Operating Instructions

IF2004/USB

4-Channel RS422/USB Converter
The following sensors/systems can be connected to the 4-Channel RS422/USB Converter:

- Sensors of the ILD1420 / 1750 / 2300 series
- Sensors of the optoCONTROL ODC2500 / 2520 / 2600 series
- Systems of the confocalDT IFD2421 / 2422 / 2451 / 2461 / 2471 series
- Systems of the colorCONTROL ACS7000 series
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1. Safety
System operation assumes knowledge of the operating instructions.

1.1 Symbols Used
The following symbols are used in these operating instructions:

- **CAUTION** Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.
- **NOTICE** Indicates a situation that may result in property damage if not avoided.
- **measure** Indicates a user action.
- i Indicates a tip for users.

1.2 Warnings
Connect the power supply according to the safety regulations for electrical equipment.
> Risk of injury
> Damage to or destruction of the converter

Avoid shocks and impacts to the converter.
> Damage to or destruction of the converter

The supply voltage must not exceed the specified limits.
> Damage to or destruction of the converter

Protect the cable against damage.
> Destruction of the converter
> Failure of the converter

1.3 Notes on CE Marking
The following apply to the IF2004/USB converter:
- EU Directive 2014/30/EU
- EU Directive 2011/65/EU, “RoHS”

Products which carry the CE mark satisfy the requirements of the EU directives cited and the European harmonized standards (EN) listed therein. The EU Declaration of Conformity is available to the responsible authorities according to EU Directive, article 10, at:

MICRO-EPSILON MESSTECHNIK
GmbH & Co. KG
Königbacher Straße 15
94496 Ortenburg / Germany

The converter is designed for use in industrial environments and meets the requirements.
1.4 **Intended Use**
- The converter IF2004/USB is designed for use in industrial and laboratory applications. It is used for
  - converting from the RS422 interface to the USB interface.
- The converter must only be operated within the limits specified in the technical data, see Chap. 2.2.
- The converter must be used in such a way that no persons are endangered or machines and other material goods are damaged in the event of malfunction or total failure of the system.
- Take additional precautions for safety and damage prevention for safety-related applications.

1.5 **Proper Environment**
- Protection class: IP 40 (applies only when cables are plugged in)
- Temperature range:
  - Operation: +5 ... +50 °C (+41 up to +122 °F)
  - Storage: +5 ... +50 °C (+41 up to +122 °F)
- Humidity: 5 - 95 % (non-condensing)
- Ambient pressure: Atmospheric pressure
2. Functional Principle

2.1 Description

You can connect up to four sensors respectively controllers of Micro-Epsilon with RS422 interface with the adapter IF2004/USB 2.0 to a USB port.

2.2 Technical Data

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Converter via USB interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors/Controller</td>
<td>24 Volt external, see Fig. 2</td>
</tr>
<tr>
<td>Polarity protection</td>
<td>Yes</td>
</tr>
<tr>
<td>Galvanic separation</td>
<td>No</td>
</tr>
<tr>
<td>All GND signals are internal</td>
<td>connected with the housing.</td>
</tr>
</tbody>
</table>

| USB bus                      | USB-Interface 2.0            |

| Sensor-Interface Sensor 1/2,| 2 RS422 driver and 2 RS422  |
| Sensor 3/4                  | receiver per connector for  |
|                              | data transmission, input/output frequency max. 8 MHz |
|                              | 2 RS422 driver per connector for sensor synchronization, output frequency max. 8 MHz |

| Trigger inputs              | 4, TTL compatible           |
| Input voltage               | Low-Level ≤ 1.0 V           |
| High-Level > 2.0 V          |                             |
| Input current               | max. 3.0 mA                 |
| Input frequency             | max. 100 kHz                |

| Trigger outputs             | 2, TTL compatible           |
| Output voltage              | Low-Level ≤ 0.7 V at $I_{IN} = 5 \text{ mA}$ |
| High-Level > 2.8 V at $I_{OUT} = 5 \text{ mA}$ |
| Function                    | programmable                |

| FIFO                         | FIFO volume = 3072 tuple    |

| Temperature range            | Operation +5 ... +50 °C (+41 up to +122 °F) |
| Storage                      | +5 ... +50 °C (+41 up to +122 °F) |
3. **Delivery**

3.1 **Unpacking, Included in Delivery**
- 1 converter IF2004/USB
- 1 USB cable
- 1 CD with driver, instruction manual

Carefully remove the components of the converter from the packaging and ensure that the goods are forwarded in such a way that no damage can occur.

