL-NACT Actual speed 100 % = 16383	MCTRL-PHI-ACT Actual phase
Cam profiler	1xxx3	MCTRL-NACT Actual speed 100 % = 16383	Reserved
Positioning	2xxx3	MCTRL-NACT Actual speed 100 % = 16383	Reserved
vector control	1xx3 / 4xx3 / 5xx3 / 10xx3	MCTRL-NACT Actual speed 100 % = 16383	MCTRL-IACT
vector control	6xx3 / 7xx3 / 8xx3 / 9xx3	MCTRL-NACT Actual speed 100 % = 16383	MCTRL-PHI-ANA
vector control	110x3	Reserved	Reserved

For more detailed information about the function block AIF-OUT, see the Manual 93XX.

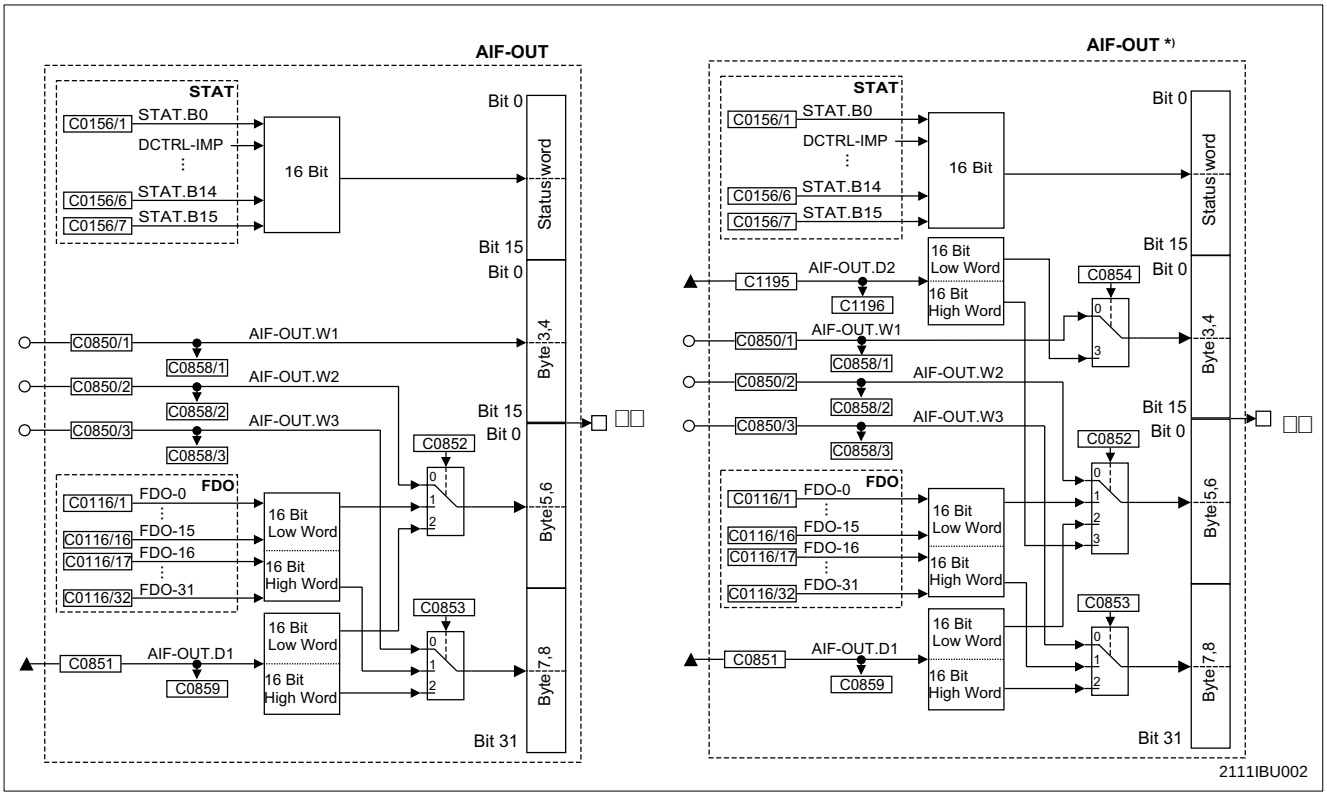
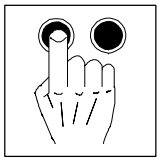


Fig. 6-2 Function block AIF-OUT and AIF-OUT*)
AIF-OUT*) is available for the 9300 technology variants: servo inverter, positioning controller and cam profiler as of software version 2.0). AIF-OUT.D2 is new.

Tip!

Please observe that bytes 7 and 8 shown in the diagram above cannot be accessed via INTERBUS-Loop.



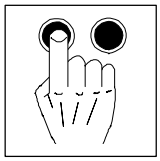
6.1.2 Unit control (C0009 = 11)

In the following the bit assignment of control and status word is under C0009 = 11:

6.1.2.1 Control word

Control word for 82XX and 8200 vector

	820X	821x,822x	8200vector	
			Factory setting: C0001=3 if C0007 < 52	**Factory setting: C001=3 if C0007 > 51**
0	JOG1, JOG2, JOG3 00 = C0046 active 01 = JOG1 (C0037) active 10 = JOG2 (C0038) active 11 = JOG3 (C0039) active	JOG1, JOG2, JOG3 00 = C0046 active 01 = JOG1 (C0037) active 10 = JOG2 (C0038) active 11 = JOG3 (C0039) active	NSET1-JOG1/3 00 = C0046 active 01 = JOG1 (C0037) active 10 = JOG2 (C0038) active 11 = JOG3 (C0039) active	The default setting (see below) is accepted with setting C0007 > 51 Use C0410 to set your own configurations.
1			NSET1-JOG2/3	
2	CW/CCW (CW rotation/CCW rotation) 0 = CW rotation 1 = CCW rotation	CW/CCW (CW rotation/CCW rotation) 0 = CW rotation 1 = CCW rotation	DCTRL1-CW/CCW 0 = not active 1 = active	
3	QSP (quick stop) 0 = QSP not active 1 = QSP active	QSP (quick stop) 0 = QSP not active 1 = QSP active	AIF-CTRL-QSP 0 = not active 1 = active	
4	Reserved	RFG stop (stop of the ramp function generator) 0 = RFG stop not active 1 = RFG stop active	NSET1-RFG1-STOP 0 = not active 1 = active	
5	Reserved	RFG zero (deceleration along the T i f ramp C0013) 0 = RFG zero not active 1 = RFG zero active	NSET1-RFG1-0 0 = not active 1 = active	
6	Reserved	UP function for motor potentiometer 0 = UP not active 1 = UP active	MPOT1-UP 0 = not active 1 = active	
7	Reserved	DOWN function for motor potentiometer 0 = DOWN not active 1 = DOWN active	MPOT1-DOWN 0 = not active 1 = active	
8	Reserved	Reserved	Reserved	
9	Ctrl. inhibit (controller inhibit) 0 = controller not inhibited 1 = controller inhibited	Ctrl. inhibit (controller inhibit) 0 = controller not inhibited 1 = controller inhibited	AIF-CTRL-CINH 0 = not active 1 = active	
10	Reserved	Reserved	No function	
11	Reserved	TRIP reset 0 -> 1 = Edge from 0 to 1	AIF-CTRL-TRIP-RESET 0 -> 1 = Edge from 0 to 1	
12	PAR1 (Parameter set changeover) 0 -> 1 = Parameter set 1 -> 0 = Parameter set	PAR1 (Parameter set changeover) 0 -> 1 = Parameter set 1 -> 0 = Parameter set	DCTRL1-PAR2/4 0 = not active 1 = active	
13	Reserved	Reserved	DCTRL1-PAR3/4 0 = not active 1 = active	
14	DC brake (DC injection brake) 0 = DC brake not active 1 = DC brake active	DC brake (DC injection brake) 0 = DC brake not active 1 = DC brake active	MCTRL1-DCB 0 = not active 1 = active	
15	Reserved	Reserved	Reserved	

