Instructions for Use

COMBIVERT G6

Controlboard MODBUS

Translation of the original manual

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Impressum

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1 Introduction

The described devices, accessories, hardware and/or software are products of KEB Automation KG. The enclosed documents correspond to conditions valid at printing. Misprint, mistakes and technical changes reserved.

1.1 Markings

1.1.1 Warnings

Certain operations can cause hazards during the installation, operation or thereafter. There are safety informations in the documentation in front of these operations.

Warnings contain signal words for the severity of the hazard, the type and/or source of the hazard, the consequence of non-compliance and the measures to avoid or reduce the hazard.

⚠ DANGER

Type and/or source of the hazard.

Leads to death or serious bodily injury if not observed.

a) Measures to avoid the hazard.

b) Can be supplemented by an additional danger sign or pictogram.

⚠ WARNING

Type and/or source of the hazard.

May cause death or serious injury if not observed.

a) Measures to avoid the hazard.

b) Can be supplemented by an additional danger sign or pictogram.

⚠ CAUTION

Type and/or source of the hazard.

May cause bodily injury if not observed.

a) Measures to avoid the hazard.

b) Can be supplemented by an additional danger sign or pictogram.

NOTICE

Type and/or source of the hazard.

Can cause damage to property if not observed.

a) Measures to avoid the hazard.

b) Can be supplemented by an additional danger sign or pictogram.

1.1.2 Information notes

Indicates to the user a special condition, prerequisite, scope or simplification.

This is a reference to further documentation with barcode for smartphones and link for online users.

https://www.keb.co.uk/nc/search

Notes on conformity for use in the North American or Canadian market.

1.1.3 Symbols and markers

✓ Condition

a) Action step

⇨ Result or intermediate result

=> Cross-reference to a chapter, page or picture

Hyperlink

<Steuercode>

Lexicon entry

1.2 Laws and guidelines

KEB Automation KG confirms with the CE mark and the EU declaration of conformity, that our device complies with the essential safety requirements.

The EU declaration of conformity can be downloaded on demand via our website.

1.3 Warranty and liability

The warranty and liability on design, material or workmanship for the acquired device is given in the general conditions of sale.

Here you will find our general sales conditions.

https://www.keb.co.uk/terms-and-conditions

Further agreements or specifications require a written confirmation.

1.4 Support

Through multiple applications not every imaginable case has been taken into account. If you require further information or if problems occur which are not treated detailed in the documentation, you can request the necessary information via the local KEB Automation KG agency.

The use of our units in the target products is beyond of our control and therefore exclusively the responsibility of the customer**.**

The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the intended use. However, they are considered for information only without responsibility and changes are expressly reserved, in particular due to technical changes. This also applies to any violation of industrial property rights of a third-party.

Selection of our units in view of their suitability for the intended use must be done generally by the user.

Tests can only be carried out within the scope of the intended end use of the product (Application**) by the** Customer**. They must be repeated, even if only parts of hardware, software or the unit adjustment are modified.**

1.5 Copyright

1.6 Validity of this manual

This part of the instruction manual describes the implemented control card. It

- is only valid in conjunction with the instructions for use of the power part.
- contains only supplementary safety instructions.
- if certain functions or properties are version-dependent, this is indicated at the appropriate place. The version number of the COMBIVERT can be found in brackets after the material number.

1.7 Target group

The instructions for use is determined exclusively for electrical personnel. Electrical personnel for the purpose of this instruction manual must have the following qualifications:

- Knowledge and understanding of the safety instructions.
- Skills for installation and assembly.
- Start-up and operation of the product.
- Understanding of the function in the used machine.
- Detection of hazards and risks of the electrical drive technology.
- Knowledge of IEC 60364.
- Knowledge of national safety regulations (e. g. DGUV Regulation 3.

2 General Safety Instructions

The products are developed and built according to the state of the art and recognized safety rules. Nevertheless, their use may create dangers to life and limb of the user or third parties or damage to the machine and other material property.

The following safety instructions have been created by the manufacturer for the area of electric drive technology. They can be supplemented by local, country- or application-specific safety instructions. This list is not exhaustive. Non-observance of the safety instructions by the customer, user or other third party leads to the loss of all resulting claims against the manufacturer.

NOTICE

Hazards and risks through ignorance!

a) Read the instructions for use.

b) Observe the safety and warning instructions.

c) Ask if something is unclear.

2.1 Installation

⚠ DANGER

Electrical voltage at terminals and in the device!

Danger to life due to electric shock !

✓ For any work on the device

a) Switch off the supply voltage.

b) Secure it against switching on.

c) Wait until all drives has been stopped in order that no regenerative energy can be generated.

d) Await capacitor discharge time (min. 5 minutes). Measure DC voltage at the terminals.

e) Never bridge upstream protective devices. Also not for test purposes.

NOTICE

Use of unsuitable voltage sources!

Electric Shock!

a) Use for the connection only suitable voltage sources with safe isolation (SELV/PELV) in accordance with VDE 0100 with nominal voltage of DC 24 V ±10 %.

b) Pay attention on a sufficient overvoltage category of the voltage supply.

c) With existing or newly wired circuits the person installing the units or machines must ensure that the PELV requirements are met.

