

# COMBICOM



Port Expander

Version 1.0

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## 1 General Information

The presented documentation as well as the herein mentioned hard and software are developments of Karl E. Brinkmann GmbH. Errors excepted. The company Karl E. Brinkmann GmbH established this documentation to the best of her knowledge but without engagement, that the herein stated specifications may not provide the user with the expected advantages. The Karl E. Brinkmann GmbH reserves the right to change the specifications without prior notification or further obligation. All rights reserved.

This instruction manual describes the software state as of 04/2006.

### 1.1 Product description

This manual describes a communication gateway with Ethernet and USB interface and 4 HSP5/485 interfaces for the connection to frequency inverters or KEB COMBIVERT F5 operators. Voltage supply is made via an external 24V power supply unit or by the USB cable. The Port Expander can be placed remotely on a mounting rail in the control cabinet or locally on the table. The last HSP5/485 interface can be switched alternatively also to the DIN66019II protocol.

### 1.2 Technical Data

Voltage supply X1A	12..30VDC±0%, 2,4W max. (12V/0,2A 24V/0,1A)
USB interface X2A	USB 2.0, type B socket, current consumption 0,4A max.
Ethernet interface X2B	RJ45, IEEE 802.3 10/100Base-TX
HSP5/485 interfaces X4	RJ45, max. line length 100m
Housing	118 x 140 x 45 mm
Operation temperature	-10° to 45° C
Part number	00.F5.025-0080

### 1.3 Accessories

USB cable plug A-B 1,0m	00.F5.0C4-1010
CAT5 cable 2*RJ45 2,0m yellow	00.F5.0C3-1020
Operator HSP5/485, RJ45 connection	00.F5.060-9002
Converter cable RJ45 – HSP5 DSUB9, 2,5m	00.F5.0C0-4025
Adapter DSub9/Western	00.F5.0C0-0002

## 2 Voltage supply

No further voltage supply is necessary if the unit is operated by the USB interface. 24 volt are supplied via terminals X1A.1 (-) and X1A.2 (+) if the port expander is placed in a control cabinet. Terminal X1A.4 serves against interferences on the cable shield and shall be connected with the grounded mounting rail/control cabinet rear-panel via a short cable.

## 3 Ethernet interface

The Ethernet interface recognizes automatically the used speed (10 or 100 MBaud), half or full duplex operation, polarity as well as MDI/MDIX operation (auto-crossover). Patch or crossover cables can be used. Always recommended is a category 5 shielded network cable with 8 pole RJ45 connector

### 3.1 Supported protocols

ARP	Address Resolution Protocol Response
ICMP	Echo Response (Ping)
TCP/IP	DIN66019II, Modbus/TCP, Http
TCP/UDP	DIN66019II, Modbus/TCP
DHCP	BootP Response, can be switched off

15 simultaneous connections (sockets) are max. available via the Ethernet interface. These connections are created automatically in case of new inquiries via TCP and UDP and automatically closed after approx. 30 seconds without data transfer. Further inquiries are ignored if the maximum number is reached.

### 3.2 IP Address

The IP address is adjusted in parameter ET.01. In case of doubt the address to be adjusted is given by the network administrator, because it is not allowed to have double addresses in the entire connected Ethernet. When using a direct connection of a port expander and PC by means of a patch cable, this IP address should be adjusted in such way that the difference is only in the lowest byte to the address of the PC (same network but different node). With activated DHCP server the port expander answers BootP/DHCP-Requests and enables the connected PC to receive a temporary valid IP address (see section DHCP server).

### 3.3 DHCP Server

The DHCP server functionality is activated / deactivated with parameter ET.13. BootP- and DHCP requests are answered delayed in activated state. The following restrictions become valid because the port expander has no information about available IP addresses in the network:

The DHCP server is only provided for operation with cross/patch cable to a PC/notebook, in order to assign an IP address to the PC/notebook if necessary. Thus an end to end operation without manual intervention and without knowledge of the IP protocol is possible.

