

# IM232/IM485

## Revision 1

### Hardware Reference Manual – P – Version 1.1



**Made in Germany**

**By**

**E.E.P.D. Electronic Equipment  
Produktion & Distribution GmbH**



E.E.P.D.® Electronic Equipment Produktion & Distribution GmbH  
Gewerbering 3, D-85258 Weichs, Germany  
Tel. +49 8136 2282-0, Fax +49 8136 2282-109, Internet <http://www.eepd.de>  
Copyright © 2018 by E.E.P.D. GmbH - All rights reserved

# General Notes

This User Manual is for your information.

The information contained herein has been checked carefully and is believed to be reliable. However, E.E.P.D. gives no guarantee or warranty concerning the accuracy of spoken information and shall not be responsible for any loss or damage of any nature resulting from the usage of or from reliance upon it.

We are thankful for all suggestions or improvements at any time.

**E.E.P.D. reserves the right to make changes in the products or specifications, or both, at any time without notice.**

## Copyright Notice

Copyright © 2018 by E.E.P.D.® GmbH. ALL RIGHTS RESERVED!

E.E.P.D. GmbH copyrights this document. You may not reproduce, transmit, transcribe, store in a retrieval system, or translate into any language or computer language, in any form or by any means, or otherwise, any part of this publication without the express written permission of E.E.P.D. GmbH.

## Trademark Acknowledgement

AT, DOS, OS/2, VGA are registered trademarks of International Business Machines Corporation.

Intel, Pentium and Atom are registered trademarks of Intel Corporation.

Panel Link and TMDS are registered trademarks of Silicon Image, Inc.

VESA is a registered trademark of Video Electronics Standard Association.

Windows Vista, Windows XP, Windows 95, Windows98, Windows NT, Windows 7, Windows 8 and Windows 10 are registered trademarks of Microsoft Corporation.

PROFIVE® and E.E.P.D.® are registered trademarks of E.E.P.D. Electronic Equipment Produktion & Distribution GmbH.

**All rights reserved. All other mentioned trademarks are registered trademarks of their owners.**

## Disclaimer

This document is provided for the general information of the customer. It describes the general functionality of the boards and is not considered as assured characteristics. The written declarations in this specification are not constituent part of any contract.

E.E.P.D. reserves the right to modify the information contained in this manual as necessary and the customer should ensure that he has the most recent revision of this document. E.E.P.D. makes no warranty for the use of its products and bears no responsibility for any errors, which may appear in this document. The customer should be on notice that the field of personal computers is the subject of many patents held by different parties. Customers must ensure that they take appropriate action so that their use of the products does not infringe upon any patents. It is the policy of E.E.P.D. to respect the valid patent rights of third parties and not to infringe upon or assist others to infringe upon such rights.

E.E.P.D. assumes no responsibility for circuits, descriptions and tables within this document as far as patents or other rights of third parties are concerned.

## Life Support Applications

E.E.P.D.'s products are not intended for using as critical components in life support appliances, devices or systems in which the failing of an E.E.P.D. product could be expected to result in personal injury.

## FCC and CE Disclaimer

This product cannot be used as a stand-alone product!

Therefore it has to be integrated together with other products like power-supplies, mass storage devices (i.e. hard disks), etc. to be functional.

To meet FCC and/or CE requirements every component as well as the combination of all components has to be validated against all standards required for the end product.

In order to meet FCC and/or CE requirements this product has to be integrated into a proper housing, which provides appropriate shielding and insulation.

It is on the customer's sole responsibility to assure that his end-product meets all required standards.

E.E.P.D. gives no warranty at all that their products will meet the FCC and CE standards when used in combination with other third party products or when used in any other way as specified.

## Limited Warranty

This product will be free from defects in workmanship and material under normal and proper use for the period of time defined in our General Terms of Business, effective the date of the original shipment from E.E.P.D. GmbH.