For a trouble-free and safe operation, please pay attention to the following instructions:

- The electrical installation shall be carried out in accordance with the relevant requirements.
- Cable cross-sections and fuses must be dimensioned by the user according to the specified minimum/maximum values for the application.
- For drive converters that are not isolated from the supply circuit (in accordance with EN 61800-5-1) all control lines must be included in other protective measures (e.g. double insulation or shielded, earthed and insulated).
- When using components without isolated inputs/outputs, it is necessary that equipotential bonding exists between the components to be connected (e.g. by the equipotential line). Disregard can cause destruction of the components by equalizing currents.

2.2 Start-up and operation

The start-up (i.e. the starting of normal operation) is prohibited until the machinery has been proved to conform to the provisions Directive 2006/42/EG and Directive 2014/30/EU; EN 60204-1 must be observed.

⚠ WARNING

Wrong parameterization

Unintentional behaviour of the drive

✓ During initial start-up or replacement of the drive controller

a) Secure motors against automatic restart.

b) Check whether the appropriate parameter list for the application has been imported.

⚠ WARNING

Software protection functions as sole protection.

Protection function in case of software problems without function.

✓ Securing a unit solely with software-supported functions is not sufficient.

a) Install external protective measures (e.g. limit switch) that are independent of the drive controller.

2.3 Maintenance

⚠ DANGER

Unauthorized exchange, repair and modifications

Unpredictable malfunctions

a) The function of the drive controller is dependent on its parameterization. Never replace without knowledge of the application.

b) Modification or repair is permitted only by KEB Automation KG authorized personnel.

c) Only use original manufacturer parts.

d) Infringement will annul the liability for resulting consequences.

3 Product description

3.1 Functional description

This manual describes the software extension of the control board COMBIVERT G6 with MODBUS.

It is based on the standard control board analog/digital. It is designed to be used on any G6 with or without STO functions.

This manual describes the fieldbus parameter group and the behaviour of the MODBUS driver.

All DIN666019II behaviours and services comply with the G6 standard analog/digital. For more information, see the documentation on DIN66019II.

3.2 Validity

The described software is only valid for devices with material number in accordance with the following key:

xxG6CDx-YSxx

The assignment of the firmware depends on the hardware of the power unit:

Power unit hardware	**Power unit code Config-ID**	**Control board firmware MODBUS Config-ID 160212**
U/F 7137	5424 / 5425	1.2.0.x / 1.3.0.x
U/F 7084	5888 / 5889	1.2.1.x / 1.3.1.x

3.3 Hardware description

The D-Sub DE-9 socket (X4A) is intended for the connection to DIN66019II or MODBUS. The socket supports the RS232 or alternatively the RS485 transmission standard. All other connections correspond to the standard control board analog/digital.

The following figure shows the assignment of the interface X4A:

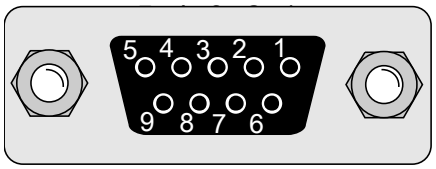

Fig. 1: D-Sub DE-9 socket

1 reserved	2 TxD (RS232)
3 RxD (RS232)	4 RxD-A (RS485)
5 RxD-B (RS485)	6 reserved
7 DGND (reference potential)	8 TxD-A (RS485)
9 TxD-B (RS485)	

The protocol of the interface can be switched between MODBUS and DIN 66019II by parameter or via an input.

4 MODBUS functions

4.1 Supported functions

The KEB G6 MODBUS interface supports the following functions defined in the Modbus standard:

- 3: 'Reading Holding Registers'
- 4: 'Reading Input Registers' *(for KEB, identical to function 3)*
- 6: 'Preset Single Register'.
- 16: 'Preset Multiple Registers'.

These functions only support 16-bit access to parameters.

Therefore, two additional functions for accessing 32-bit parameters were created:

- 100: 'Read Registers 32':
  Reading multiple 32 bit registers (indirect set addressing through Fr09)
- 101: 'Write Registers 32':
  Writing multiple 32 bit registers (indirect set addressing through Fr09). For those function the datagram building is similar to 3 / 16 functions.

4.2 Parameter addressing

The addresses of the parameters (register) are divided into different groups. Each of those groups has its own accessing method:

- **0000(hex)…1FFF(hex)**:
  This group is defined to access to mapping parameters. Parameters are set up to be redirected to the mapping list.
- **2000(hex)…5EFF(hex)**:
  In this address area the parameters of the inverter control board are mapped by a fixed algorithm. Please keep in mind that in this address area access is done with indirect set addressing (with Fr09). This means when writing/reading one parameter in different sets you have to set the set indicator (Fr09) previously before access.
- **5F00(hex)…5FFF(hex):**
  This block consists of the operator parameters.

