

# COMBICOM



**GB** Port Expander

Version 1.1

Mat.No.	Rev.
00F5ZE0-K010	1C

**KEB**



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## 1. Preface

### 1.1 General

First we would like to welcome you as a customer of the company Karl E. Brinkmann GmbH and congratulate to the purchase of this product. You have decided for a product on highest technical niveau.

The described hard- and software are developments of the Karl E. Brinkmann GmbH. The enclosed documents correspond to conditions valid at printing. Misprint, mistakes and technical changes reserved.

The instruction manual must be made available to the user. Prior to performing any work on the unit the user must familiarize himself with the unit. This especially applies to the knowledge and observance of the following safety and warning indications. The used pictograms have following significance:

 <p>Danger Warning Caution</p>	<p>Is used when the life or health of the user is in danger or considerable damage to property can occur.</p>
 <p>Attention observe at all costs</p>	<p>Is used when a measure is necessary for safe and disturbance-free operation.</p>
 <p>Information Aid Tip</p>	<p>Is used, if a measure simplifies the handling or operation of the unit.</p>

Non-observance of the safety instructions leads to the loss of any liability claims. This list is not exhaustive.

### 1.2 Validity and liability

**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 machine manufacturer.**

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 application. However, they are considered for information only without responsibility. 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 by the machine manufacturer in combination with the application. They must be repeated, even if only parts of hardware, software or the unit adjustment are modified.

Unauthorised opening and tampering may lead to bodily injury and property damage and may entail the loss of warranty rights. Original spare parts and authorized accessories by the manufacturer serve as security. The use of other parts excludes liability for the consequences arising out of.

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The suspension of liability is also valid especially for operation interruption damages, loss of profit, data loss or other damages. This is also valid, if we referred first to the possibility of such damages.

If individual regulations should be futile, not effective or impracticable, then the effectivity of all other regulations or agreements is not affected by this.

## 1.3 Copyright

The customer may use the instruction manual as well as further documents or parts from it for internal purposes. Copyrights are with KEB and remain valid in its entirety.

## 1.4 Product description

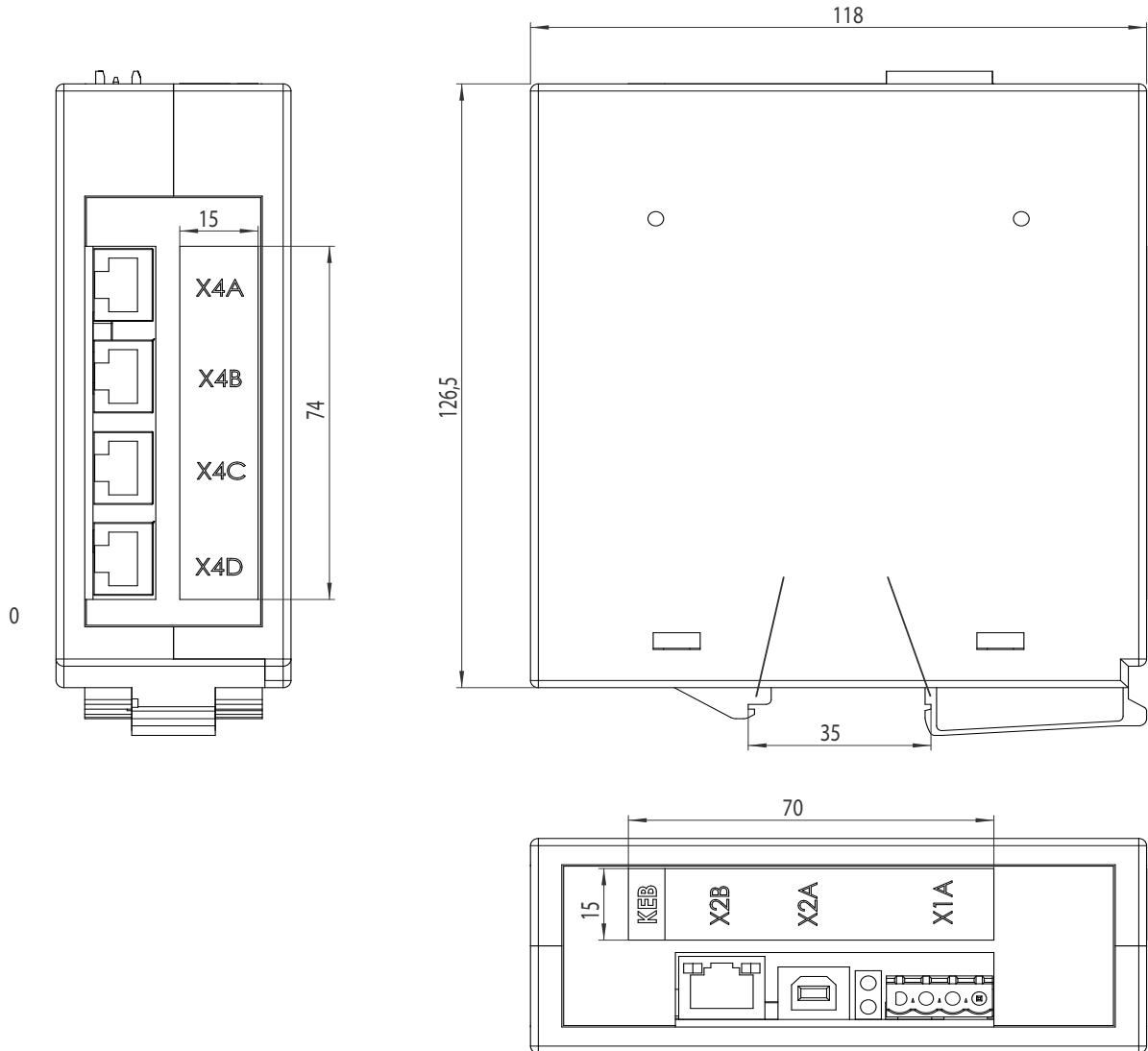
This manual describes a communication gateway with Ethernet and USB interface and 4 HSP5/485 interfaces for the connection to frequency inverters or KEB COMBIVERT F5 operators. Voltage supply is made via an external 24V power supply unit or by the USB cable. The Port Expander can be placed remotely on 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. This instruction manual describes the software state as of 10/2009.