Check the delivery for completeness and shipping damage immediately after unpacking.

If there is damage or parts are missing, immediately contact the manufacturer or supplier.

3.2 **Storage**
- Temperature range storage: +5 ... +50 °C (+41 up to +122 °F)
- Humidity: 5 - 95 % (non-condensing)

4. **Mounting**

4.1 **Dimensions**
Converter dimensions (external dimensions): approx. 102.9 x 40.0 x 94.0 mm

*Fig. 1 Dimensional drawing IF2004/USB*
4.2 Electrical Connections

4.2.1 Connection Possibilities

Fig. 2 Connectors and LEDs IF2004/USB - front side

Fig. 3 Connectors IF2004/USB - rear side

Connectors and power LED:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4 LEDs green, function programmable (LED 1 to LED 4)</td>
</tr>
<tr>
<td>2</td>
<td>USB connector type B</td>
</tr>
<tr>
<td>3</td>
<td>3-pin terminal block type Phoenix contact no. 1827871 for power connection</td>
</tr>
<tr>
<td>4</td>
<td>6-pin terminal block type Phoenix contact no. 1803316 for additional sensor interface (sensor 1)</td>
</tr>
<tr>
<td>5</td>
<td>Sub-HD 15-pin connector for sensor interface (sensor 1 and 2)</td>
</tr>
<tr>
<td>6</td>
<td>Sub-HD 15-pin connector for sensor interface (sensor 3 and 4)</td>
</tr>
<tr>
<td>7</td>
<td>Binder connector series 712 7-pin type 09-0424-00 for external trigger inputs / outputs</td>
</tr>
</tbody>
</table>

Fig. 4 Overview connectors and LEDs
Fig. 5 Connectors front side

Fig. 6 Connectors rear side

X = Cable length in m
4.2.2 RS422 Connectors to 6-pin Clamp

4.2.2.1 Serial Numbers up to 000253

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>ILD 1420 PCF1420- X/I</th>
<th>ILD 1750 PC1700- X</th>
<th>ILD 2300 PC2300/OE PC2300-0,5/Y</th>
<th>ODC2520 PC/ SC2520- x</th>
<th>ODC2500 SCD2500-x/ RS422</th>
<th>ACS7000 CAB-M9- 5P-St-ge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Converter TxD-</td>
<td>green</td>
<td>gray</td>
<td>blue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Converter TxD+</td>
<td>yellow</td>
<td>yellow</td>
<td>red</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Converter RxD+</td>
<td>pink</td>
<td>brown</td>
<td>violet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Converter RxD-</td>
<td>gray</td>
<td>green</td>
<td>black</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2.2.2 Serial Numbers from 000300

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>ILD 1420 PCF1420- X/I</th>
<th>ILD 1750 PC1700- X</th>
<th>ILD 2300 PC2300/OE PC2300-0,5/Y</th>
<th>ODC2520 PC/ SC2520- x</th>
<th>ODC2500 SCD2500-x/ RS422</th>
<th>ACS7000 CAB-M9- 5P-St-ge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Converter TxD-</td>
<td>yellow</td>
<td>yellow</td>
<td>red</td>
<td>green</td>
<td>green</td>
<td>brown</td>
</tr>
<tr>
<td>2</td>
<td>Converter TxD+</td>
<td>green</td>
<td>gray</td>
<td>blue</td>
<td>brown</td>
<td>yellow</td>
<td>white</td>
</tr>
<tr>
<td>3</td>
<td>Converter RxD+</td>
<td>gray</td>
<td>green</td>
<td>black</td>
<td>gray</td>
<td>white</td>
<td>yellow</td>
</tr>
<tr>
<td>4</td>
<td>Converter RxD-</td>
<td>pink</td>
<td>brown</td>
<td>violet</td>
<td>yellow</td>
<td>brown</td>
<td>green</td>
</tr>
</tbody>
</table>

