COMBIVERT **G6**

PROGRAMMING MANUAL | **CONTROL G6 IO-LINK**

Translation of the original manual
Document 20100117 EN 03

Preface

The hardware and software described in this document are products of KEB. The information contained in this document is valid at the time of publishing. KEB reserves the right to update this document in response to misprints, mistakes or technical changes.

Signal words and symbols

Certain procedures within this document can cause safety hazards during the installation or operation of the device. Refer to the safety warnings in this document when performing these procedures. Safety signs are also located on the device where applicable. A safety warning is marked by one of the following warning signs:

⚠ DANGER	Dangerous situation, which will cause death or serious injury iif this safety warning is ignored.
⚠ WARNING	Dangerous situation, which may cause death or serious injury if this safety warning is ignored.
⚠ CAUTION	Dangerous situation, which may cause minor injury if this safety warning is ignored.
NOTICE	Situation, which can cause damage to property if this safety warning is ignored.

RESTRICTION

Used when the following statements depend on certain conditions or are only valid for certain ranges of values.

Used for informational messages or recommended procedures.

More symbols

►	This arrow starts an action step.
• / -	Enumerations are marked with dots or indents.
=>	Cross reference to another chapter or another page.

Note to further documentation.
https://www.keb-automation.com/search

Laws and guidelines

KEB Automation KG confirms with the EC declaration of conformity and the CE mark on the device nameplate that it complies with the essential safety requirements.

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

Warranty and liability

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

Here you will find our general sales conditions.
https://www.keb-automation.com/terms-conditions

Further agreements or specifications require a written confirmation.

Support

Although multiple applications are referenced, not every case has been taking into account. If you require further information or if problems occur which are not referenced in the documentation, you can request the necessary information via the local KEB agency.

The use of our units in the target products is outside of our control and therefore lies exclusively in the area of 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 regarded as being only informal 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 done within 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.

Copyright

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1 Basic Safety Instructions

The products are designed and constructed in accordance with state-of-the-art technology and the recognized safety rules and regulations. However, the use of such devices may cause functional hazards for life and limb of the user or third parties, or damages to the system 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. Violation 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!

► Read the instructions for use!

► Observe the safety and warning instructions!

► If anything is unclear, please contact KEB Automation KG!

1.1 Target group

This instruction manual 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 *DIN IEC 60364-5-54*.
- Knowledge of national safety regulations.

1.2 Validity of this manual

This manual describes the control part IO-Link of the COMBIVERT G6.
The manual

- contains only supplementary safety instructions.
- is only valid in connection with the power unit manual of COMBIVERT G6.

1.3 Electrical connection

⚠ DANGER

Voltage at the terminals and in the device!

Danger to life due to electric shock !

- ► For any work on the unit switch off the supply voltage and secure it against switching on.
- ► Wait until the drive has stopped in order, that perhaps regenerative energy can be generated.
- ► Wait untill the DC-Link capacitors are discharged (5 minutes). Verify by measuring the DC voltage at the terminals.
- ► Never bridge upstream protective devices (also not for test purposes).

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 accordly to the specified minimum / maximum values for the operation.
- Within systems or machines the person installing electrical wiring must ensure that on existing or new wired safe ELV circuits the EN requirement for safe insulation is still met!
- 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.

1.4 Start-up and operation

The start-up (i.e. for the specified application) is forbidden until it is determined that the installation complies with the machine directive; account is to be taken of *EN 60204-1*.

⚠ WARNING

Software protection and programming!

Hazards caused by unintentional behavior of the drive!

- ► Check especially during initial start-up or replacement of the drive controller if parameterization is compatible to application.
- ► Securing a unit solely with software-supported functions is not sufficient. It is imperative to install external protective measures (e.g. limit switch) that are independent of the drive controller.
- ► Secure motors against automatic restart.

2 Product Description

2.1 Product features

These instructions for use describe the power units of the following devices:

Device series:	COMBIVERT G6
Hardware:	IO-Link

2.2 Overview of functions

2.2.1 Overview of functions

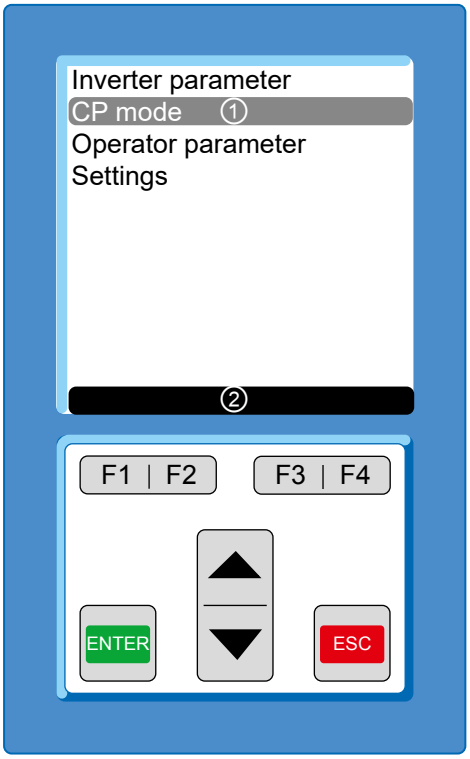
The control provides the following functions:

- Hardware-installed supply of digital and analog inputs and outputs.
- Diagnostic interface
- Ethernet based fieldbus interface (EtherCAT / Varan)
- CAN fieldbus interface
- KTY interface
- Brake control
- STO functionality
- Status LEDs

3 LC Display Operation

For optional assembly of the LC display.