4.3 Watchdog function

The MODBUS driver supports fieldbus monitoring. With regard to the settings Pn05 and Pn06, the watchdog is controlled via the MODBUS communication.

This function only starts after the first valid datagram exchange.

5 Parameter description

5.1 OS group: Operator system

The settings in this group correspond to the G6 standard version. Please refer to the G6 standard documentation for a further description.

5.2 Fb group: Fieldbus parameters

These parameters set the fieldbus interface.

This group is available on the display and via a PC connection.

5.2.1 Fb00 Protocol selector

Selector to set the requested protocol:

- 0: DIN66019II
- 1: Modbus
- 2: DIN66019II is selected by input activation. Input is selectable on parameter Fb01.

Lower limit	Upper limit	Standard value	Unit
0	2	0	-

5.2.2 Fb01 DIN66019II input select.

Input selection to activate/deactivate DIN66019II instead of MODBUS.

If the function is set to "0 = off", the DIN66019II cannot be selected by input.

Lower limit	Upper limit	Standard value	Unit
0: off	7: RST	1: I1	-

5.2.3 Fb02 Current protocol

Specifies the current protocol for the D-Sub DE-9 port.

0: DIN66019II

1: MODBUS

Lower limit	Upper limit	Standard value	Unit
0	1	0	-

5.2.4 Fb03 MODBUS node ID

Slave address for MODBUS protocol only.

Lower limit	Upper limit	Standard value	Unit
0	239	1	-

5.2.5 Fb04 MODBUS baud rate

D-Sub DE9 transmission speed. Value is reset to default if parameter os15 (Store diag. baudrate) is not set to 'On'.

Lower limit	Upper limit	Standard value	Unit
0: 1.2	8: 100.0	5: 38.4	kBaud

5.2.6 Fb10 MODBUS config

Configures the MODBUS interface protocol.

B7	B6	B5	B4	B3	B2	B1	B0
RTU/ AS-CII	Parity		-	-	-	-	-

Bit 7	1	MODBUS RTU
	0	MODBUS ASCII (not supported yet)

Bit 5/6	00	8 data bits / no parity bit / 2 stop bits
	01	8 data bits / odd parity bit / 1 stop bit
	10	8 data bits / even parity bit / 1 stop bit

Lower limit	Upper limit	Standard value	Unit
0	255	192	-

5.2.7 Fb11 Reading map size

Defines the mapping buffer size for parameter reading.

Lower limit	Upper limit	Standard value	Unit
1	100	2	-

5.2.8 Fb12 Writing map size

Defines the mapping buffer size for parameter writing.

Lower limit	Upper limit	Standard value	Unit
1	100	2	-

5.2.9 Fb13 Read map index

Set the pointer to read mapping buffer to be displayed on Fb14.

Lower limit	Upper limit	Standard value	Unit
0	99	0	-

5.2.10 Fb14 Read map

Value stored into the read mapping buffer at the Fb13 position.

Lower limit	Upper limit	Standard value	Unit
0	FFFFFFFFh	0	-

5.2.11 Fb15 Write map index

Set the pointer to write mapping buffer to be displayed on Fb16.

Lower limit	Upper limit	Standard value	Unit
0	99	0	-

5.2.12 Fb16 Write map

Value stored into the write mapping buffer at the Fb15 position.

Lower limit	Upper limit	Standard value	Unit
0	FFFFFFFFh	0	-

5.2.13 Fb20 diag response delay time

Specifies the permissible delay time for a diagnostic response in ms.

Lower limit	Upper limit	Standard value	Unit
0	126	0	ms

6 Revision History

Edition	Version	Note
2012-09-03	-	First creation
2012-09-19	-	New functions of version 1.1.0.0 added.
2013-01-31	-	New parameters of version 1.2.x.0 added.
2023-01-31	00	Revision to version 1.3.x.0; Parameter Fb05 removed; Fb20 added.

Glossary

Application

The application is the intended use of the KEB product.

COMBIVERT

Proper name for a KEB Drive Controller

Customer

The customer has purchased a product from KEB and integrates the KEB product into his product (customer product) or resells the KEB product (re-seller).

Directive 2006/42/EC

Machinery Directive

Directive 2014/30/EU

Electromagnetic Compatibility (EMC) Directive

EN 60204-1

Safety of machinery - Electrical equipment of machines - Part 1: General requirements (VDE 0113-1, IEC 44/709/CDV).

EN 61800-5-1

Adjustable speed electrical power drive systems. Part 5-1: Safety requirements - Electrical, thermal and energy requirements (VDE 0160-105-1, IEC 61800-5-1)

MODBUS

The MODBUS protocol is an open communication protocol based on a client/server architecture. It is part of the IEC 61158 standard. MODBUS is a trademark of SCHNEIDER ELECTRIC USA, INC.

PELV

Safe protective extra-low voltage (earthed).

RS232

RS-232 is a standard of a physical interface for asynchronous, serial data transmission.

RS485

RS-485 is an industry standard according to EIA-485 for a physical interface for asynchronous, serial data transmission.

SELV

Safe protective extra-low voltage (unearthed; <60V).

Notes

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