In the event of a warranty claim for defects, which appear within the warranty period, customer shall deliver the product along with proof of purchase to the original place of purchase, shipping prepaid. Repair, replacement or refund of the purchase price of the defective product will be at the sole option of the manufacturer. All transportation risks and costs in connection with warranty service are the responsibility of the customer.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES; EXPRESS OR IMPLIED; INCLUDING WITHOUT LIMITATION; IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE; TO ANY CUSTOMER; CONSUMER; END USER; PURCHASER; OR OTHERWISE: IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR LOSS OF PROFITS; INDIRECT; SPECIAL; INCIDENTAL; OR CONSEQUENTIAL DAMAGES ARISING OUT OF ANY BREACH OF CONTRACT OR WARRANTY; NEGLIGENCE; STRICT LIABILITY OR OTHERWISE.

The remedies for defects in this product are limited to those set forth above. If this limitation of remedies is held by any court to be void or unenforceable, or if no warranty is made, manufacturers liability shall in no event exceed the purchase price of the product giving rise to the claim, regardless of whether such claim is brought in breach of contract or warranty, negligence, strict liability or otherwise.

## Reshipment / Return

Please remove all connections and peripheral devices when returning the module to the manufacturer. Use an appropriate packaging to protect the module during transport.

## Packaging

In order to avoid damage in transit the module has been shipped with a protective packaging. The packaging is made of recyclable materials which should be recycled.

## Proper Disposal

At the end of its life, dispose the device properly.

# Table of contents


<b>Preface</b> .....	<b>1</b>
<b>1 Ordering Information</b> .....	<b>3</b>
1.1 Available Modules .....	3
<b>2 Installation and Operation</b> .....	<b>4</b>
2.1 System information.....	4
2.1.1 Required tools .....	4
2.1.2 External documents.....	4
2.1.3 Technical support .....	4
2.1.4 Installation and connection regulations .....	5
2.1.5 Scope of supply .....	5
2.1.6 System characteristics – usage.....	5
2.2 Mounting solutions.....	6
2.2.1 USB port installation .....	6
2.2.2 DIN rail mounting.....	7
2.2.3 Mounting on E.E.P.D. module carrier.....	9
2.3 Initial Operation .....	10
<b>3 Product Description</b> .....	<b>11</b>
3.1 Features .....	11
3.2 Environmental Specification .....	13
3.3 Detailed Technical Specification .....	14
3.3.1 FTDI231X USB to UART Bridge .....	14
3.3.2 RS485 / RS422 Full Duplex Transceiver SN65HVD31 (IM485B only) .....	15
3.3.3 RS485 Half Duplex Transceiver SN65HVD11 (IM485A only).....	15
3.3.4 RS232 Transceiver TRS3253E (IM232 only).....	16
3.4 Pin out description .....	17
3.4.1 UART .....	17
3.4.2 Single USB .....	18
3.5 Driver Support .....	19
<b>4 Appendix</b> .....	<b>20</b>
<b>Revision History</b> .....	<b>20</b>
<b>Table of Figures</b> .....	<b>20</b>
<b>Index of Tables</b> .....	<b>20</b>
<b>Terminology</b> .....	<b>21</b>


# Preface


## Read this first

**About this guide** this manual describes the IM232/IM485 module; its goal is to describe the module, how it works, how to integrate it and how to use it.

## Safety First

<p><b>DANGER</b></p> 	<p>The red Danger sign warns you when a wrong or missing action dramatically endangers your life or health. The used components as well as the peripheral components could be destroyed.</p>
--	--

<p><b>WARNING</b></p> 	<p>The orange Warning sign warns you when a wrong or missing action could seriously harm your health or destroy the used components.</p>
---	--

<p><b>CAUTION</b></p> 	<p>The yellow Caution sign warns you when a wrong or missing action could damage the component.</p>
---	---



The yellow ESD sign draws your attention that static-sensitive parts of the component could be destroyed. Unpack shielded components only with ESD protections like an ESD wrist strap.



The E.E.P.D. Note gives you more information and advice for optimal use of this product.

For example it helps you to purchase necessary or optional accessories.