3.1 Control elements



Name	Function
①	Menu bar
②	Function bar
F1	Function key 1
F2	Function key 2
F3	Function key 3
F4	Function key 4
▲	Menu bar up or increase parameter value
▼	Menu bar down or decrease parameter value
ENTER	select / confirm
ESC	return to the superordinate menu

Figure 1: Control elements

3.1.1 Description of control elements

3.1.1.1 Menu bar

The menu bar shows the current selection in the menu. It can be moved with the ▲ and ▼ keys. Press Enter to change to the subordinate operating level, ESC to return to the next higher operating level.

3.1.1.2 Function keys and toolbar

The function keys F1...F4 are variable assigned depending on the menu item. The toolbar displays current assignment of the function keys F1...F4.

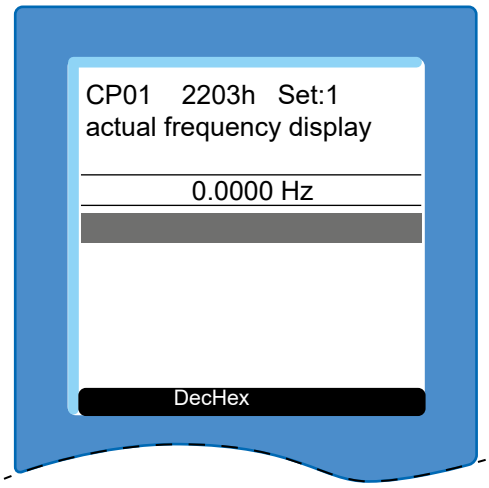
The keys can have the following assignment:

Display	Function
DecHex	Display changes between decimal and hexadecimal display
Menu	jumps to the main menu
Up	jumps to the top of the current page, repeated pressing scrolls back one page
Down	jumps to the end of the current page, repeated pressing scrolls forward to the next page

Table 1: Assignment of the function keys

3.2 Initial start-up

3.2.1 Switch on



At the first switch on with factory setting the operator indicates the actual frequency in the customer parameter menu (CP mode).
To make the basic settings change to the main menu as follows:

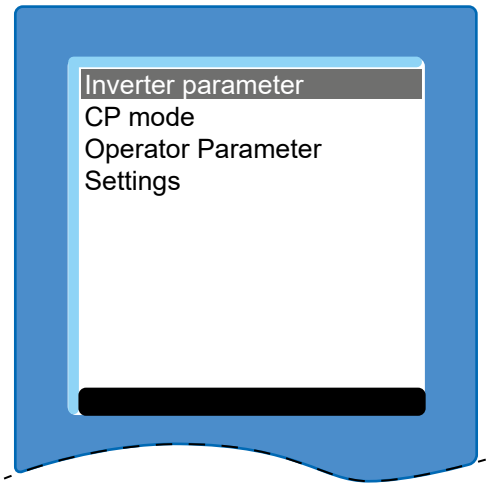
<ESC> → changes to the parameter selection

<F1> → jumps to the main menu

Figure 2: Switch-on display

The startup menu can be defined under “Start mode”.

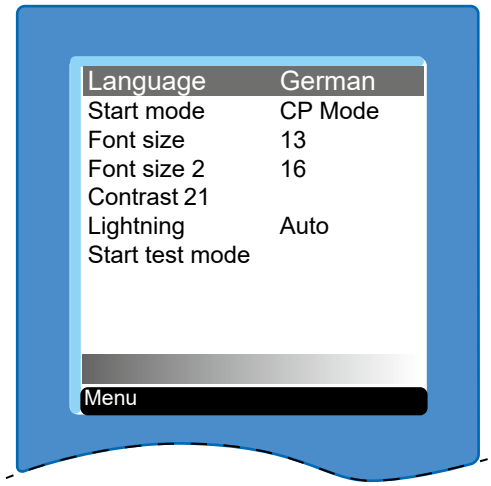
3.2.2 Main menu



The main menu is the top-level menu. With the keys <▲> and <▼> select the desired submenu. Press <ENTER> to jump to the selected submenu.

Figure 3: Main menu

4 Initial settings



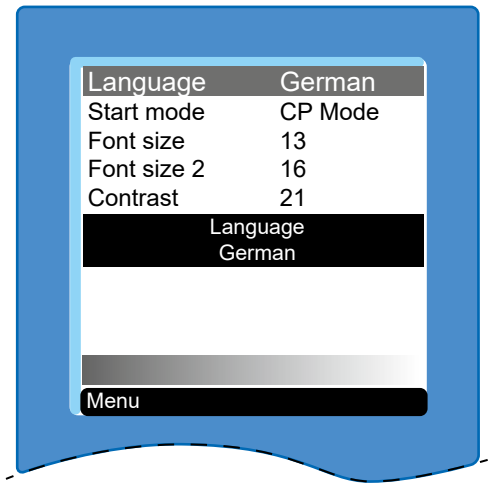
To adjust the display to the individual needs select "Settings" in the main menu and confirm with <ENTER>.

With the keys <▲> and <▼> select the desired function.

Press <ENTER> to switch into the input mode to change the parameter value.

Figure 4: Initial settings

4.1 Change language



Press <ENTER> to switch into the input mode to change the parameter value. With the keys <▲> and <▼> select one of the following languages:

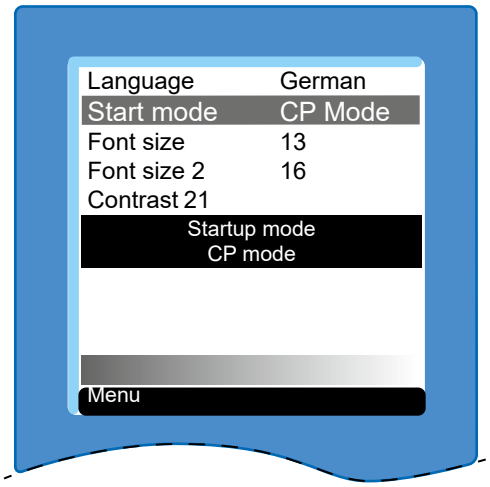
- German
- English
- Espanõl
- Russian
- Italiano
- Francais
- American

<ENTER> selects the desired language and jumps back into the "Settings" sub-menu.