All requests are collected and if 3 equal requests are recognized, an appropriate response is transmitted.

Thus in standard network operation the standard DHCP servers can assign a valid IP address first (before the port expander assigns it).

The IP address of the port expander increased by 1 is preset as IP address. The IP address of the port expander decreased by 1 is preset, if the low byte of the IP address is higher than 254.

### 3.4 DIN66019II Port

This port is used for the transmission of inverter parameter data by means of enclosed DIN66019II/IP telegrams. Several simultaneous connections of different clients are possible on this port. As a standard the port is set to 8000. The adjustment can be changed with parameter ET.02. In order to make several simultaneous connections from one client to different inverters, the following 3 port numbers (8001..8003) are available with same protocol. Available are TCP/IP and TCP/UDP connections. Access can occur also with the COMBIVIS5 IP driver. The slave address in the DIN66019II protocol serves as node address (see section node addressing). The DIN66019II port can be protected with the data port password (see section data port password). Attention: This port numbers must not overlap with the Modbus port !

### 3.5 Modbus Port

This port is used for data transmission with the Modbus/TCP protocol. Several simultaneous connections of different clients are possible on this port. As a standard the port is set to 502. The adjustment can be changed with parameter ET.03. Attention: This port must not overlap with the DIN66019II ports! TCP/IP and also TCP/UDP connections are available here.

The desired parameter address is specified as Modbus register address. The Modbus unit identifier specifies the node address (see section node addressing). All accesses are made with indirect set addressing.

The Modbus functions 3 and 4 enable reading of 16 bit parameter values. Only a Modbus register count of 1 is supported. Function 6 serves for writing of a 16 bit parameter value. The DIN66019II port can be protected with the data port password (see section data port password).

The Modbus protocol doesn't offer a direct access to 32 bit data. So at LONG parameters only the lower word is readable. The 16 bit value is sign-extended to 32 bit during writing.

### 3.6 Http Port

On the standard HTTP port 80 the status page can be called up via a browser. This status page contains informations about the version of the unit as well as the current adjusted IP port numbers for DIN66019II and Modbus.

### 3.7 Node addressing

Access to parameters with the protocols DIN66019II and Modbus occurs node-dependent, i.e. 5 node addresses are available. The basis node address can be adjusted via parameter SY.06.

If SY.06 is set to 0 (default value), node 0 has access to internal parameters in the port expander, nodes 1..4 have access to HSP5/485 ports 1..4. All other node addresses are rejected with error code *unit not ready* (exception: Port 4 is in DIN66019II mode, see below.). These 5 node addresses can be shifted upwards with parameter SY.06. This enables e.g. COMBIVIS that the port expander can be operated among other units in a project.

### 3.8 Data port password

In order to protect the Ethernet interface against unauthorized write accesses, a writing protection password can be defined with parameter ET.09. Read accesses are always possible. The definition of the password can be made only via USB interface. Value 0 switches off the write protection. On access via Ethernet this password must be entered once in parameter ET.09 in order to execute any write operations. If the password is not correctly entered, the error message *operation not possible* and/or Modbus *exception code 1* is displayed at next writing. The port expander cancels the IP connection automatically and the password must be entered again, if the connection is released via TCP or communication is suspended for 30 seconds.

**ATTENTION:** Read out of CFG files via Ethernet interface is not possible with activated data port password, because pointer parameters must be also written here.

## 4 USB interface

**Attention:** The use of the USB-interface with PCs / Notebooks is designated only for temporary operation. A permanent connection for all-time use in industrial environment is not recommended because of the limited interference immunity of USB.

The USB interface connects the port expander via a commercial USB cable with a PC or a USB-hub. DIN66019II is used as protocol. Access to internal parameters as well as to the HSP5/485 ports is possible (see section node addressing). The port expander can be power-supplied also via the USB interface. A virtual COM port driver (VCP) is necessary on PC side which provides when installed once a further COM interface to communication with COMBIVIS or other applications. The interface parameters baud rate, character format or parity are not important, because the quickest possible transmission method is used here. If KEB drivers are used, the adjustment "send single" should be switched off.