## 1.5 Technical data

Voltage supply X1A	12..30VDC $\pm$ 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 126.5 x 45 mm
Operation temperature	-10° to 45° C
Part Number	00.F5.025-0080

### 1.6 Dimensions



### 1.7 Accessory

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.F5.0C0-0020

## 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). These parameters can also be set. 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

30 simultaneous connections (sockets) are max. available via the Ethernet interface. These connections are automatically adjusted 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).

#### 3.2.1 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.

### 3.3 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).



This port numbers must not overlap with the Modbus port !

### 3.4 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.



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 Modbus 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.

### 3.5 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.

### 3.6 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 have 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.

### 3.7 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.



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



Using the USB interface with PCs / notebooks is intended only for temporary operation. Fixed connection for continuous operation in industrial environment is not recommended due to the restricted 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. Parameter ud.03 defines the maximum timeout for a response.

### 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).

Thus the DIN66019II slave addresses 4...239 could be responded directly up to software V1.1. From software V1.1 (10/2009) at first the node address is deducted of 4, thus node 4 results to DIN66019II address 0, 5=1, 200=196, etc.. Thereby addresses 0... 3 can also be responded.

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 parameter

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.		

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sy.06	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 Operating Parameters

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: timeout counter	Address 0205h
ru.06	port 2 timeout counter	Address 0206h
ru.07	port 3 timeout counter	Address 0207h
ru.08	port: 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 FAxxxxxx are displayed here. This address is assigned by the manufacturer and cannot be changed.		

et.01	IP Adresse	Address 0301h
The IP address consists of 4 bytes and is the clear 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	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 displayed 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		
et.15	link mode	Adresse 030Fh
Determines the adjustments of the Ethernet interface. Fixed values or automatic recognition can be adjusted here. The additional clearlock value 32 activates a special behaviour, which corrects link problems automatically with automatic detection on both sides (control and switch).		