# 1 Ordering Information

## 1.1 Available Modules

Ordering Number	Function	Connection	Color	Pinout see Tab 2
IM232AA0	RS232	direct connection	gray	A
IM232AA30	RS232	direct connection	magenta	A
IM232AC0	RS232	cable connection	gray	A
IM485AA0	RS485 half duplex	direct connection	gray	B
IM485AA30	RS485 half duplex	direct connection	magenta	B
IM485AC0	RS485 half duplex	cable connection	gray	B
IM485BA0	RS485 full duplex	direct connection	gray	C
IM485BA30	RS485 full duplex	direct connection	magenta	C
IM485BC0	RS485 full duplex	cable connection	gray	C

Tab. 1: Available Modules



## **2 Installation and Operation**

### **2.1 System information**

#### **2.1.1 Required tools**

No tools are required for a standard connection or DIN rail mounting. However, a module protection is recommended for standard connections.

For a secure mounting on the optional module holder from E.E.P.D. we recommend following tools:

- Module holder: cross-headed screwdriver

Further required tools depend on mounting type and place.


#### **2.1.2 External documents**

Please note also external mounting and user manuals.

#### **2.1.3 Technical support**

For technical information about hardware or software please contact 'sales@eepd.de'.

## 2.1.4 Installation and connection regulations

<p><b>WARNING</b></p> 	<p><b>Please follow all safety instructions at the place of installation.</b></p> <p><b>Please ensure that during installation no voltage is applied.</b></p> <p><b>Please ensure that during mechanical installation no cables are connected.</b></p>
---	--

## 2.1.5 Scope of supply

Please check before installation that all required parts are complete:

- 1x IM232/485 USB module
- 1x cross-headed screw
- Hardware Reference Manual
- Driver CD-ROM


## 2.1.6 System characteristics – usage

The RS-232/485 module allows a system extension to a D-SUB-9 connector via USB port. Especially in industrial environments, many technical devices use this RS-232/485 interface. Via the USB module, serial connections to service and configuration connections of various end devices that require an RS-232/485 connection can be established. Thus telephone systems, control units, routers, POS terminals, switches, storage systems as well as microcontrollers can be operated and programmed with modern computers.


## 2.2 Mounting solutions

### 2.2.1 USB port installation

If the installation site permits, the USB adapter module can be plugged into any standard USB 3.0/2.0/1.1 Type A socket.

<p><b>CAUTION</b></p> 	<p><b>To avoid mechanical stress on interfaces, we recommend a safe module holder.</b></p>
---	--

---

	<p><b>The full range of functions depends on the respective USB port.</b></p>
---	---

---

## 2.2.2 DIN rail mounting

The USB adapter module is designed for mounting on a TS35 mounting rail (DIN rail). The following procedure is recommended for insertion and removal.

### **Insertion:**

Hang the module on the clip lock in the mounting rail, push it in the direction of the USB plug and snap it into the rail.