Figure 5: Change language

The parameters are displayed in English if the selected language is not available.

4.2 Startup mode



The startup mode determines which display appears at switch on.

Press <ENTER> to switch into the input mode to change the parameter value.

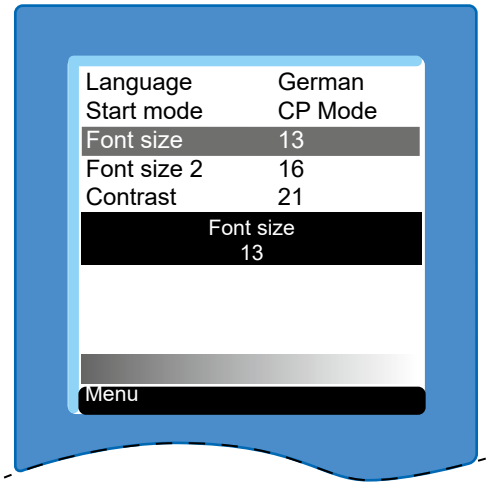
With the keys <▲> and <▼> select one of the following home screens:

- Inverter parameter
- CP Mode (customer parameter)
- Operator parameter
- Settings

<ENTER> selects the desired startup screen and jumps back into the "Settings" submenu.

Figure 6: Set start mode

4.3 Set font size and font size 2



The font size determines the complete menu view in the display except for the font size 2 (see below).

Press <ENTER> to switch into the input mode to change the parameter value.

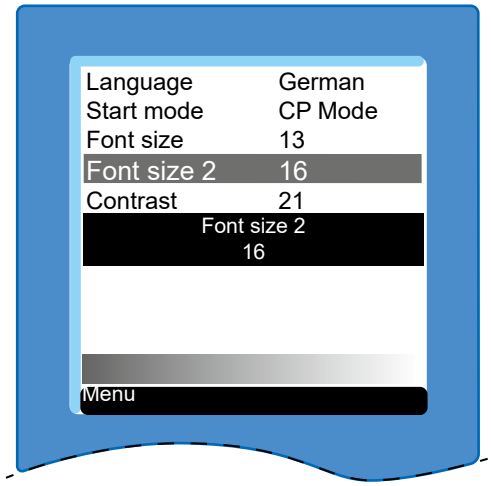
With the keys <▲> and <▼> select one of the following font sizes:

- 8, 10, 13, 16, 24

<ENTER> selects the desired font size and jumps back into the "Settings" submenu.

The display will only be updated after a change of the menu.

Figure 7: Set font size



The font size 2 determines the display size of the parameter values in CP mode.

Press <ENTER> to switch into the input mode to change the parameter value.

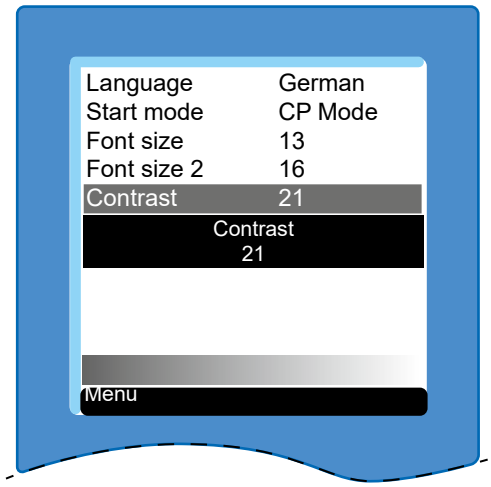
With the keys <▲> and <▼> select one of the following font sizes:

- 8, 10, 13, 16, 24

<ENTER> selects the desired font size and jumps back into the "Settings" sub-menu.

Figure 8: Set font size 2

4.4 Contrast settings



Sets the contrast level of the LC display.

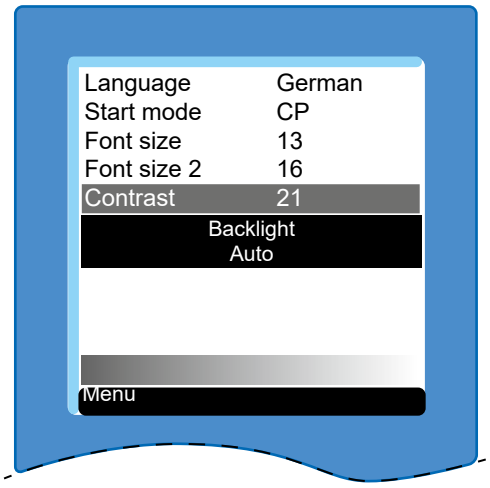
Press <ENTER> to switch into the input mode to change the parameter value.

With the keys <▲> and <▼> set the contrast level from 0...50. Use the contrast bar on the bottom of the toolbar to control the settings.

<ENTER> stores the specified contrast setting and returns to the "Settings" sub-menu.

Figure 9: Contrast settings

4.5 Setting the backlight of the display



The menu item "Lighting" defines the behavior of the backlight of the LC Display.

Press <ENTER> to switch into the input mode to change the parameter value.