4.2.3 Trigger Inputs

- Pin 1: Trigger IN 1
- Pin 2: Trigger IN 2
- Pin 3: Trigger IN 3
- Pin 4: Trigger IN 4
- Pin 5: Trigger OUT 1
- Pin 6: Trigger OUT 2
- Pin 7: GND

7-pin subminiature male cable connector,
Company Binder, series 712, view: solder pin side male cable connector

4.2.4 RS422 Connectors to 15-pol. Sub-D, Sensor 1/2 and 3/4

<table>
<thead>
<tr>
<th>Pin 1</th>
<th>Sensor 1/3 Tx-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pin 2</td>
<td>Sensor 1/3 Tx+</td>
</tr>
<tr>
<td>Pin 3</td>
<td>Sensor 1/3 Rx-</td>
</tr>
<tr>
<td>Pin 4</td>
<td>Sensor 1/3 RX+</td>
</tr>
<tr>
<td>Pin 5</td>
<td>GND</td>
</tr>
<tr>
<td>Pin 6</td>
<td>Sensor 1/3 TRG+</td>
</tr>
<tr>
<td>Pin 7</td>
<td>Sensor 1/3 TRG-</td>
</tr>
<tr>
<td>Pin 8</td>
<td>+24 V 2)</td>
</tr>
<tr>
<td>Pin 9</td>
<td>Sensor 2/4 TRG+</td>
</tr>
<tr>
<td>Pin 10</td>
<td>Sensor 2/4 TRG-</td>
</tr>
</tbody>
</table>

2) Power supply +24 V via power connection, see Fig. 7
4.2.5 Supply Voltage

Nominal value: 24 VDC

- Only turn on the power supply after wiring has been completed.
- Connect the 24 VDC and GND inputs at the converter with a 24 V voltage supply.

Use the power supply for measurement instruments only, not simultaneously for drives or similar pulse interferences.

> Disturbance of the data output

MICRO-EPSILON recommends using an optional available power supply unit PS2020, see Chap. A 1, for the converter.

5. Installation of Driver

Before first use of the converter install the respective driver of the company FTDI.

<table>
<thead>
<tr>
<th>Source of supply for the driver</th>
<th>FTDI Virtual COM Port Treiber (ZIP, 1.32 MB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation CD from unpacking</td>
<td><a href="http://www.micro-epsilon.com/download/drivers/FTDI_VCP_Driver.zip">http://www.micro-epsilon.com/download/drivers/FTDI_VCP_Driver.zip</a></td>
</tr>
</tbody>
</table>

Install the driver as follows:
- Insert the installation CD into the CD-ROM drives.
- Connect the sensor/controller with the USB converter.
- Connect the USB converter cable with a free USB port.
- Connect the converter with a power supply.

The driver installation starts automatically. Depending on the operating system the latest driver of the internet or the driver CD is used.

For users of Windows 7:

If you use an computer with internet access, connect the converter to a free USB port. Windows 7 automatically searches for the latest driver version and installs the driver.

Manual installation of driver:

You can also install the driver manually if the driver is not installed automatically. Install the driver as follows:
- Insert the installation CD into the CD-ROM drives.
- Connect the sensor/controller with the USB converter.
- Connect the USB converter cable with a free USB port.
- Connect the converter with a power supply.
Start the device manager, menu Start > Control Panel > Device Manager.

Right-click the entry and choose Update Driver Software ...

Choose the path for the driver by means of Browse...

Click on the Next button.

The routine now starts the installation of the driver.

Click on the button Close to finish installation.
6. **Triggering**

The trigger inputs trigger In 1 ... 4 on the converter are connected internal with a pull down resistance with the supply ground. The trigger inputs switches with TTL high level.

![Diagram of trigger inputs](image)

**Fig. 8 Wiring trigger inputs**

- Ideally connect sensors respectively controllers of the same series for triggering, different measuring ranges are possible. This enables coordinated output characteristics of the converter because the time responses of the connected sensors resp. controllers are equivalent.

For triggering sensors/controllers are set to a slave operating mode while the IF2004/USB works as master.