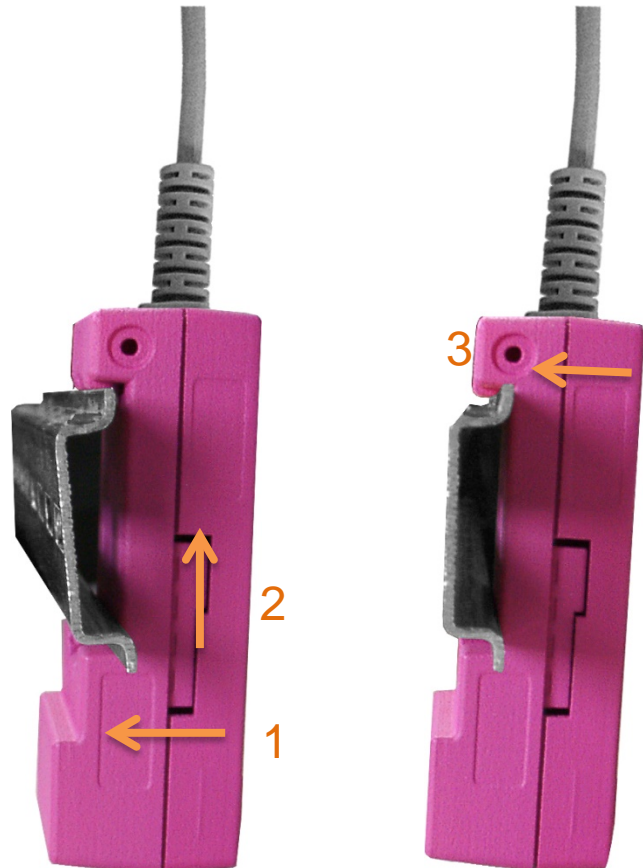


Fig. 1: Module Mounting

**Removal:**

Push the module in the direction of the USB connector, move it away from the rail and remove it.

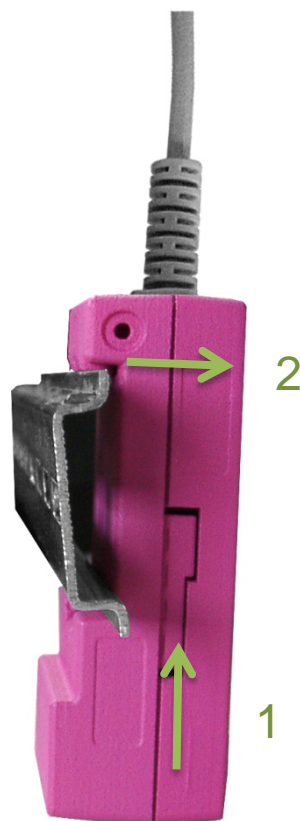


Fig. 2: Module Disassembly

### 2.2.3 Mounting on E.E.P.D. module carrier

The USB module is particularly suitable for connection to a TB-H USB hub, as well as to a TB-M from E.E.P.D.. The mounting profile offers space for seven USB modules, to mount them easily and stable. Insert the USB module into the guide of the respective slot and push it back to the stop. Secure the module with the enclosed screw.

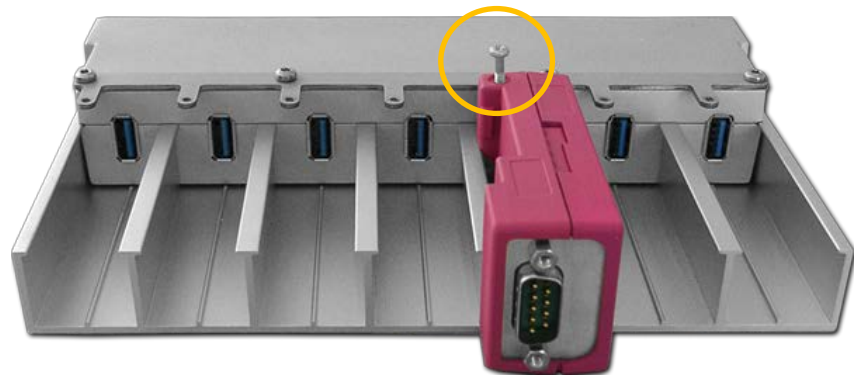


Fig. 3: Module Carrier



Fig. 4: Screw

## 2.3 Initial Operation

Commissioning is easy. As soon as the USB module is connected to the USB connector of your system for the first time, your operating system usually automatically searches and installs the necessary drivers. However, you can also install / update these from the 'Drivers' folder on the supplied driver CD-ROM.

For your information, please also read the README file provided on the CD-ROM.

The wiring and operation of connected systems of external companies can be found in their documentation.

The dialog with the module takes place by means of simple commands in ASCII code and can usually be realized from any application, among others with a terminal program, by accessing the serial interfaces without special effort. To set up a virtual serial interface, it may be necessary to install the appropriate driver for the respective operating system. These are on the supplied CD-ROM.