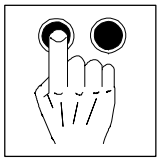


Control word for 93XX

9300	9300 Servo				9300 Positioning controller	9300 Cam profiler	9300 Vector		
C0005	1xx3	4xx3	5xx3	6xx3,7xx3	2xxx3	xxx3	1xxx, 2xxx, 3xxx, 5xxx, 10xxx, 11xxx	4xx3	6xx3,7xx3
0	NSET-JOG*1	Reserved	NSET-JOG*1	Reserved	Reserved	CSEL1-CAM*1	NSET-JOG*1	Reserved	Reserved
1	NSET-JOG*2	Reserved	NSET-JOG*2	Reserved	Reserved	CSEL1-CAM*2	NSET-JOG*2	Reserved	Reserved
2	NSET-N-INV	NSET-N-INV	NSET-N-INV	NSET-N-INV	Reserved	CSEL1-CAM*4	NSET-N-INV	Reserved	Reserved
3	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP	AIF-CTRL.QSP
4	NSET-RFG-STOP	NSET-RFG-STOP	NSET-RFG-STOP	NSET-RFG-STOP	POS-PRG-START	CSEL1-EVENT	NSET-RFG-STOP	NSET-RFG-STOP	Reserved
5	NSET-RFG-0	NSET-RFG-0	NSET-RFG-0	NSET-RFG-0	POS-PRG-STOP	CDATA-CYCLE	NSET-RFG-0	NSET-RFG-0	Reserved
6	Reserved	Reserved	Reserved	Reserved	Reserved	CSEL1-LOAD	Reserved	Reserved	Reserved
7	Reserved	Reserved	Reserved	Reserved	POS-PRG-RESET	CSEL1-LOAD	Reserved	Reserved	Reserved
8	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
9	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH	AIF-CTRL.CINH
10	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET	AIF-CTRL.TRIP-SET
11	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET	AIF-CTRL.TRIP-RESET
12	DCTRL-PAR*1	DCTRL-PAR*1	DCTRL-PAR*1	DCTRL-PAR*1	POS-PS-CANCEL	Reserved	DCTRL-PAR*1	DCTRL-PAR*1	DCTRL-PAR*1
13	DCTLR-PAR-LOAD	DCTLR-PAR-LOAD	DCTLR-PAR-LOAD	DCTLR-PAR-LOAD	POS-PARAM-RD	Reserved	DCTLR-PAR-LOAD	DCTLR-PAR-LOAD	DCTLR-PAR-LOAD
14	NSET-Ti*1	NSET-JOG*1	REF-ON	REF-ON	POS-LOOP-ONH	Reserved	NSET-Ti*1	NSET-JOG*1	Reserved
15	NSET-Ti*2	NSET-JOG*2	NSET-Ti*1	Reserved	POS-STBY-STP	Reserved	NSET-Ti*2	NSET-JOG*2	Reserved

Tip!

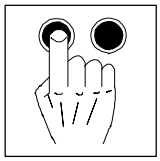
The single bit control commands of the control word depend on other bit positions. Chapter 6.1.3.1 describes the bits required to effect the command.



6.1.2.2 Status word

Status word for 82XX and 8200 vector

	820X	821x,822x	8200vector Lenze setting
0	Reserved	Actual parameter set 0 = Parameter set 1 or 3 active 1 = Parameter set 2 or 4 active	DCTRL-PAR-B0
1	IMP (pulse inhibit) 0 = Pulses for power stage enabled 1 = Pulses for power stage inhibited	IMP (pulse inhibit) 0 = Pulses for power stage enabled 1 = Pulses for power stage inhibited	DCTRL1-IMP
2	I_{max} (current limit reached) 0 = Current limit not reached 1 = current limit reached	I_{max} (current limit reached) 0 = Current limit not reached 1 = current limit reached	MCTRL1-IMAX
3	Reserved	$f_d = f_{dset}$ 0 = $f_d \neq f_{dset}$ 1 = $f_d = f_{dset}$	MCTRL1-RFG1=NOUT
4	$f_d = f_{dset}$ 0 = $f_d \neq f_{dset}$ 1 = $f_d = f_{dset}$	RFG on = RFG off 0 = RFG on ≠ RFG off 1 = RFG on = RFG out	NSET1-RFG1-I=0
5	Qmin ($f_d \leq f_{dQmin}$) 0 = Qmin not active 1 = Qmin active	Qmin ($f_d \leq f_{dQmin}$) 0 = Qmin not active 1 = Qmin active	PCTRL1-QMIN
6	f_d = 0 (act. frequency = 0) 0 = $f_d \neq 0$ 1 = $f_d = 0$	f_d = 0 (act. frequency = 0) 0 = $f_d \neq 0$ 1 = $f_d = 0$	DCTRL1-NOUT=0
7	Ctrl. inhibit (controller inhibit) 0 = controller not inhibited 1 = controller inhibited	Ctrl. inhibit (controller inhibit) 0 = controller not inhibited 1 = controller inhibited	DCTRL1-CINH
8...11	Unit status 0 = No error 8 = Error active	Unit status 0 = Controller initialization 1 = Switch on inhibit 3 = Operation inhibited 4 = Flying-restart circuit active 5 = DC brake active 6 = Operation enabled 7 = Message active 8 = Fault active	Unit status 0 = Controller initialization 1 = Switch on inhibit 3 = Operation inhibited 4 = Flying-restart circuit active 5 = DC brake active 6 = Operation enabled 7 = Message active 8 = Fault active
12	Overtemperature warning (ϑ_{max} - 10°C) 0 = No warning 1 = Warning	Overtemperature warning 0 = No warning 1 = Warning	DCTRL1-OH-WARN
13	U_{Gmax} (DC-bus overvoltage) 0 = No overvoltage 1 = overvoltage	U_{Gmax} (DC-bus overvoltage) 0 = No overvoltage 1 = overvoltage	DCTRL1-OV
14	Direction of rotation 0 = CW rotation 1 = CCW rotation	Direction of rotation 0 = CW rotation 1 = CCW rotation	DCTRL1-CCW
15	Ready for operation 0 = not ready for operation 1 = ready for operation	Ready for operation 0 = not ready for operation 1 = ready for operation	DCTRL1-RDY

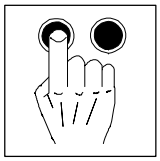


Status word for 93XX

9300	Servo				Servo positioning controller	Servo cam profiler	vector		
C0005	1xx3	4xx3	5xx3	6xx3,7xx3	2xxx3	1xxx3	xxx, 2xxx, 3xxx, 5xxx, 10xxx, 11xxx	4xxx	6xxx, 7xxx, 8xxx, 9xxx
0	DCTRL-PAR1-0	DCTRL-PAR1-0	DCTRL-PAR1-0	DCTRL-PAR1-0	Reserved	CERR1-ERR	DCTRL-PAR1-0	DCTRL-PAR1-0	DCTRL-PAR1-0
1	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP	DCTRL-IMP
2	MCTRL-IMAX	MCTRL-IMAX	REF-OK	REF-OK	POS-REF-OK	MCTRL-IMAX	MCTRL-IMAX	MCTRL-IMAX	MCTRL-IMAX
3	MCTRL-MMAX	Reserved	MCTRL-MMAX	Reserved	Reserved	MCTRL-MMAX	MCTRL-MMAX	MCTRL-IMAX negated	MCTRL-MMAX
4	NSET-RFG-I=0	MCTRL-IMAX negated	NSET-RFG-I=0	MCTRL-IMAX negated	MCTRL-MMAX negated	DCTRL-TRIP	NSET-RFG-I=0	NSET-RFG-I=0	NSET-QSP-OUT
5	QMIN	QMIN	REF-BUSY	REF-BUSY	POS-IN-TARGET	CDATA-X0	QMIN	QMIN	QMIN
6	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0	DCTRL-NACT=0
7	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH	DCTRL-CINH
8 ... 11	Controller status: 0 = Unit initialization 1 = Switch-on inhibit 3 = Operation inhibited 4 = Flying-restart circuit active 5 = DC-injection brake active 6 = Operation enabled 7 = Message active 8 = Fault active 10 = Fail-QSP (only 9300 servo positioning controller)								
12	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN	DCTRL-WARN
13	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS	DCTRL-MESS
14	DCTRL-CW/CCW	DCTRL-CW/CCW	DCTRL-CW/CCW	Reserved	DCTRL-AIFL-QSP	DCTRL-CW/CCW	DCTRL-CW/CCW	DCTRL-CW/CCW	DCTRL-CW/CCW
15	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY	DCTRL-RDY

Tip!