The following application of triggering presumes a operational IF2004/USB with connected sensors resp. controllers; the voltage supply of IF2004/USB is turned on:

- Configure the trigger type in the sensor/controller.
- Opportunity 1: MultiChannelTool  
  Opportunity 2: Data Acquisition Library
- You can find the MultiChannelTool and the Data Acquisition Library (MEDAQLib) in the download area of the respective sensors/controllers on our website.
- **Example with ILD2300**
  - Choose the button **Multi channel configuration** in the menu **Extras** and choose the trigger type.
  - Choose the command **SP_Trigger-mode**.
  - Start the measurement.
  - Activate triggering with a high impulse (TTL) on the trigger inputs of the converters, see **Fig. 8**.

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IF2004/USB
7. Software Support with MEDAQLib

MEDAQLib offers you a documented driver DLL. Therewith you embed the RS422/USB converter and the connected sensors/controllers into an existing or a customized PC software.

MEDAQLib
- contains a DLL, which can be imported into C, C++, VB, Delphi and many additional programs,
- makes data conversion for you,
- works independent of the used interface type,
- features by identical functions for the communication (commands),
- provides a consistent transmission format for all MICRO-EPSILON sensors.

For C/C++ programmers MEDAQLib contains an additional header file and a library file.

You will find the latest driver / program routine at:
www.micro-epsilon.de/download
www.micro-epsilon.de/link/software/medaqlib

8. Liability for Material Defects

All components of the device have been checked and tested for functionality at the factory. However, if defects occur despite our careful quality control, MICRO-EPSILON or your dealer must be notified immediately.

The liability for material defects is 12 months from delivery. Within this period defective parts, except for wearing parts, will be repaired or replaced free of charge, if the device is returned to MICRO-EPSILON with shipping costs prepaid. Any damage that is caused by improper handling, the use of force or by repairs or modifications by third parties is not covered by the liability for material defects. Repairs are carried out exclusively by MICRO-EPSILON.

Further claims can not be made. Claims arising from the purchase contract remain unaffected. In particular, MICRO-EPSILON shall not be liable for any consequential, special, indirect or incidental damage. In the interest of further development, MICRO-EPSILON reserves the right to make design changes without notification.

For translations into other languages, the German version shall prevail.

9. Service, Repair

If the converter or the USB cable is defective:
- Please send us the affected parts for repair or exchange.

In the cause of a fault cannot be clearly identified, please send the entire measuring system to:

MICRO-EPSILON MESSTECHNIK
GmbH & Co. KG
Königbacher Strasse 15
94496 Ortenburg / Germany

Tel. +49 (0) 8542 / 168-0
Fax +49 (0) 8542 / 168-90
info@micro-epsilon.de
www.micro-epsilon.com

10. Decommissioning, Disposal

Remove all cables from the converter.

Incorrect disposal may cause harm to the environment.

Dispose of the device, its components and accessories, as well as the packaging materials in compliance with the applicable country-specific waste treatment and disposal regulations of the region of use.
## Appendix

### A 1 Optional Accessories

<table>
<thead>
<tr>
<th>DIN rail mounting clip</th>
<th>Installation of the converter on a DIN rail or for direct wall mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="DIN rail mounting clip" /></td>
<td><img src="image2.png" alt="Installation of the converter on a DIN rail or for direct wall mounting" /></td>
</tr>
<tr>
<td>22.5 (89)</td>
<td>30 (1.18)</td>
</tr>
<tr>
<td>17.5 (69)</td>
<td>5.8 (0.32)</td>
</tr>
<tr>
<td>Mounting rail TS35</td>
<td>8.9 (0.35)</td>
</tr>
<tr>
<td>2 x ø4.4 (.17 dia.)</td>
<td>36 (1.42)</td>
</tr>
<tr>
<td>30 (1.18)</td>
<td>54 (2.13)</td>
</tr>
<tr>
<td>90 (3.54)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PS2020</th>
<th>Power supply for DIN rail mounting, input 230 VAC, output 24 VDC/2.5 A</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="PS2020" /></td>
<td><img src="image4.png" alt="Power supply for DIN rail mounting, input 230 VAC, output 24 VDC/2.5 A" /></td>
</tr>
</tbody>
</table>