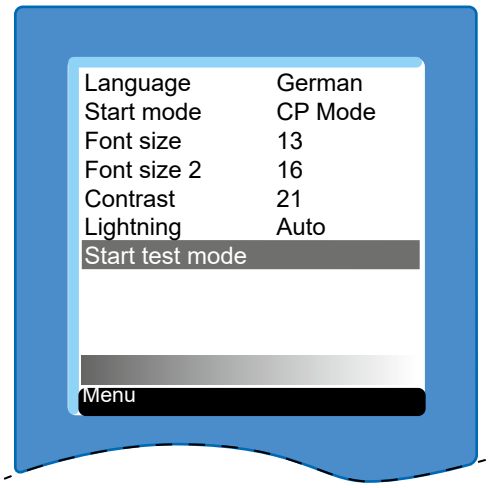
With the keys <▲> and <▼> select one of the following settings:

- on → generally on
- off → generally off
- auto → on when pressing a button; off after 10 seconds of non-operation

<ENTER> selects the desired backlight and jumps back into the "Settings" submenu.

Figure 10: Backlight settings

4.6 Functional test of keyboard and display

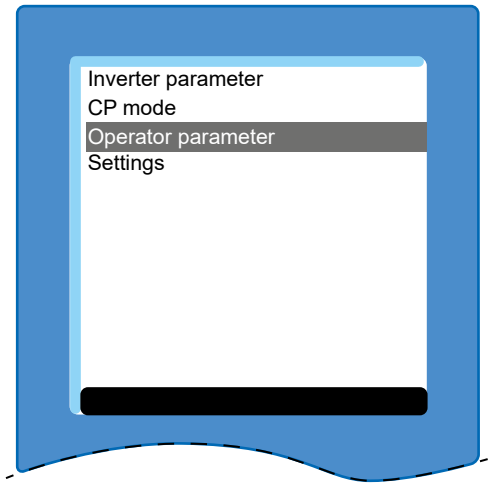


<ENTER> starts a test mode, which allows you to test the function of each button and the LCD display.

Follow the instructions on the screen during the test run.

Figure 11: Functional test of keyboard and display

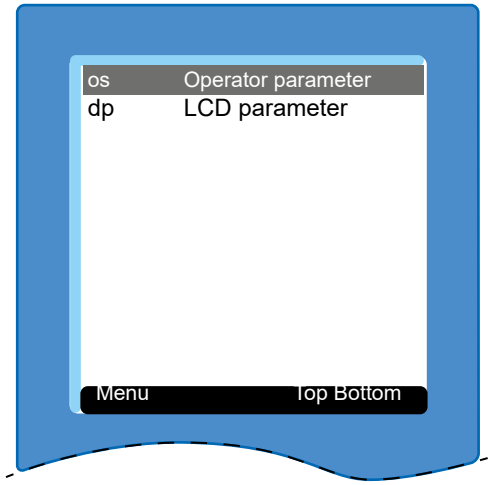
5 Operator Parameters



Use the operator parameters to configure the control card, the fieldbus (if available) and the display.

With the keys < ▲> and <▼> select "Operator parameter" and confirm with <ENTER>.

Figure 12: Operator parameters



The control card parameters are divided into two groups:

- os - operator system parameters; Display and setting of the control card
- dp - LC display parameter; Configuration of the LC display via bus

With the keys <▲> and <▼> select the corresponding parameter group.

<ENTER> switches to the selected submenu.

Figure 13: Select control board parameter group

5.1 Parameters for LC display setting

The settings of the LC parameters are completely accepted from the LC display only after restarting the device.

Id-Text	Name	Parameter index
dp00	Language	0x2780
Meaning	A language is selected for the menu and the parameters. The parameters are displayed in English if the selected language is not available.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: English 1: German 2: American 3: France 4: Italian 5: Russian 6: Spanish Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
dp01	Startup mode	0x2781
Meaning	The startup mode determines the menu item after initialization of the control.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: Inverter parameters 1: CP mode 2: Operator parameters 3: Menu Standard value: 1	
Note	–	

Id-Text	Name	Parameter index
dp02	Font size	0x2782
Meaning	It can be selected between font sizes 8.10.13.16 and 24 in the display. Exception: see parameter „font size 2“	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	8: 8dpi 10: 10dpi 13: 13dpi 16: 16dpi 24: 24dpi Standard value: 13	
Note	–	

Id-Text	Name	Parameter index
dp03	Font size 2	0x2783
Meaning	The font size for the display of parameter values is specified in the CP mode.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	8: 8dpi 10: 10dpi 13: 13dpi 16: 16dpi 24: 24dpi Standard value: 16	
Note	–	

Id-Text	Name	Parameter index
dp04	Contrast	0x2784
Meaning	The contrast settings of the LC display can be changed to optimize readability.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...50 Standard value: 21	
Note	–	

Id-Text	Name	Parameter index
dp05	Backlight	0x2785
Meaning	The contrast settings of the LC display can be changed to optimize readability.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0 off Lighting of the LC display generally off. 1 on Lighting of the LC display generally on. 2 auto If the backlight is adjusted to "auto", it is switched on during pressing a key and switched off again after 10 seconds if no key is pressed. Standard value: 2	
Note	–	

6 IO-Link Interface

An IO-Link slave (device) interface is implemented according to the IO-Link specification V1.0. Cyclic process data (PDO) and acyclic parameter data (SPDU - service protocol data unit) are supported for accessing the parameters of the device.

The device does not support the standard IO mode (SIO mode). After the wake-up is immediately switched to the communication mode.