## 5 HSP5/485 Ports

The port expander has four HSP5/485 interfaces, which allows simultaneous communication with up to 4 Combivert F5 inverters or operators. The protocol is HSP5 in interference-proof RS485 construction. Line lengths up to 100 meters are possible here.

Connection to an inverter occurs via standard CAT5 cable with RJ45 plug on both sides and 00.F5.060-9002 operator.

Connection to the diagnostic interface of a F5 operator occurs via special converter cable 00.F5.0C0-4xxx as well as the adapter DSub9/Western 00.F5.0C0-0002.

The transmission rate of each port can be adjusted to a fixed value or an automatic recognition/adaption with parameters UD.04..UD.07. Parameters RU.01..RU.04 display the current value of the port. The connection is monitored by reading and if necessary by correcting during automatic recognition/adaption.

### 5.1 Port 4 Mode

Port 4 can be changed to DIN66019II mode with parameter UD.08. Then a serial RS485 connection to several units can be generated here which recognize the DIN66019II protocol.

A 2-wire connection is not possible by hardware limitations. All node addresses from 4 to 239 are processed with this port (at basis node address SY.06 = 0). An automatic transmission rate recognition is not possible here any longer moreover the port 4 baud rate must be adjusted manually to the correct value of the connected units.

A RS485 adapter cable for the connection to KEB operators has the following assignment:

X4D.1 --- DSub9.4	X4D.2 --- DSub9.5
X4D.4 --- DSub9.8	X4D.5 --- DSub9.9
X4D.3 --- DSub9.7	

## 6 Internal Parameters

### 6.1 System Parameters

sy.01	software date	Address 0001h
This parameter displays the date of the installed firmware.		

sy.02	device identifier	Address 0002h
This parameter displays the software-identification number (CFG-ID) for COMBIVIS.		

sy.04	cfg. data sel.	Address 0004h
Selection of internal device data.		

sy.05	cfg. data	Address 0005h
Output of internal device data.		

sy.06	node address offset	Address 0006h
This parameter defines the adjustment of the node address. See section node addressing		

sy.10	other	Address 000Ah
Display of unit type group for COMBIVIS.		

### 6.2 Operation Parameter

ru.01	port 1 actual baud rate	Address 0201h
ru.02	port 2 actual baud rate	Address 0202h
ru.03	port 3 actual baud rate	Address 0203h
ru.04	port 4 actual baud rate	Address 0204h
Displays the actual baud rate of the HSP5/485 ports 1 to 4.		

ru.05	port 1 timeout counter	Address 0205h
ru.06	port 2 timeout counter	Address 0206h
ru.07	port 3 timeout counter	Address 0207h
ru.08	port 4 timeout counter	Address 0208h
Displays the error counter status of HSP5/485 ports 1 to 4. These parameters can be reset by writing. The error counter is increased each time, if an inquiry was not answered on the corresponding port (Timeout).		