## 6.4 User surface

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.03	port timeout	Address 0803h
Defines the timeout period for all ports. Too small values cause communication problems. The default value of 50 ms is suitable for most applications. After this time has elapsed without response a telegram with error code 1 will be returned (unit not ready).		
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		

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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 indicator 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		

### Debugging

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

## 6.5 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

## 6.6 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

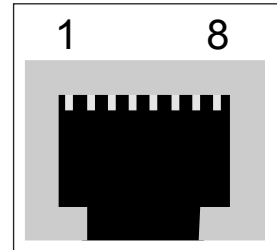
### X2B Ethernet (RJ45 female)

1	TxD+	5	n.c.
2	TxD-	6	RxD-
3	RxD+	7	n.c.
4	n.c.	8	n.c.

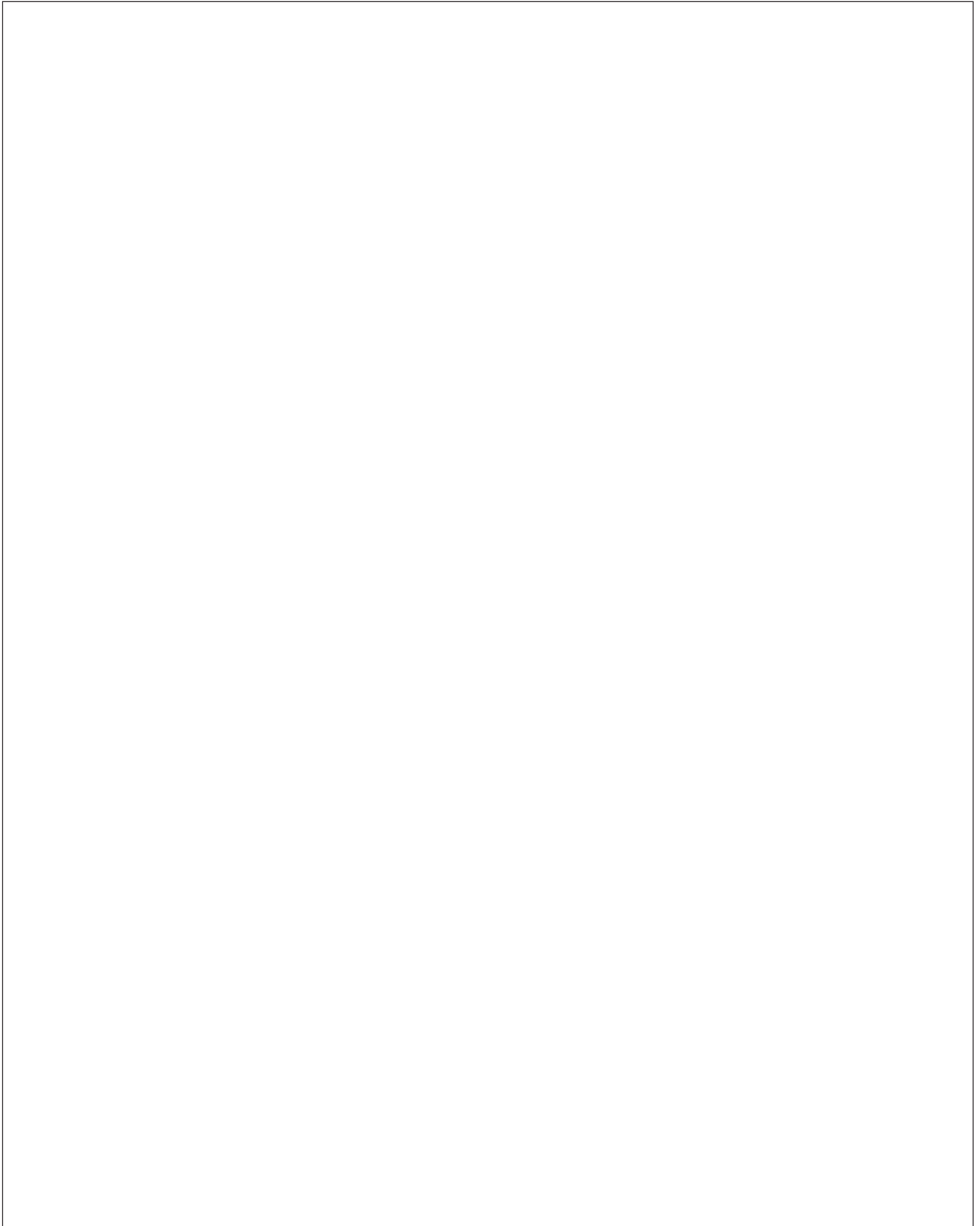
### X4A..D HSP5/485 Ports (RJ45 female)