6.1 Identification

About the direct parameter data channel with Frame Type 0 the most important information for commissioning the communication can be read at startup:

Address	Parameter Name	Access	Implementation / reference	Description
Direct Parameter page 1				
0x00	Master-Command	W	Mandatory/ see B.1.2	Master command to switch to operating states (see NOTE 1)
0x01	MasterCycle-Time	R/W	Mandatory/ see B.1.3	Actual cycle duration used by the Master to address the Device. Can be used as a parameter to monitor Process Data transfer.
0x02	MinCycleTime	R	Mandatory/ see B.1.4	Minimum cycle duration supported by a Device. This is a performance feature of the Device and depends on its technology and implementation.
0x03	M-sequence Capability	R	Mandatory/ see B.1.5	Information about implemented options related to M-sequences and physical configuration
0x04	RevisionID	R/W	Mandatory/ see B.1.6	ID of the used protocol version for implementation (shall be set to 0x11)
0x05	ProcessDataIn	R	Mandatory/ see B.1.7	Number and structure of input data (Process Data from Device to Master)
0x06	ProcessData-Out	R	Mandatory/ see B.1.8	Number and structure of output data (Process Data from Master to Device)
0x07	VendorID 1 (MSB)	R	Mandatory/ see B.1.9	Unique vendor identification (see NOTE 2)
0x08	VendorID 2 (LSB)			
0x09	DeviceID 1 (Octet 2, MSB)	R/W	Mandatory/ see B.1.10	Unique Device identification allocated by a vendor
0x0A	DeviceID 2 (Octet 1)			
0x0B	DeviceID 3 (Octet 0, LSB)			

Table 2: Identification

Accessed via addresses 0000h (16 byte) and 0001h (16 byte) via SPDU possible.

Individual values are displayed as COMBIVIS parameters:

Id-Text	Name	Parameter index
fb03	Device identification	0x2183
Meaning	Device identification number	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0...FFFFFFh Standard value: 0	
Note	Any combination of G6 power unit config ID and control card config ID has its own deviceID (reference table)	

Id-Text	Name	Parameter index
fb05	IO-Link baud rate	0x2185
Meaning	Baud rate IO-Link bus	
Type	Variable	
Data length	8 bit	
Access	read	
Coding	1: 4.8 kBd (COM1) 2: 38.4 kBd (COM2) 3: 230.4 kBd (COM3) Standard value: 2: 38.4 kBd	
Note	Baud rate not changeable.	

An addressing of the device is not necessary, because IO-Link connections are always 1:1 connections with the master. A master can have multiple output ports.

6.2 IO-Link status and error message

The status of the IO-Link state machine is shown in the following parameters.

<table>
<tr><th>Id-Text</th><th>Name</th><th>Parameter index</th></tr>
<tr><td>fb01</td><td>DL-Status + Master Command</td><td>0x2181</td></tr>
<tr><td>Meaning</td><td colspan="2">Display for DL-status + master command</td></tr>
<tr><td>Type</td><td colspan="2">Variable</td></tr>
<tr><td>Data length</td><td colspan="2">8 bit</td></tr>
<tr><td>Access</td><td colspan="2">read</td></tr>
<tr><td>Coding</td><td colspan="2">
<table>
<tr><td>Bitmask</td><td>0xFF00</td><td>Bitmask</td><td>0X00FF</td></tr>
<tr><td>Name</td><td>DL status</td><td>Name</td><td>Master command</td></tr>
<tr><td>Sub-definitions</td><td>[5]</td><td>Sub-definitions</td><td>[5]</td></tr>
<tr><td>SIO</td><td>0</td><td>Fallback</td><td>90</td></tr>
<tr><td>CommStart</td><td>256</td><td>undefined</td><td>0</td></tr>
<tr><td>CommFinished</td><td>512</td><td>DeviceStartup</td><td>151</td></tr>
<tr><td>Startup</td><td>768</td><td>PD output operate</td><td>152</td></tr>
<tr><td>Operate</td><td>1024</td><td>DeviceOperate</td><td>153</td></tr>
</table>
Standard value: 0
</td></tr>
<tr><td>Note</td><td colspan="2">–</td></tr>
</table>

The following parameters are to assess the quality of bus communication:

<table>
<tr><th>Id-Text</th><th>Name</th><th>Parameter index</th></tr>
<tr><td>fb07</td><td>Transmitter overcurrent</td><td>0x2187</td></tr>
<tr><td>Meaning</td><td colspan="2">Display of overcurrent events at the transmitter</td></tr>
<tr><td>Type</td><td colspan="2">Variable</td></tr>
<tr><td>Data length</td><td colspan="2">8 bit</td></tr>
<tr><td>Access</td><td colspan="2">read / write</td></tr>
<tr><td>Coding</td><td colspan="2">0: no overcurrent
1: Overcurrent occurred

Standard value: 0</td></tr>
<tr><td>Note</td><td colspan="2">–</td></tr>
</table>

6.3 Frame types

The IO-Link specification defines different telegram types, which differ by the size of the process input and process output data.

For the buildup of the communication, the master must determine the communication parameters of the device. One of the relevant informations is the length of the process data. Based on this information, the IO-Link master decides which type of telegram for cyclic data exchange is used.In the phase of the communication setup the master uses the telegram type 0.

For the cyclic communication the G6 supports the frame type 1 in the "interleaved mode":