The current controller status can only be clarified by combining the bits with the status information (bit 0, 1, 2, 3, 4, 5 and 6). This is shown in chapter 6.1.3.1.



6.1.3 DRIVECOM control (C0009 ≠ 11, 12)

6.1.3.1 DRIVECOM status machine

Controllers 82XX, 8200 vector (C0001 ≠ 3)

For standard control you enter the control information via the corresponding control inputs (terminal):

Information about the current unit status (Fig. 6-3, see below) (rectangles) are available in the DRIVECOM parameter "status word". Commands in the DRIVECOM parameter "control word" are switched off and cannot change the controller status. The commands to change the controller status are entered via the corresponding control inputs. These commands are marked by arrows in the following diagram.

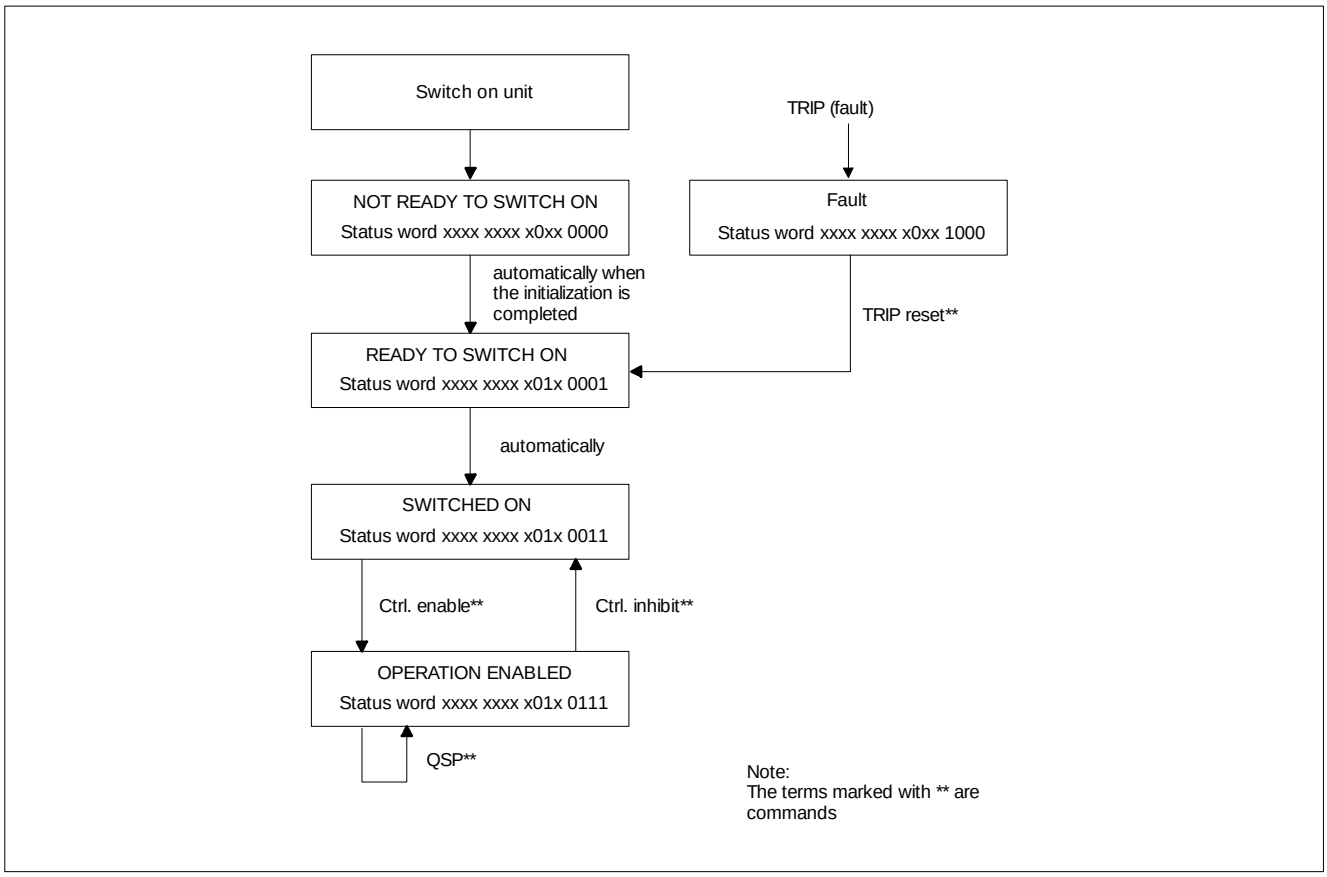


Fig. 6-3 Status diagram for standard unit control

Status	Meaning
NOT READY TO SWITCH ON	The controller is being initialized and is not yet ready to operate. It then automatically switches to the status READY TO SWITCH ON.
READY TO SWITCH ON	The controller is inhibited and waits for the power stage to be charged. It then automatically switches to the status "SWITCHED ON".
SWITCHED ON	The controller is inhibited and waits for controller enable.
OPERATION ENABLED	The controller is enabled. In this status, a pulse inhibit can be set automatically.
FAULT	The controller is in the status "FAULT" (TRIP).

Controllers 82XX and 8200 vector (C0001 = 3) and 93XX

With INTERBUS-DP control (82XX: Lenze parameter C0001 = 3; 93XX: always) and when using the 2112 fieldbus module, the Lenze controller status is normalized according to the DRIVECOM-Profile 20.

Information about the current unit status (Fig. 6-4 rectangles in the status diagram) are available in the DRIVECOM parameter "Status word". Commands in the DRIVECOM parameter control word can change the controller status. These commands are marked by arrows in the following diagram.

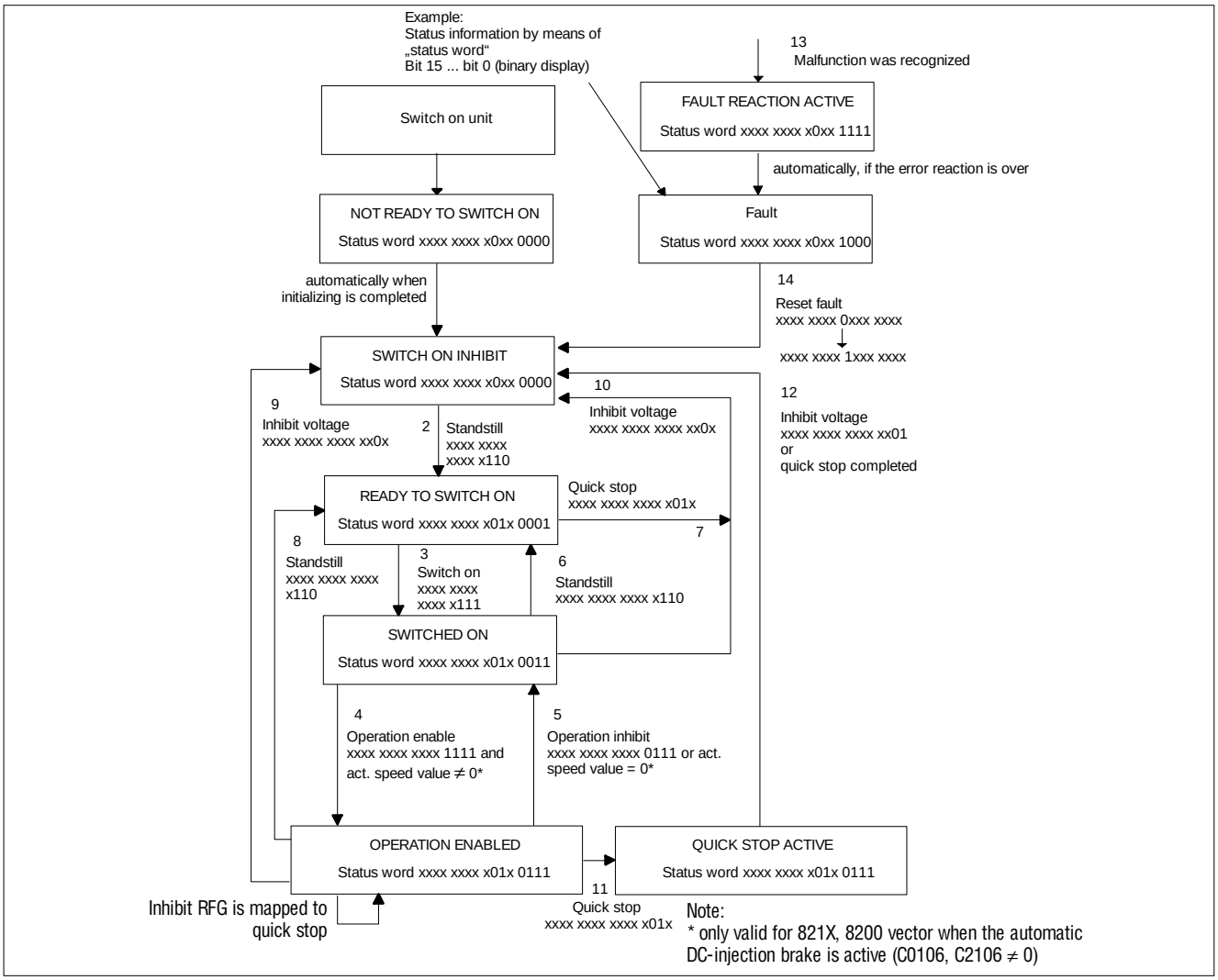
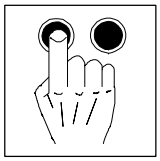