## 6.3 Ethernet Parameter

et.00	MAC address	Address 0300h
The MAC address (Media Access Control) is formed of 6 byte. The first three bytes contain the manufacturer's code (00-08-FA). Only the lowest 4 bytes „FAXxxxx“, are displayed here. This address is assigned by the manufacturer and cannot be changed.		
et.01	IP address	Address 0301h
The IP address consists of 4 bytes and is the unique identification of one Internet participant. In case of doubt the network administrator gives the address to be adjusted.		
et.02	DIN66019II port number	Address 0302h
This parameter adjusts the port number for the access via DIN66019II/TCP protocol. The following 3 port numbers are also available.		
et.03	MODBUS port number	Address 0303h
This parameter adjusts the port number for the access via Modbus/TCP protocol. The standard value is 502.		
et.04	IP error count	Address 0304h
Serves for the diagnosis of the IP protocol stack.		
et.05	TCP connections	Address 0305h
This parameter displays the number of active TCP connections.		
et.06	UDP connections	Address 0306h
This parameter displays the number of active UDP connections.		
et.08	TCP multicount	Address 0308h
This parameter serves only for diagnostic purposes.		
et.09	data port password	Address 0309h
This parameter defines the write protection password for the data port. The programming of the password occurs only via the USB interface. Then this password must be entered again for write access via the data port. Error message "operation not possible" is returned in case of locked data port write access. Value 0 switches off the write protection password.		
et.12	data port response delay	Address 030Ch
Displays the response delay time for the Ethernet data ports in ms. The network traffic can be decreased if higher values are adjusted. Value 0 enables the fastest communication with the port expander, however a high network traffic is also produced.		
et.13	DHCP server active	Address 030Dh
Serves for switching off and on of the DHCP server functionality. See section DHCP server.		
et.14	link state	Address 030Eh
Displays status information for the Ethernet connection		



## 6.4 Userdefinition parameter

ud.01	password	Address 0801h
Password input for the corresponding user level. The following values for the password level are possible:		
200	User write protection (operating parameter cannot be changed)	
440	User reading/writing	

ud.04	port 1 baud rate	Address 0804h
ud.05	port 2 baud rate	Address 0805h
ud.06	port 3 baud rate	Address 0806h
ud.07	port 4 baud rate	Address 0807h
Adjusts the used baud rate of the HSP5/485 ports 1 to 4. Value 12: <i>autodetect</i> is searching for the baud rate of the connected unit and adjusts itself if possible. Value 13: <i>auto maximum</i> is also searching for the baud rate of the connected unit and the highest possible value is adjusted (not when connection via operator). The following values are assigned to the baud rates: 3 – 9600, 4 – 19200, 5 – 38400, 6 – 55500, 8 – 100000, 10 – 125000, 11 - 250000		

ud.08	port 4 DIN66019II mode	Address 0808h
Changes port 4 to 66019II operating mode (1). This special operating mode is switched off at value 0.		

ud.09	indirect set pointer	Address 0809h
Display and adjustment of the set selector for indirect parameter access.		

ud.10	active set	Address 80Ah
Display and adjustment of the active set.		

ud.11	serial no. (date)	Address 080Bh
ud.12	serial no. (count)	Address 080Ch
ud.13	QS number	Address 080Dh
Display of the factory-made serial number with additional information		

## 6.5 Debugging

Db.00..04	dbg xxx	Address 06xxh
Only for internal diagnostics. No function for the user.		

## 6.6 Position of the connectors/diagnostic displays



SPEED (yellow, above in X2B)  
On: 100MBd link recognized

X2B Ethernet interface

LINK/ACTIVE (green, below in X2B)  
Off: no link  
On: link is available  
Blinking: data receive

X2A USB interface

POWER/COM (yellow, right)  
Off: no voltage supply  
On: voltage supply OK  
Blinking: Parameter access active

WINK (yellow, left)  
Signals IP scan requests

X1A voltage supply/shield

X4A..D (bottom side)  
HSP5/485 Ports 1..4

## 6.7 Terminal assignments

### X1A Power (plug)

1	0V in
2	+24V in
3	Shielding/PE
4	Shielding/PE

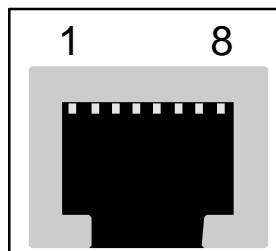
### X2A USB (Type B receptacle)

1	+5V in
2	Usb-
3	Usb+
4	GND

### X2B Ethernet (RJ45 female)

1	TXD+	5	n.c.
2	TXD-	6	RXD-
3	RXD+	7	n.c.
4	n.c.	8	n.c.

### RJ45 Socket (Top View)



### X4A..D HSP5/485 Ports (RJ45 female)

1	TXD+	5	RXD-
2	TXD-	6	GND
3	GND	7	EnTx+
4	RXD+	8	EnTx-


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