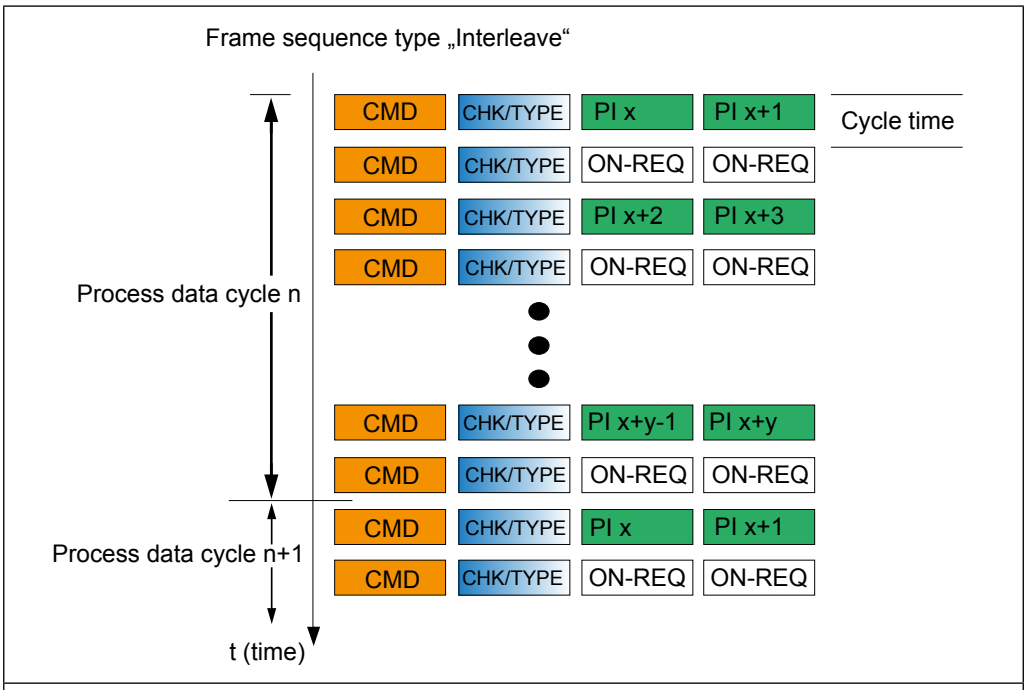


Figure 14: Interleaved mode

By that it also sent on-request data between the process data. If they are not needed, dummy commands are transmitted. Thus, a fixed process data cycle time is realized. At first the PD-Out data are transmitted, after that the PD-In data.

6.4 Parameterization data (SPDU)

The device parameters can be addressed via a 16-bit index plus 8-bit sub-index. About the subindex with the values 1...n each subindices or sets of parameters can be addressed.

About the subindex 0, all subindices 1...n addressed simultaneously. If at write access a value can not be written (e.g. because it is outside the valid value range), all others are still written. The first error message from several not possible write accesses is sent to the master.

Generally written will be only the corresponding data type byte (incl. value range checks), excess bytes are ignored. Exception when writing to subindex 0. In this case the number of bytes to be written are checked. When reading the correct data length is returned.

6.5 Process data

There are each 4 bytes of process data available per direction. The number can not be changed.

For each process data object a maximum of 4 objects can be mapped.

The data direction is described from the view of the process control (PLC, IPC, ...).

Process output data (PD Out) are data from the control to G6.

Process input data (PD In) are data from G6 to the control.

To activate the process data objects in the device, it is necessary to set the mapping of the process data by using the parameters defined in chapter 3.

The writing of the process output data (2 * 2 byte) and reading of process input data (2 * 2 byte) results in a cycle time of 18.4 ms.

If via the IO-Link master command (value 0x99) the output process data is set invalidated, the processing of the output process data in the power unit is stopped (PD Out Count is set to 0).

At switched off power unit, the last received PD in process data are sent. In addition, an event is generated, which marks the invalidity of the process data.

The number of the performed process data accesses is illustrated in the following parameters:

Id-Text	**Name**	**Parameter index**
fb02	Received PD Out	0x2182
Meaning	Number of received process output data (PD out)	
Type	Variable	
Data length	16 bit	
Access	read / write	
Coding	0...65535 Standard value: 0	
Note	–	

7 Process Data Mapping

The setting of the process data assignment is possible via the KEB-specific parameters (fb10-fb19). After successful adjustment of the process data mapping the process data can be processed by the G6 device.

After loading of the default values, a standard process data mapping is already set. The number of each mapped parameters (fb14, fb19) has to be written once (default value 2) to activate the process data. Then the numbers are stored non-volatile.

In addition, the IO-link master must release the output process data via the master command (value 0x98).

7.1 Output process data (manager => client)

Id-Text	Name	Parameter index
fb10	PD out index	0x218A
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	Default up to 4 parameter addresses to be used as process data. Only parameters may be used that are allowed as process data.	
Data length	16 bit	
Access	read / write	
Coding	0000h…7FFFh Standard value: 0000h	
Note	–	

Id-Text	Name	Parameter index
fb11	PD out subindex	0x218B
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	The value of the subindex determines the parameter set of the selected PD parameter.	
Data length	8 bit	
Access	read / write	
Coding	1...8 for subindex 1...8 (or rather set 0..7) Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
fb12	PD out offset	0x218C
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	Specifies the offset of occupancy in the process data field. Position of the value of the mapped parameter.	
Data length	8 bit	
Access	read / write	
Coding	0...3 Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
fb13	PD out type	0x218D
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	The value specifies the parameter type of the selected PD parameter.	
Data length	8 bit	
Access	read / write	
Coding	0: off (no parameter type defined) 1: Long (32bit) 2: Word (16bit) 3: Byte (8 bit) Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
fb14	PDO out count	0x218E
Meaning	Sets the number of PD out objects	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...4 Standard value: 0	
Note	Is automatically set to 0 when changing the parameters fb10... fb13.	

7.2 Input process data (client => manager)

Id-Text	Name	Parameter index
fb15	PD in index	0x218F
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	Default up to 8 parameter addresses to be used as process data. Only parameters may be used that are allowed as process data.	
Data length	16 bit	
Access	read / write	
Coding	0000h…7FFFh Standard value: 0000h	
Note	–	

Id-Text	Name	Parameter index
fb16	PD in subindex	0x2190
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...8		
Meaning	The value of the subindex determines the parameter set of the selected PD parameter.	
Data length	8 bit	
Access	read / write	
Coding	1...8 for subindex 1...8 (or rather set 0..7) Standard value: 1	
Note	–	

Id-Text	Name	Parameter index
fb17	PD in offset	0x2191
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	Specifies the offset of occupancy in the process data field. Position of the value of the mapped parameter.	
Data length	8 bit	
Access	read / write	
Coding	0...3 Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
fb18	PD in type	0x2192
Type	Array	
Subindex 0		
Meaning	Number of subindices of this object	
Data length	8 bit	
Access	read	
Coding	4 Standard value: 4	
Note	–	
Subindex 1...4		
Meaning	The value specifies the parameter type of the selected PD parameter.	
Data length	8 bit	
Access	read / write	
Coding	0: off (no parameter type defined) 1: Long (32bit) 2: Word (16bit) 3: Byte (8 bit) Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
fb19	PDO in count	0x2193
Meaning	Sets the number of PD in objects	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...4 Standard value: 0	
Note	Is automatically set to 0 when changing parameters fb15...fb18.	