Fig. 6-4 Status diagram DRIVECOM unit control

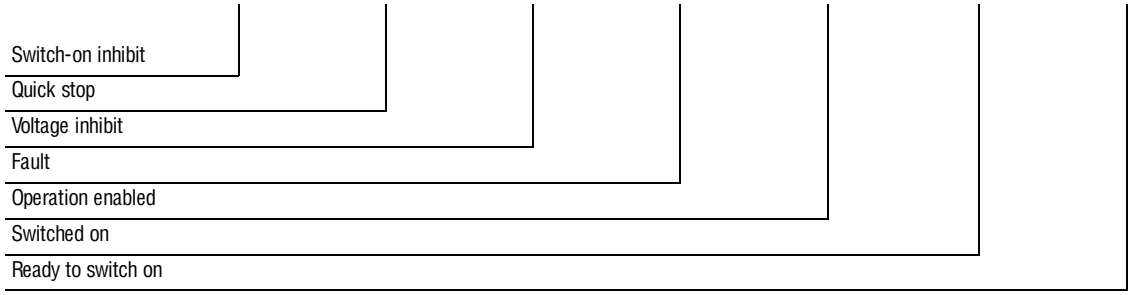
Status	Meaning
NOT READY TO SWITCH ON	The controller is being initialized and is not yet ready to operate. It then automatically switches to the status READY TO SWITCH ON.
SWITCH ON INHIBIT	The controller is inhibited and waits for command 2 (shut down).
READY TO SWITCH ON	The controller is inhibited and waits for command 3 (switch on).
SWITCHED ON	The controller is inhibited and waits for command 4 (enable operation).
OPERATION ENABLED	The controller is enabled. In this status, a pulse inhibit can be set automatically.
FAULT REACTION ACTIVE	A fault (TRIP) was recognized and a fault response initiated.
FAULT	The controller is in the status "FAULT" (TRIP).
QUICK STOP ACTIVE	While being in the status "OPERATION ENABLED" the command "Quick stop" was set. The controller is decelerated in a controlled way (quick-stop ramp). After deceleration, the controller automatically changes to the controller status "SWITCH ON INHIBIT".

The actual unit status can only be clarified by combining the unit-status information bits (bit 0 to 6). This is shown in the following:

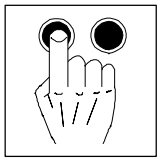


Parameter setting

Unit status	Bits of the status word						
Bit	**6**	**5**	**4**	**3**	**2**	**1**	**0**
NOT READY TO SWITCH ON	0			0	0	0	0
SWITCH ON INHIBIT	1			0	0	0	0
READY TO SWITCH ON	0	1		0	0	0	1
SWITCHED ON	0	1		0	0	1	1
OPERATION ENABLED	0	1		0	1	1	1
FAULT	0			1	0	0	0
FAULT REACTION ACTIVE	0			1	1	1	1
QUICK STOP ACTIVE	0	0		0	1	1	1



Command	Meaning
COMMAND 2, 6, 8 (standstill) Control word: bit 0 = 0	Command to change from different states to the status „READY TO SWITCH ON“.
COMMAND 3 (switch on)	Command to change to the controller status “SWITCHED ON“.
COMMAND 4 (enable operation)	Command to change to the controller status “OPERATION ENABLED“. The controller inhibit is deactivated.
COMMAND 5 (inhibit operation)	Command to change to the controller status “SWITCHED ON“. The controller inhibit is activated.
COMMAND 7, 9, 10, 12 (voltage inhibit) Control word: bit 1 = 0	Command to change to the controller status “SWITCH ON INHIBIT“. The controller inhibit is activated.
COMMAND 7, 10, 11 (quick stop) Control word: bit 2 = 0	Command to change to the controller status “SWITCH ON INHIBIT“. If the controller was enabled, it is decelerated in a controlled way along the Lenze quick-stop ramp.
COMMAND 13 (FAULT/TRIP)	The controller has recognized a malfunction. For some malfunction a controlled deceleration may be necessary (depending on the controller). Once completed, the controller changes to the status FAULT.
COMMAND 14 (reset fault/TRIP) Control word: bit 7 = 0 ⇒ 1	With the series 821X, 8200 vector this command acknowledges a fault. The controller changes to the status “SWITCH ON INHIBIT“ when a fault is no longer recognized.



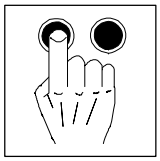
The individual bit-control commands of the control word depend on other bit positions. In the following you will find a description of the bits required to effect the command.

Controller status commands	**Bits of the control word**							
Bit	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0**
1 Standstill						1	1	**0**
2 Switch on						1	1	**1**
3 Operation enable					**1**	1	1	1
4 Operation inhibit					**0**	1	1	1
5 Voltage inhibit							**0**	
6 Quick stop						**0**	1	
8 Fault reset	0→1							

Fault reset
RFG-zero
RFG-stop
RFG inhibit
Operation enable
Quick stop
Voltage inhibit
Switch on

Detailed information on the tables:

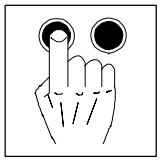
0	= Bit status is 0
1	= Bit status is 1
no entry	= Any bit status, no influence



6.1.3.2 Control word

Bit	Name	Meaning
0	Switch on	0 = command 2, 6, 8 (controller inhibit) 1 = command 3 (controller inhibit)
1	Voltage inhibit	0 = Voltage inhibit active 1 = voltage inhibit not active
2	Quick stop	0 = Quick stop active 1 = Quick stop not active
3	Operation enable	0 = Operation inhibited 1 = Operation enabled
4	RFG inhibit	Inhibit of the ramp-funtion generator. Quick stop is activated without the controller leaving its status. 0 = RFG inhibit (quick stop) 1 = RFG inhibit not active
5	RFG-stop	820X: Reserved 821X, 822X: Output of the RFG (speed setpoint integrator) is ”frozen”. 0 = RFG stop 1 = RFG stop not active 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B4 negated.
6	RFG-zero	820X: Reserved 821X, 822X: Input of the ramp function generator (speed setpoint integrator) is set to 0. Thus controlled deceleration along the ramp. 0 = RFG zero 1 = RFG zero not active 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B5 negated.
7	Fault reset	Fault reset (TRIP). For this, a bit change from 0 to 1 is required. For 82XX, the controller is initialized. During this time, the controller does not accept any commands.
8 .. 9	Reserved	
11	Manufacturer	820X, 821x, 822x: Reserved 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B7 1) .
12	Manufacturer	820X, 821x, 822x: Parameter set changeover: 0 – 1 = Parameter set 2 1 – 0 = Parameter set 1 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B12 1) .
13	Manufacturer	820X, 821x, 822x: DC-injection brake: 0 = DCB not active 1 = DCB active 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B13 1) .
14	Manufacturer	820X, 821x, 822x: Reserved 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B14 1) .
15	Manufacturer	820X: PI - inhibit Inhibit the update of the PO data of the controller (input data for the master). Updates for status and actual information of the process channel can be inhibited to transfer control information timed more accurately (see chapter 3.6.2). 0 = Read status and actual value 1 = Do not read status and actual value 821X,822X: Reserved 8200 vector, 93XX: free. Mapping to bit AIF-CTRL.B15 1) .