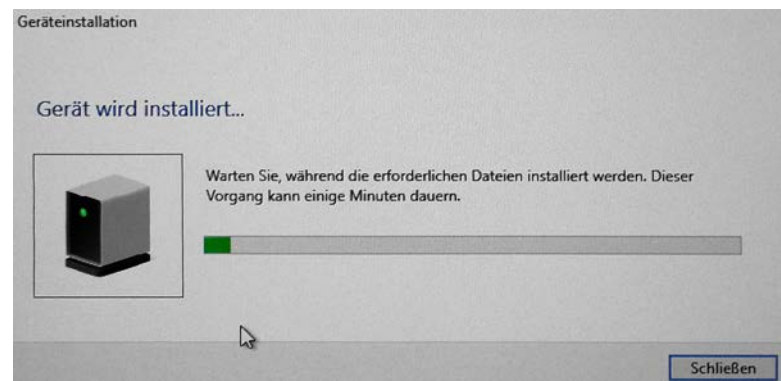


Fig. 5: Installation Screen

## 3 Product Description

### 3.1 Features

#### Power Supply

USB VCC (+5 V supply, current limited to 500 mA)

#### Serial Port

IM232:

9-pin male D-SUB connector with standard RS232 pinout

Maximum bit rate 1 Mbit/s

IM485A:

9-pin male D-SUB connector

RS485 half duplex support

Maximum bit rate 3 Mbit/s

IM485B:

9-pin male D-SUB connector

RS485 full duplex support

Maximum bit rate 3 Mbit/s

#### USB Client Port

1 USB 2.0 type A

#### OS Support

Linux Ubuntu 18.04 LTS

Microsoft® Windows® 7

Microsoft® Windows® 10

#### Housing

ABS-PC

#### Cooling

Designed for fanless operation.



## **Conformity**

CE, ROHS, REACH

## **Dimension**

93 mm x 38.5 mm x 26.6 mm

## **Weight**

Approximately 40 grams

## **Mounting**

Optional TB-M and TB-H module mounting or  
hat rail mounting

## 3.2 Environmental Specification

### Max. Operating Temperature

-40°C to +85°C ambient



Other operating temperature ranges upon request

---

### Max. Storage Temperature

-40°C to +85°C

### Max. rel. Humidity for all versions

95% @ 40°C Non-condensing

## 3.3 Detailed Technical Specification

### 3.3.1 FTDI231X USB to UART Bridge

- Single chip USB to asynchronous serial data transfer interface.
- Entire USB protocol handled on the chip. No USB specific firmware programming required.
- Data transfer rates from 300 baud to 3 Mbaud.
- 512 byte receive buffer and 512 byte transmit buffer utilizing buffer smoothing technology to allow for high data throughput.
- FTDI's royalty-free Virtual Com Port (VCP) and Direct D2XX) drivers eliminate the requirement for USB driver development in most cases.
- UART interface support for 7 or 8 data bits, 1 or 2 stop bits and odd / even / mark / space no parity.
- Low operating and USB suspend current; 8 mA (active-type) and 125  $\mu$ A (suspend-type).
- UHCI/OHCI/EHCI host controller compatible.
- USB 2.0 full speed capable.
- Extended operating temperature range: -40°C to +85°C.

### 3.3.2 RS485 / RS422 Full Duplex Transceiver SN65HVD31 (IM485B only)

- 1/8 Unit-Load option available (up to 256 Nodes on the bus).
- Bus-pin ESD protection exceeds 15 kV HBM.
- Low-current standby mode: < 1 mA.
- Glitch-free power-up and power-down protection for hot-plugging applications.
- Bus idle, open, and short circuit failsafe.
- Driver current limiting and thermal shutdown.
- Designed for RS422 and RS485 networks.
- 3 Mbit/s signaling rate.

### 3.3.3 RS485 Half Duplex Transceiver SN65HVD11 (IM485A only)

- 1/8 unit-load option available (up to 256 nodes on the bus).
- Bus-pin ESD protection exceeds 15 kV HBM.
- Low-current standby mode: < 1 mA.
- Glitch-free power-up and power-down protection for hot-plugging applications.
- Driver current limiting and thermal shutdown.
- 3 Mbit/s signaling rate.
- Meets or exceeds the requirements of ANSI TIA/EIA-485-A.
- Bus-pin short circuit protection from -7V to 12 V.
- Open-circuit, idle-bus, and shorted-bus failsafe receiver.
- Thermal shutdown protection.