8 Description File (IODD)

The description files „IO-Link Device Descriptions“ (IODDs) for G6 devices with IO-Link interface can be downloaded from the KEB homepage (*www.keb.de*) under the search term „IODD“. The IODDs comply with the specification of version 1.0.1.

A CiA402-compatible parameter description file can be found via the IODDfinder on the IO-Link homepage at *www.io-link.com*.

9 Fieldbus Watchdog

The fieldbus watchdog is a function in the IO-Link control board. It is used to trigger an error or warning in the inverter, if certain events are not cyclically repeated within a certain time. The activation of the watchdog is set by the control card parameters fb04 and fb05. The monitoring time and the at exceeding of the monitoring time executed function is set by parameter in the inverter (pn05, pn06).

Id-Text	Name	Parameter index
fb40	Buswatchdog activation	0x21A8
Meaning	Allows a delayed activation of the fieldbus watchdog after switching on the device.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: off (fieldbus watchdog inactive) 16: Activation after the first asynchronous communication 32: Activation by setting the master command to „Processdata output operate“ (0x98) 128: Activation by any communication via the IO-Link interface Standard value: 0	
Note	Possible settings are OR connected.	

Id-Text	Name	Parameter index
fb41	Buswatchdog inhibit	0x21A9
Meaning	Determines on which incidents the fieldbus watchdog gets reseted.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: off (no reset) 16: The watchdog is reset upon receipt of process output data. 128: Reset by any communication via the IO-Link interface Standard value: 0	
Note	Possible settings are OR connected.	

10 Events

In case of an occuring event, the device sets the so-called "event flag", which is transmitted in the process data telegram CHECK/STAT Byte in bit 7. The master detects the set bit and reads the reported event. During the reading of an event, no service data can be exchanged. By this way it is possible to transfer events or states of a device via the IO-Link master to the PLC or visualization.

The COMBIVERT G6 supports detailed events.

The following events are supported:

Order No.	Eventcode	EventQualifier	Description
1	0x8CA0 (manufacturer specific)	Instance: Application Type: Information Mode: Single shot	Sent when PD-in count fb19 is set to 0, or when communication to the power unit is lost or gets restored.

Table 3: Events

The "PD valid" bit in the event service is also set when valid process data are sent from the power unit to the IO-Link master.

Id-Text	Name	Parameter index
fb27	Synchronization state	0x219B
Meaning	State of synchronization to the fieldbus cycle	
Type	Variable	
Data length	8 bit	
Access	read	
Coding	0: off (device not synchronous) 1: on (device synchronous) Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
fb28	PD access time	0x219C
Meaning	Processing time, which is required, to process the PD data (from FPGA sync until the end of processing with fully-utilized process data length in both directions).	
Type	Variable	
Data length	8 bit	
Access	read	
Coding	0...500 µs Standard value: 0 µs	
Note	–	

11 Operator Parameter

The operator parameters determine the configuration of the G6 IO-Link control. Furthermore, the software version as well as the current state can be read.

Id-Text	Name	Parameter index
os00	operator identifier	0x2080
Meaning	Displays the control board type, as well as the software version.	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	e.g.: 150405 15xxxx: G6 xx05xx: IO-Link xxxx05: Version of the parameter configuration Standard value: Device-dependent	
Note	–	

Id-Text	Name	Parameter index
os02	software date OS	0x2082
Meaning	Software date of the control board	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0.0000…9999, 1231: The year is displayed before the comma, month and day are after that. 2012,0813 means 13.08.2012. Standard value: 0.0000	
Note	–	

Id-Text	Name	Parameter index
os03	software version	0x2083
Meaning	Software version of the control board	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0.0.0.0…255.255.255.255 e.g.: 1.3.0.1 Standard value: 0.0.0.0	
Note	–	

Id-Text	Name	Parameter index
os04	diag error count	0x2084
Meaning	Specifies the number of errors occurred on the diagnostic interface.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...255 Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
os05	diag response delay time	0x2085
Meaning	Sets the minimum response delay time for requests on the diagnostic interface.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...126 ms Standard value: 0 ms	
Note	–	

Id-Text	Name	Parameter index
os06	baud rate diag	0x2086
Meaning	Default transfer speed on the diagnostic interface.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: 1.2 kbit/s 1: 2.4 kbit/s 2: 4.8 kbit/s 3: 9.6 kbit/s 4: 19.2 kbit/s 5: 38.4 kbit/s 6: 55.5 kbit/s 7: 57.6 kbit/s 8: 100 kbit/s Standard value: 5	
Note	–	

Id-Text	Name	Parameter index
os07	node ID	0x2087
Meaning	This parameter specifies the inverter address for the diagnostic interface (DIN 66019). The parameter is an image of the system parameter Sy06.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...239 Standard value: 1	
Note	–	

Id-Text	Name	Parameter index
os08	operator type	0x2088
Meaning	Displays the implemented control card functions.	
Type	Variable	
Data length	16 bit	
Access	read	
Coding		