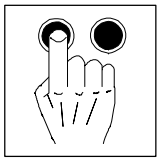
Signal configuration C0005		Bit 5 (AIF-CTRL.B4)	Bit 6 (AIF-CTRL.B5)	Bit 11 (AIF-CTRL.B7)	Bit 12 (AIF-CTRL.B12)	Bit 13 (AIF-CTRL.B13)	Bit 14 (AIF-CTRL.B14)	Bit 15 (AIF-CTRL.B15)
Speed control	1003 / 1013 / 1113	NSET-RFG-STOP (RFG stop)	NSET-RFG-0 (RFG zero)	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	NSET-TI*1	NSET-TI*2
Torque control	4003 / 4013 / 4113	NSET-RFG-STOP (RFG stop)	NSET-RFG-0 (RFG zero)	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	NSET-JOG*1	NSET-JOG*2
DF master	5003 / 5013 / 5113	NSET-RFG-STOP (RFG stop)	NSET-RFG-0 (RFG zero)	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	REF-ON	NSET-TI*1
DF-slave bus	6003 / 6013 / 6113	Reserved	Reserved	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	REF-ON	Reserved
DF-slave cascade	7003 / 7013 / 7113	Reserved	Reserved	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	REF-ON	Reserved
Cam profiler	1xxx3	CSEL1-EVENT	CDATA-CYCLE	CSEL1-LOAD	Reserved	Reserved	Reserved	Reserved
Positioning	2xxx3	POS-PRG-START	POS-PRG-STOP	POS-PRG-RESET	POS-PS-CANCEL	POS-PARAM-RD	POS-LOOP-INH	POS-STBY-STP



Signal configuration C0005		Bit 5 (AIF-CTRL.B4)	Bit 6 (AIF-CTRL.B5)	Bit 11 (AIF-CTRL.B7)	Bit 12 (AIF-CTRL.B12)	Bit 13 (AIF-CTRL.B13)	Bit 14 (AIF-CTRL.B14)	Bit 15 (AIF-CTRL.B15)
vector control	1xx3 / 2xx3 / 3xx3 / 5xx3 / 10xx3	NSET-RFG-STOP (RFG stop)	NSET-RFG-0 (RFG zero)	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	NSET-TI*1	NSET-TI*2
vector control	4xx3	NSET-RFG-STOP (RFG stop)	NSET-RFG-0 (RFG zero)	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	NSET-JOG*1	NSET-JOG*2
vector control	6xx3 / 7xx3 / 8xx3 / 9xx3	Reserved	Reserved	Reserved	DCTRL-PAR*1	DCTRL-PAR-LOAD	Reserved	Reserved
vector control	11xx3	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

6.1.3.3 Status word

Bit	Name	Meaning
0	Ready to switch on	Controller status information 0 = Status lower than “READY TO SWITCH ON“ 1 = Status at least “SWITCHED ON“
1	Ready for operation	Controller status information 0 = Status lower than “READY FOR OPERATION“ 1 = Status at least “READY FOR OPERATION“
2	Operation enabled	Controller status information 0 = Status lower than “OPERATION ENABLED“ 1 = Status “OPERATION ENABLED“
3	Fault	Controller status information 0 = No fault (TRIP)) 1 = Fault (TRIP) occured
4	Voltage inhibited	Information about command “Voltage inhibit“ 0 = Command active 1 = Command not active
5	Quick stop	Information about command “QUICK STOP“ 0 = Command active 1 = Command not active
6	Switch-on inhibit	Controller status information 0 = Status not “SWITCH-ON INHIBIT“ 1 = Status “SWITCH-ON INHIBIT“
7	Warning	Collective warning 0 = No warning 1 = warning
8	Message	Collective message. Automatic setting and resetting of pulse inhibit in the controller status ”OPERATION ENABLED”. Reasons for this can be undervoltage or overvoltage as well as overcurrent (clamp). 0 = No message 1 = Message (IMP)
9	Remote	82xx, 821x, 822x, 8200 vector: Bus access right depends on Lenze parameter ”Operating mode” (C0001) 0 = C0001 ≠ 3 1 = C0001 = 3 93XX: always 1
10	Setpoint reached	Status of speed/frequency deviation 0 = RFG on ≠ RFG off 1 = RFGon = RFGoff
11	Limit value	Status of the DRIVECOM speed limitation always 0
12	Reserved	820X, 821X, 822X: Reserved 8200 vector, 93XX: Mapping to bit C0150.B14
13	Reserved	820X, 821x, 822x: Reserved 8200 vector: Mapping to bit C0150.B15 93XX: Mapping to bit C0150.B3
14	Manufacturer	820X, 821x, 822x: I max (current limit reached) 0 = Current limit not reached 1 = Current limit exceeded 8200 vector, 93XX: Mapping to bit C0150.B2
15	Manufacturer	820X, 821x, 822x: Q min (f d < dQmin) 0 = Q min not active 1 = Q min active 8200 vector, 93XX: Mapping to bit C0150.B5



6.1.4 User defined control profile (C0009 = 12)

- Only useful with 93XX and 8200 vector (free configuration possible)
- When using a user-defined control profile, predefined control and status words are not available.
- The user determines the link between input and output data.
- Function block assignment for 93XX (see chapter 6.1.1.4, (📖 6-4))
  – Byte 3 and 4 form the input or output word W1
  – Byte 5 and 6 form the input or output word W2
- Process data assignment for 8200 vector: see chapter 6.1.1.3, (📖 6-3) .

For more information about the function blocks see the Manuals 93XX and 8200 vector.

Danger!

User-defined control is only allowed for 93XX and 8200 vector controllers!

If a speed has been selected via the corresponding process data word, the drive starts immediately when the module is being attached.

Tip!

Please observe that bytes 7/8 of the control/status word shown in the diagram above cannot be accessed via INTERBUS-Loop.

6.2 Process data monitoring

6.2.1 Process data monitoring time

If the process data transfer takes longer than t = 640 ms, the action set under parameter C0125 (Process data monitoring selection code) will be activated.

6.2.2 Process data monitoring selection code

Code	Meaning
C0125	0: No action 1: No action 2: Unit control command “Inhibit voltage” (controller inhibit with latching in status “SWITCH ON INHIBIT”). 3: Unit control command “Quick stop” (QSP) with latching in status “SWITCH ON INHIBIT”

Danger!

- DRIVECOM control
  – The latching function is active.
- Unit control
  – The latching function must be implemented in the master!
  Otherwise the machine starts automatically after the bus system has been activated if a speed setpoint ≠ 0 has been set in the process data word.

7 Troubleshooting and fault elimination

In the following you will find information about troubleshooting in the INTERBUS-Loop system in connection with controllers. Most of the diagnosis help is based on the instructions given by Phoenix or the manufacturer of InterBus Loop masters.