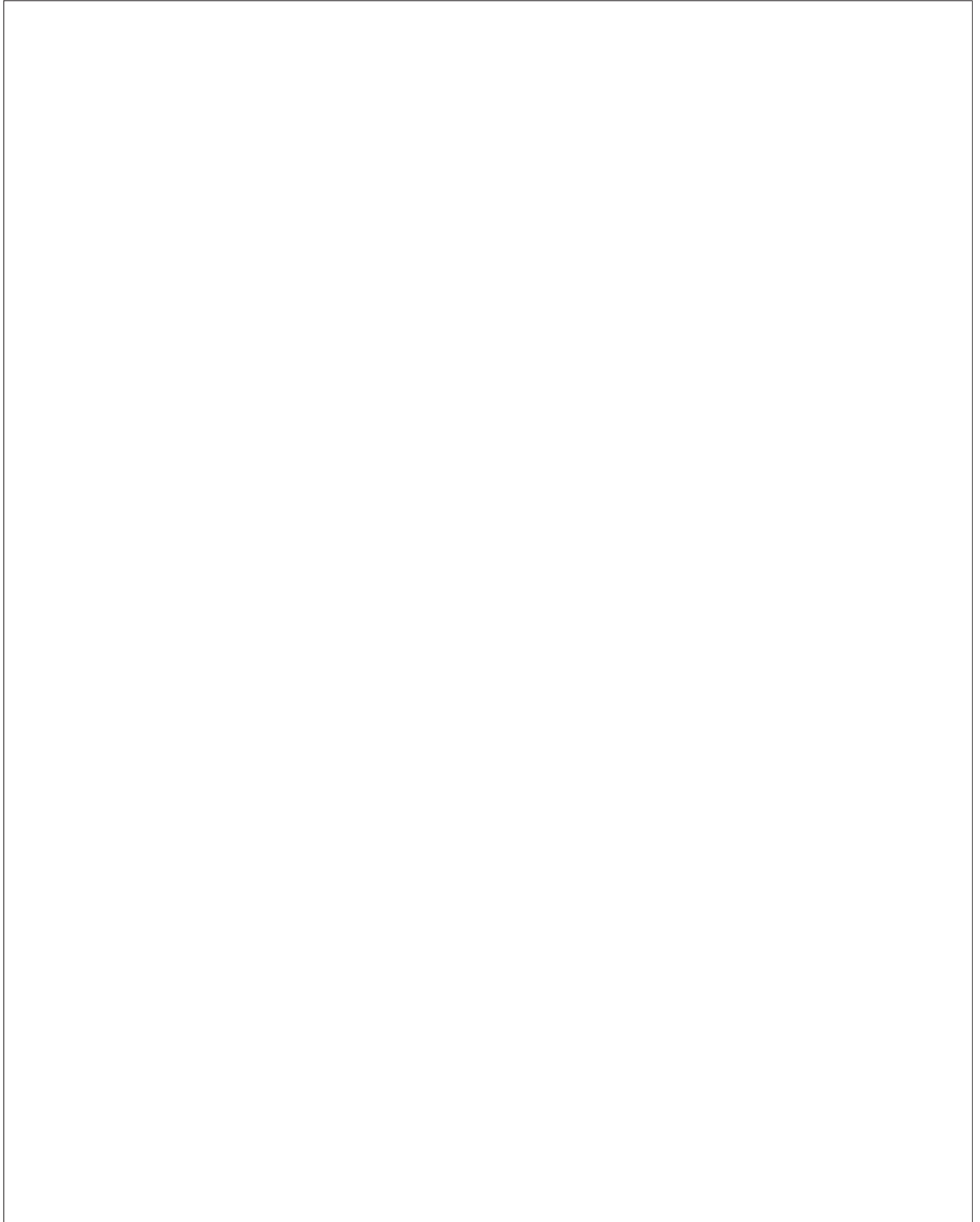
1	TxD+	5	RxD-
2	TxD-	6	GND
3	GND	7	EnTx+
4	RxD+	8	EnTx-

### RJ45 Socket (top view)













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