### 3.3.4 RS232 Transceiver TRS3253E (IM232 only)

- Enhanced ESD protection on RIN inputs and
- DOUT outputs
  - $\pm 8$  kV IEC 61000-4-2 Air-Gap Discharge
  - $\pm 8$  kV IEC 61000-4-2 Contact Discharge
  - $\pm 15$  kV Human-Body model
- Low 300 mA supply current
- Specified 1000 kbps data rate
- Auto power-down plus feature

### 3.4 Pin out description

#### 3.4.1 UART



Fig. 6: D-SUB Detail

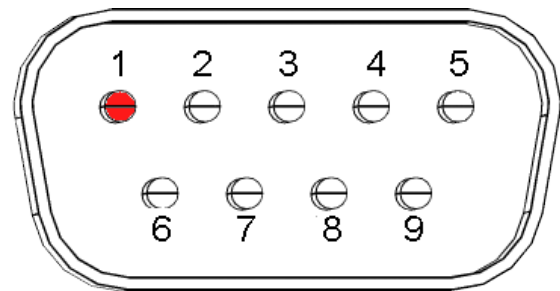


Fig. 7: D-SUB Detail Schematic

Pin	Signal	Signal	Signal
	A	B	C
	<b>RS232</b>	<b>RS485A Half Duplex</b>	<b>RS485B Full Duplex</b>
1	DCD	N.C.	GND
2	RXD	N.C.	CTS_P
3	TXD	RS485_H_P	RTS_P
4	DTR	RS485_H_N	RX_P
5	GND	GND	RX_N
6	DSR	N.C.	CTS_N
7	RTS	N.C.	RTS_N
8	CTS	N.C.	TX_P
9	RI	N.C.	TX_N

Tab. 2: D-SUB Connector

### 3.4.2 Single USB



Fig. 8: Single USB Detail

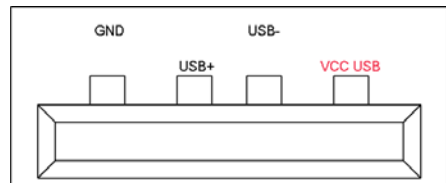


Fig. 9: Single USB Detail Schematic

Pin	Signal
1	VCC_USB
2	USB_N
3	USB_P
4	GND

Tab. 3: Single USB Connector



There is a cable option available for the USB port:



Fig. 10: USB Cable Option

## 3.5 Driver Support

[www.ftdichip.com/Drivers/D2XX.htm](http://www.ftdichip.com/Drivers/D2XX.htm)

[www.ftdichip.com/Drivers/VCP.htm](http://www.ftdichip.com/Drivers/VCP.htm)



## 4 Appendix

### Revision History

Date	Version	Changes	Proofed to release
05.04.2018	1.0	First release	
11.06.2018	1.1	Import ordering information	

### Table of Figures

Fig. 1: Module Mounting .....	7
Fig. 2: Module Disassembly .....	8
Fig. 3: Module Carrier .....	9
Fig. 4: Screw .....	9
Fig. 5: Installation Screen .....	10
Fig. 6: D-SUB Detail .....	17
Fig. 7: D-SUB Detail Schematic .....	17
Fig. 8: Single USB Detail .....	18
Fig. 9: Single USB Detail Schematic .....	18
Fig. 10: USB Cable Option .....	18

### Index of Tables

Tab. 1: Available Modules .....	3
Tab. 2: D-SUB Connector .....	17
Tab. 3: Single USB Connector .....	18

# Terminology

AC	Alternating Current
ASCII	American standard code for information exchange, 7-bit character coding
CODE	Illustration rule for assigning characters from two different character sets
COM	Serial Communication Port
Hat-rail	U-profile mounting rail (TS35) for mounting standardized modules
GND	Negative reference potential for signal and power
LED	Light emitting diode – electronic component that lights up when current flows
NC	Not connected
USB	Universal Serial Bus – is a serial bus system for device connection
VCC	Positive supply voltage
Virtual COM	Virtual COM interface. Emulation of a serial interface