The help is in form of troubleshooting trees with the following elements:

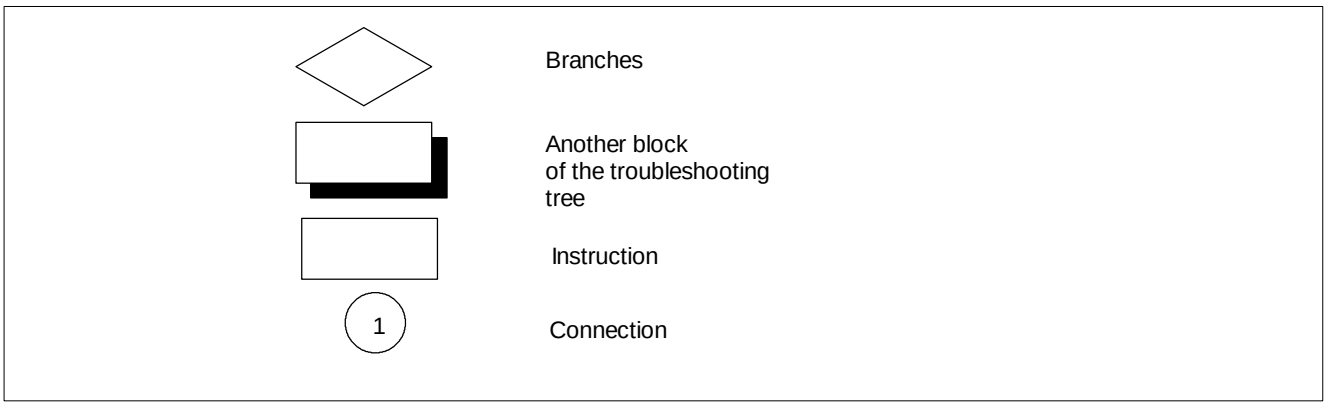
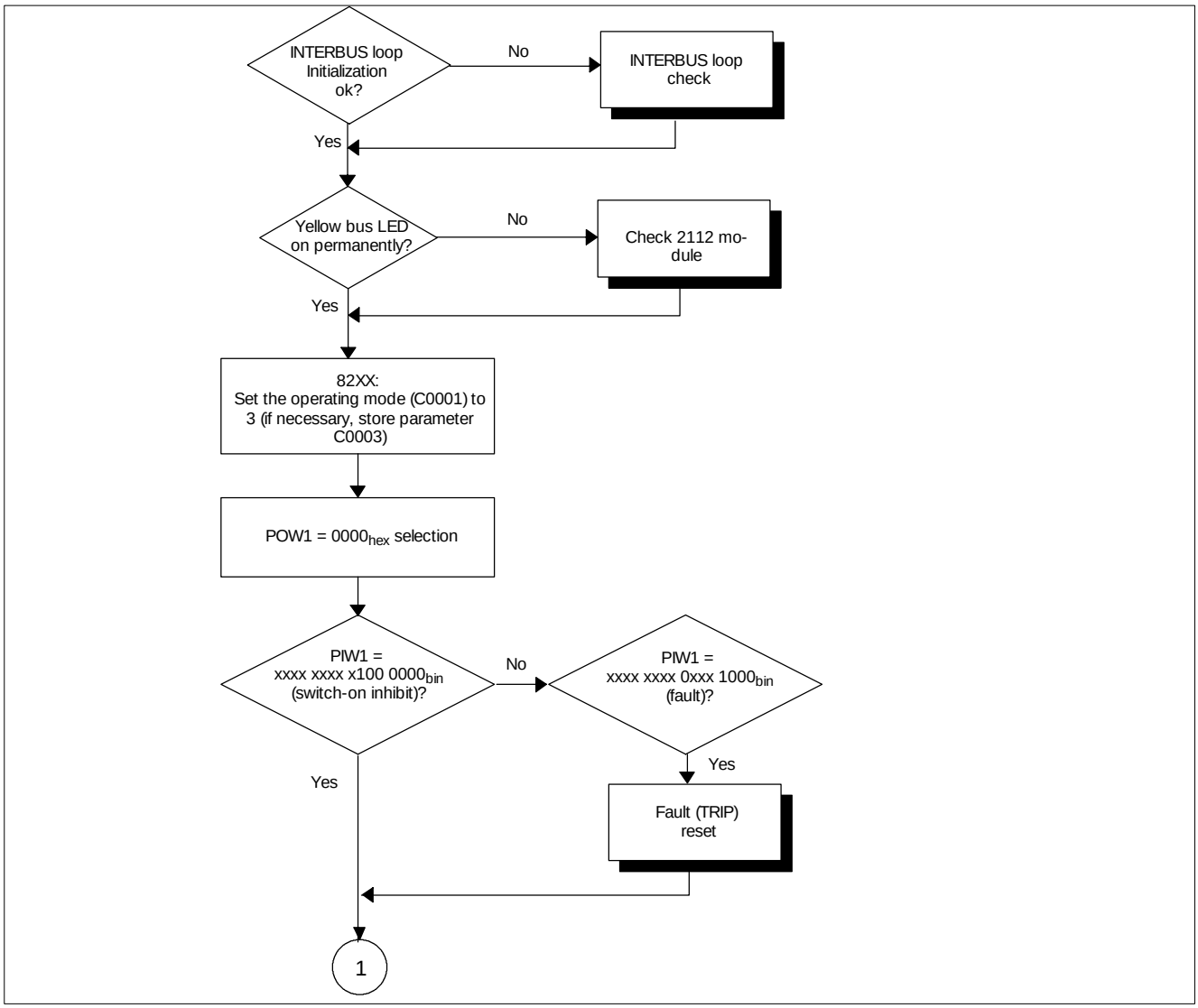
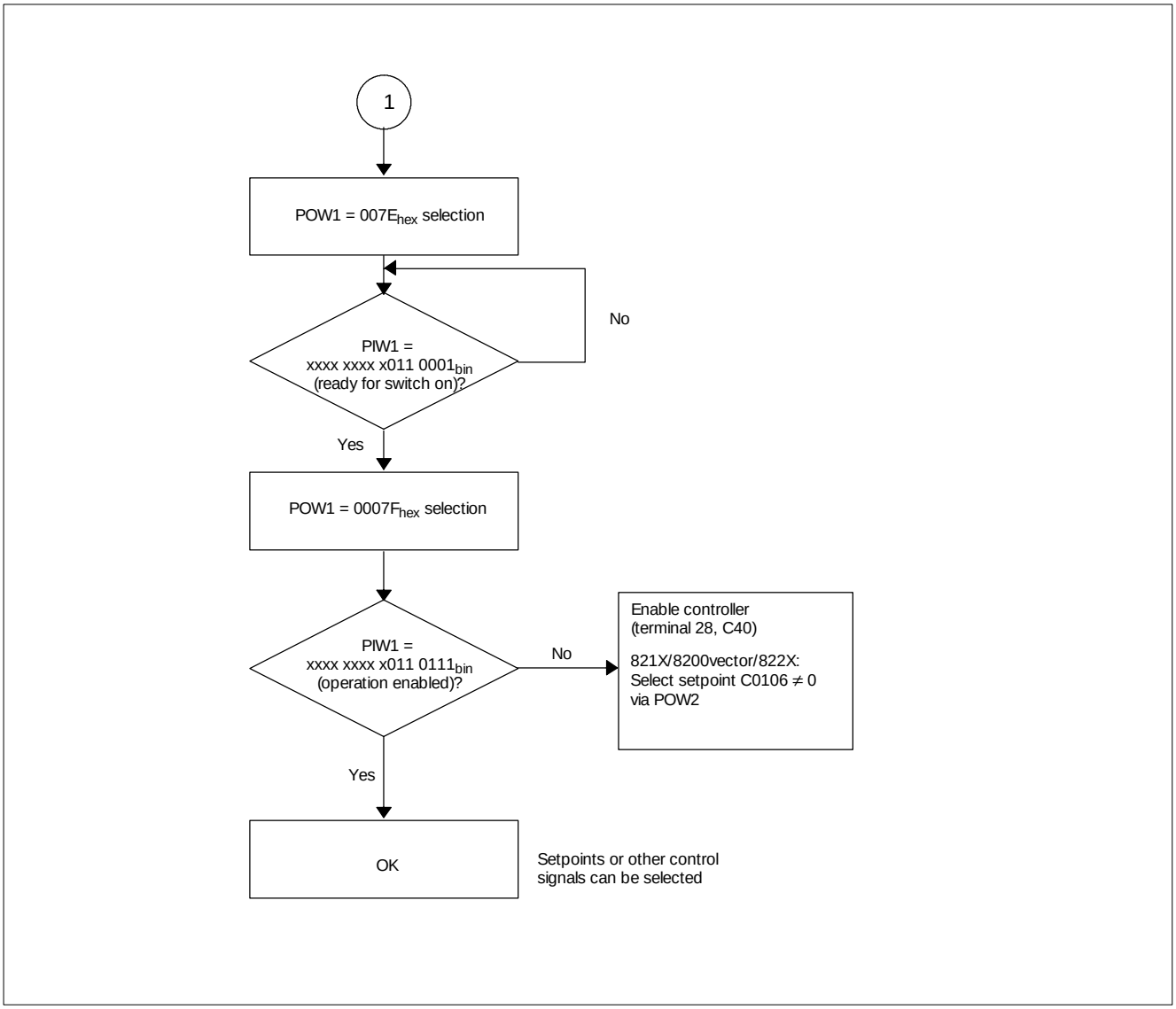