Bit 0	Initiator	0: without 1: with initiator
Bit1	Keyboard/display	0: without 1: with keyboard/LC display
Bit 8	PU image	0: with power unit image 1: without power unit image
Bit 10	f = 0Hz	0: without 1: with f=0Hz functionality
Bit 11	STO	0: without safety function 1: with safety function STO
Bit 12...13	Bus connection	0: without (standard) 1: CANopen 2: IO-Link 3: EtherCAT 4: VARAN

Standard value: 0

Note	–

Id-Text	Name	Parameter index
os09	PU max invbusy retries	0x2089
Meaning	Number of repetitions that are sent on the internal bus from the power module to the controller if it rejects "inverter busy" error.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0...255 Standard value: 200	
Note	–	

Id-Text	Name	Parameter index
os10	PU tout count	0x208A
Meaning	Counts the timeouts on the internal bus between control and power unit.	
Type	Variable	
Data length	16 bit	
Access	read / write	
Coding	0...65535 Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
os12	operator command	0x208C
Meaning	Default of instructions according to coding (see below)	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: no 1: Load default values in all operator parameters 2: reinitialize PU-parameter image Standard value: 0	
Note	–	

<table>
<tr><th>Id-Text</th><th>Name</th><th>Parameter index</th></tr>
<tr><td>os13</td><td>operator state</td><td>0x208D</td></tr>
<tr><td>Meaning</td><td colspan="2">Displays the state of the power unit, as well as the image of the power unit parameter of the control board.</td></tr>
<tr><td>Type</td><td colspan="2">Variable</td></tr>
<tr><td>Data length</td><td colspan="2">8 bit</td></tr>
<tr><td>Access</td><td colspan="2">read</td></tr>
<tr><td>Coding</td><td colspan="2">
<table>
<tr><td>Bit 0</td><td>reserved</td><td></td></tr>
<tr><td>Bit 1...2</td><td>PUConfIDState</td><td>0: PU-ID unknown
2: PU-ID OK
4: PU-ID incorrect</td></tr>
<tr><td>Bit 3...5</td><td>PU image state</td><td>0: PU-Image not init.
1: write PU image
3: PU-Image changed
4: PU-Image init.
5: PU-Image check
6: PU image not available</td></tr>
<tr><td>Bit 6...15</td><td>reserved</td><td></td></tr>
</table>
Standard value: 0
</td></tr>
<tr><td>Note</td><td colspan="2">–</td></tr>
</table>

<table>
<tr><th>Id-Text</th><th>Name</th><th>Parameter index</th></tr>
<tr><td>os14</td><td>store state</td><td>0x208E</td></tr>
<tr><td>Meaning</td><td colspan="2">Non-volatile parameters are immediately stored by writing of value "0". After completion of the storage the value jumps to status "1". If at the end of the download lists in COMBIVIS the value "0" comes before value "1", COMBIVIS will send the value as long as the inverter has completed the storing.</td></tr>
<tr><td>Type</td><td colspan="2">Variable</td></tr>
<tr><td>Data length</td><td colspan="2">8 bit</td></tr>
<tr><td>Access</td><td colspan="2">read / write</td></tr>
<tr><td>Coding</td><td colspan="2">0: busy
1: ready
2: off

Standard value: 1</td></tr>
<tr><td>Note</td><td colspan="2">–</td></tr>
</table>

Id-Text	Name	Parameter index
os15	store mode	0x208F
Meaning	The memory type of non-volatile parameters must be adjusted with this parameter. The parameters will not be stored if the value is "0", the device automatically changes to value "1" after the next "power down". This value is the default value, the non-volatile parameters are always stored. Value „2“ deactivates the storing, also over the next start of the module.	
Type	Variable	
Data length	8 bit	
Access	read / write	
Coding	0: off, curr. off / on at startup 1: on, always store 2: off, never store Standard value: 1	
Note	–	

Id-Text	Name	Parameter index
os17	safety module type	0x2091
Meaning	Type of safety module	
Type	Variable	
Data length	16 bit	
Access	read	
Coding	0: no safety module available 1: Type 1 (STO) Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
os18	safety module software date	0x2092
Meaning	Displays the software date of the safety module.	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0.0000...9999, 1231: The year is displayed before the comma, month and day are after that. 2012,0813 means 13.08.2012. If no safety module is installed, the value "0: no safety functionality“ is displayed. Standard value: 0	

Id-Text	Name	Parameter index
os19	safety module software version	0x2093
Meaning	Displays the software version of the safety module.	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0.0.0.0...255.255.255.255 If no safety module is installed, the value "0: no safety functionality“ is displayed. Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
os20	safety module signal state	0x2094
Meaning	Displays the signal state of the safety module.	
Type	Variable	
Data length	8 bit	
Access	read	
Coding		
Note	–	

Bit 0	no safety functionality	1: no safety functionality
Bit 1...2	Error STO	1: Error STO 2: STO OK
Bit3	ModFeedback	4: ModFeedback ist set 8: ModFeedback ist not set
Bit 4...5	ST Safety	16: ST is set 32: ST is not set
Bit 6...7	PU alive	64: PU alive 128: PU not alive

Standard value: 0

Id-Text	Name	Parameter index
os21	safety module information	0x2095
Meaning	Displays the error code of the safety module	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0...65535 Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
os23	current PU Id	0x2097
Meaning	Displays of the power unit Id	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0...65535 Standard value: 0	
Note	–	

Id-Text	Name	Parameter index
os30	serial number OS 2	0x209E
Meaning	Serial number part 2 of the control hardware.	
Type	Variable	
Data length	32 bit	
Access	read	
Coding	0…4294967295 Standard value: 0	
Note	–	

12 Revision History

Version	Date	Description
00	2015-10	New creation of the programming manual G6 IO-Link
01	2016-10	New formats, preface, sample pages, new parameters added
02	2019-05	Adaptation to new KEB CI optics
03	2023-08	Update the default pages, editorial changes

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