Fig. 7-1 Elements of a troubleshooting tree

7.1 Controller is inhibited

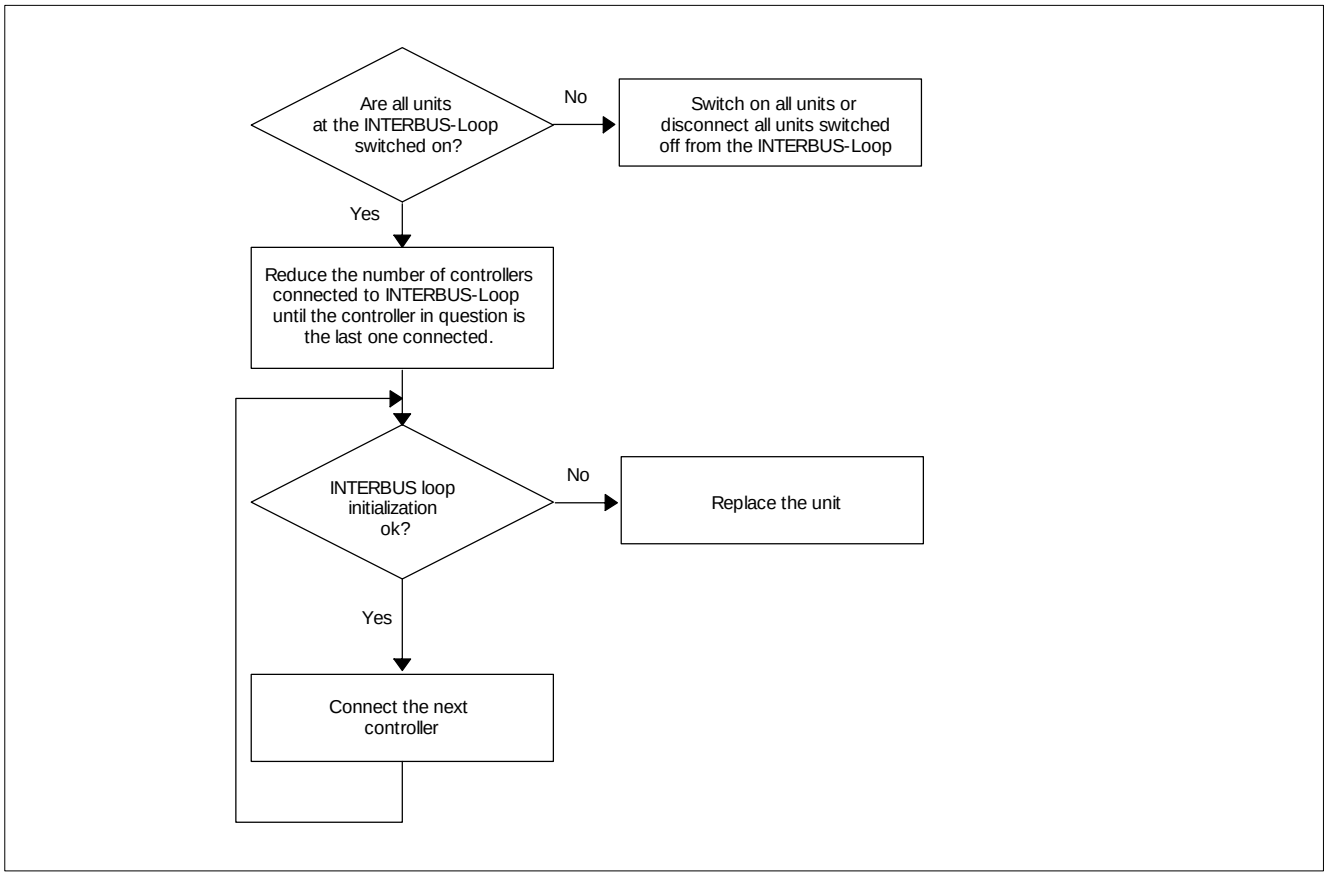
The controller cannot be enabled via INTERBUS-Loop process data, i.e. the status ”OPERATION ENABLED” will not be reached.




1
POW1 = 007E$_{hex}$ selection
PIW1 =
xxxx xxxx x011 0001$_{bin}$
(ready for switch on)?
No
Yes
POW1 = 0007F$_{hex}$ selection
PIW1 =
xxxx xxxx x011 0111$_{bin}$
(operation enabled)?
No
Enable controller
(terminal 28, C40)
821X/8200vector/822X:
Select setpoint C0106 ≠ 0
via POW2
Yes
OK
Setpoints or other control
signals can be selected

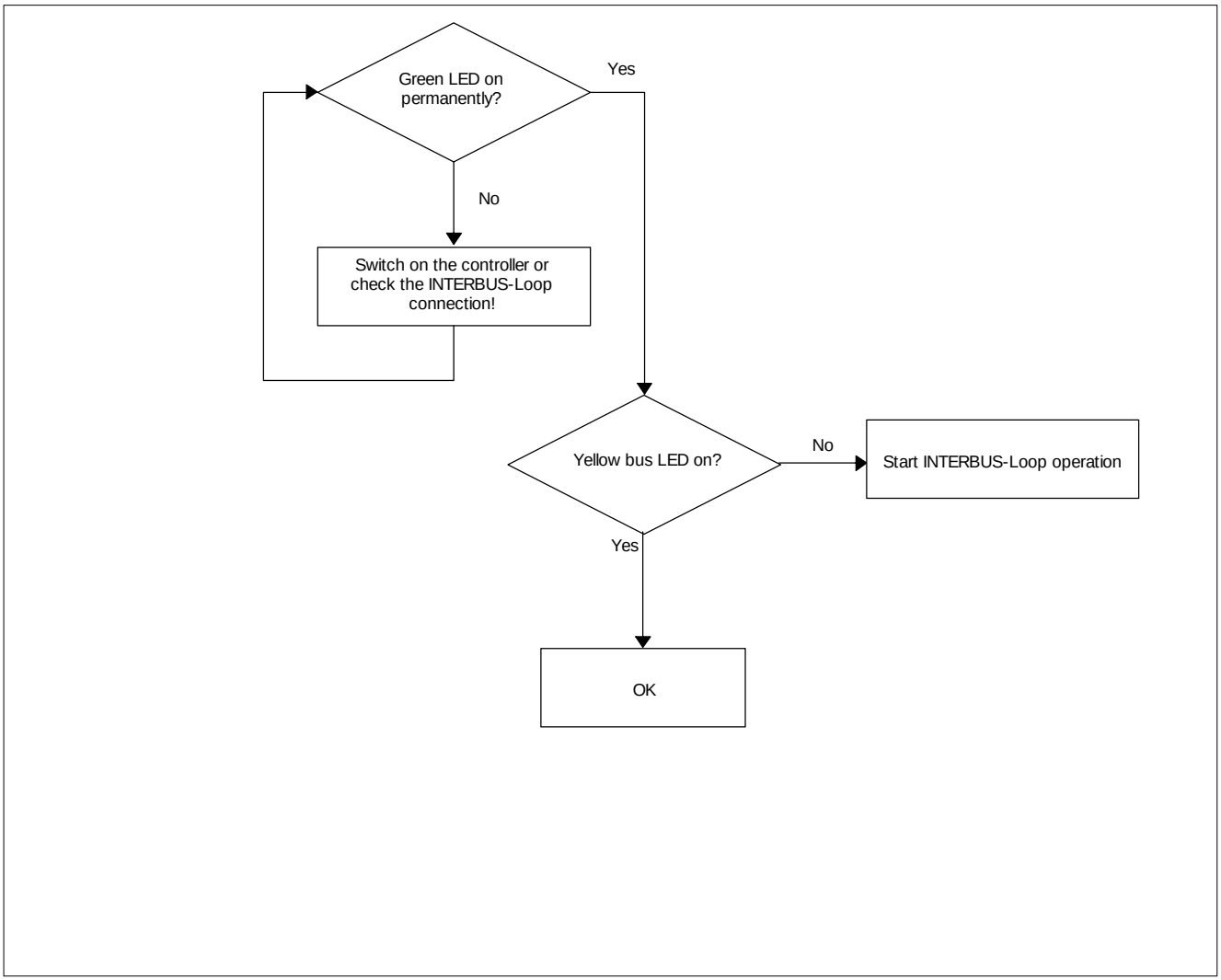
7.2 Check INTERBUS-Loop

Short test of the INTERBUS-Loop system in the event of faulty initialization. The diagnostics information of the INTERBUS-Loop fieldbus modules in the host must be considered.
For troubleshooting it can be reasonable to reduce the bus so that only one unit is connected to the INTERBUS-Loop.



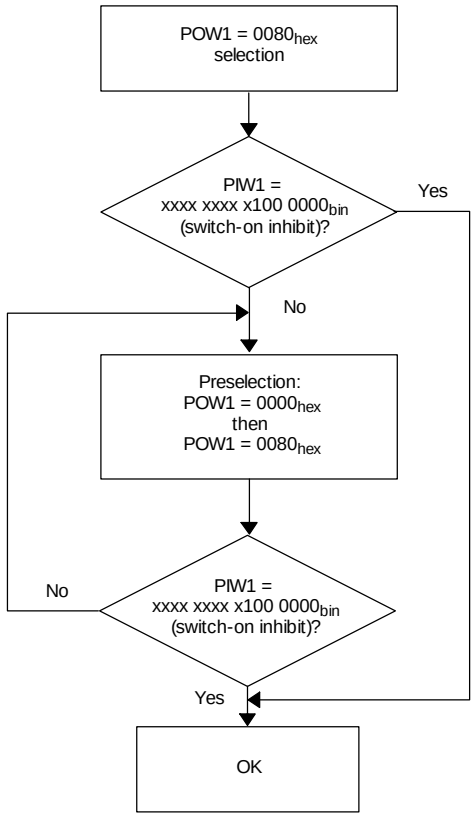
7.3 Activate fieldbus module

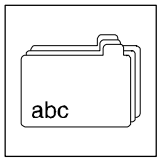
Activate the fieldbus module in connection with a controller.



7.4 Reset fault (TRIP)

Fault reset via INTERBUS-Loop process data.





8 Appendix

8.1 Accessories

In the following, you will find the accessory components for INTERBUS with the order information of Phoenix Contact:

Tip!

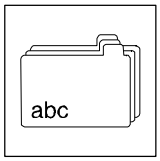
Please ask the manufacturer of the accessory components for the latest order information and the technical data.

Name	Order information of Phoenix Contact
Loop cable:	
• by the meter	• IBSSL SLC CU2/1.5 meter Order no. 2721620
• Bus terminal	• IBS SL 24 BK-D Order no. 2719551
Controls:	
For more information pleast contact the manufacturer.	

Contact addresses:

Phoenix Contact GmbH & CoKG
Flachsmarktstr. 8 - 28
D-32819 Blomberg
Phone: ++49 52 35 / 3-00
Fax: ++ 49 52 35 / 3-412 00
http://www.phoenixcontact.com

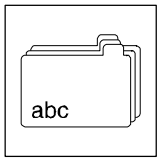
INTERBUS Club
Postfach 1108
D-32817 Blomberg
Phone: ++ 49 52 35 / 34 21 00
Fax: ++ 49 52 35 / 34 12 34
http://www.interbusclub.com



Appendix

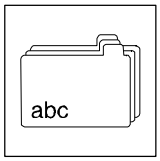
8.2 List of abbreviations

Abbreviation	Meaning
AIF	Automation Interface; interface between controller and automation or fieldbus modules. It also includes defined process data.
bin	Display of values in the binary character format (0,1).
Ctrl. enable	Controller enable
Ctrl. inhibit	Controller inhibit
DCB	DC-injection brake
EMC	Electromagnetic Compatibility
hex	Display of values in the hexadecimal character format (0, ..., 9, A, B, ..., F).
Imax	Current limit
IMP	Pulse inhibit
JOG	Fixed speed or input for activation of the fixed speed
LSB	Least Significant Bit; low-weighting bits of a binary value
PCD	Process data
PCP	Peripherials Communication Protocol
PE	Protective earth
PI-data	Process-input data
PIWx	Process-input word x from PROFIBUS: Reference point is the master, i.e. a word is transmitted from the controller to the master. “x“ characterizes the word address (starts with x = 1).
PO-data	Process-output data
POWx	Process-output word x to PROFIBUS: Reference point is the master; i.e. a word is transmitted from the master to the controller. “x“ characterizes the word address (starts with x = 1).
QSP	Quick stop
RFG	Ramp-function generator; setpoint integrator
TRIP	Operation fault
Vcc	Controlled constant voltage supply



8.3 Glossary

Technical term	Meaning
Acknowledgement	Acknowledgement of a setting or change (e. g. of parameters))
Application	as directed: Appropriate use of the machine according to the manufacturer's information or to common use because of its design and function. inappropriate The use of the machine which does not comply with the manufacturer's declaration.
Baud rate	Transmission speed of data in bit/s
Bus participant	Unit which communicates with the host via the bus
Bus terminal	Network node between long-distance and peripheral bus
Code	For input and display (access) of parameter values.
Code number	Clear labelling of a parameter, e.g. C0106.
Controller	General term for servo drives, frequency inverters and DC drives
Cycle time	The cycle time of the communication system is the time required for the exchange of all process data between the host and the field units (e.g. controllers).
Data format	Data description, consisting of the components data structure and data type.
DRIVECOM	Group of more than 30 drive manufacturers. They have created uniform communication solutions for power transmission. A result is a standardized drive profile „DRIVECOM profile drive technology 21“ (see Profile).
Fieldbus	For the exchange of data between higher-level controls (hosts) and positioning controls (e. g. controllers).
Host	PC or PLC
Icon	Sign or symbol with an unambiguous message.
Index	Parameter number according to the PROFIBUS and DRIVECOM definitions. If a parameter comprises several values (e.g. arrays and records), they are addressed by an additional subindex.
InterBus	Serial bus system of Phoenix Contact
Lenze code number	see code number
Master	see host/host system
Network topology	Design and structure of a network: e.g. point-to-point network, line network, ring network)
Parameter	Adjustable controller variables and values addressable via codes
Peripheral-bus module	Bus participant in the peripheral bus
Peripheral-bus station	Consists of bus terminal, peripheral-bus module and long-distance bus controller.
Process data	Small amounts of data (e.g. 2 bytes, DRIVECOM) for fast and cyclic transmission; e.g. setpoints and actual values
Process-data channel	Communication channel for fast and cyclic transmission of process data
Profile	The word „profile“ originates from the communication standard DIN 19245 and describes supplementary and restrictive regulations, which are valid for industry groups or device groups. The DRIVECOM-Nutzergruppe e. V. has standardized some important unit functions and summarized the results in the „DRIVECOM profile drive technology 21“.
Slave	Bus participant which is only allowed to transmit data after a request by a master. For instance, controllers are slaves. (See host/host system)



8.4 Table of keywords

Figures

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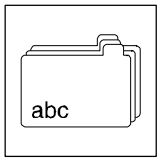

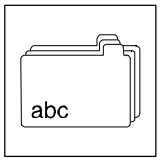

Appendix

Appendix