MICRO-EPSILON

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 / 1900 / 2300 series
- Sensors of the optoCONTROL ODC2500 / 2520 / 2600 series
- Sensors of the optoNCDT ILR2250 series
- Systems of the confocalDT IFD2421 / 2422 / 2451 / 2461 / 2465 / 2466 / 2471 series
- Systems of interferoMETER IMS5400 / 5600 series
- Systems of the colorCONTROL ACS7000 series

Contents

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.
➡	Indicates a user action.
i	Indicates a tip for users.
`Measure`	Indicates hardware or a software button/menu.

1.2 Warnings

⚠ **CAUTION**

Connect the power supply according to the safety regulations for electrical equipment.

> Risk of injury

> Damage to or destruction of the converter

NOTICE

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

Products which carry the CE mark satisfy the requirements of the EU directives cited and the relevant applicable harmonized European standards (EN). The converter is designed for use in industrial environments.

The EU Declaration of Conformity and the technical documentation are available to the responsible authorities according to the EU Directives.

1.4 Intended Use

- The IF2004/USB converter 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 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: IP40 (applies only when cables are plugged in)
- Temperature range:
  - Operation: +5 ... +50 °C (+41 ... +122 °F)
  - Storage: +5 ... +50 °C (+41 ... +122 °F)
- Humidity: 5 - 95 % (non-condensing)
- Ambient pressure: Atmospheric pressure

2.   Functional Principle

2.1   Description

The IF2004/USB 2.0 adapter enables to connect up to four sensors or controllers from Micro-Epsilon equipped with an RS422 interface to a USB port.

Fig. 1 Anschlussmöglichkeiten an die IF2004/USB

2.2   Technical Data

Model	IF2004/USB	
Power supply	Converter	via USB interface
	Sensors/Controller	24 V external, see Fig. 3
	Reverse polarity protection	Yes
	Galvanic isolation	No
	All GND signals are connected internally and with the housing.	
USB bus	USB-Interface 2.0	
Sensor interface Sensor 1/2, Sensor 3/4	2 x RS422 drivers and 2 x RS422 receivers per connector for data transmission, input/output frequency max. 8 MHz	
	2 x RS422 drivers per connector for sensor synchronization, output frequency max. 8 MHz	
Digital input	4, TTL-compatible	
	Input voltage	Low level $\leq$ 1.0 V
		High level > 2.0 V
	Input current	max. 3.0 mA
	Input frequency	max. 100 kHz
Digital output	2, TTL-compatible	
	Output voltage	Low level $\leq$ 0.7 V at I_{IN} = 5 mA
		High level > 2,8 V at I_{OUT} = 5 mA
	Function	Programmable
FIFO	FIFO volume = 3072 tuples	
Temperature range	Operation	+5 ... +50 °C (+41 ... +122 °F)
	Storage	+5 ... +50 °C (+41 ... +122 °F)

3.   Delivery

3.1   Unpacking, Included in Delivery

- 1 IF2004/USB converter

- 1 USB cable

- 1 Operating instructions

➡ 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 ... +122 °F)

- Humidity: 5 - 95 % (non-condensing)

4. Installation

4.1 Dimensions

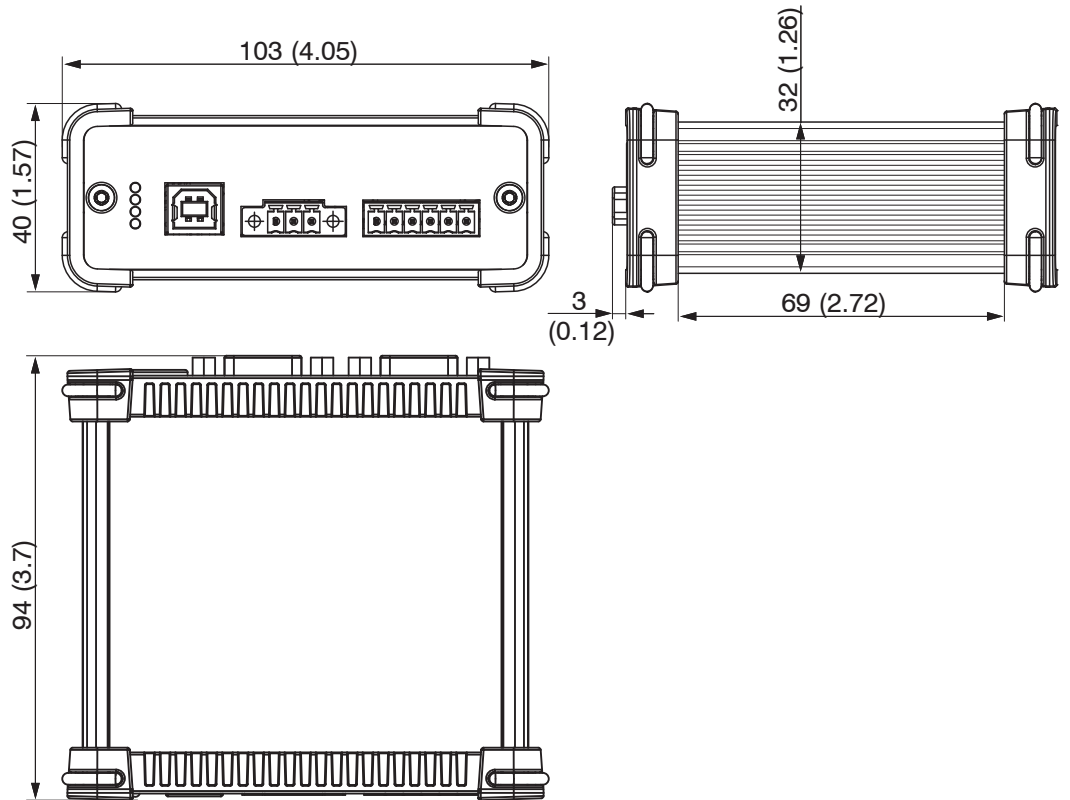Converter dimensions (outer dimensions): approx. 102.9 x 40.0 x 94.0 mm

Fig. 2 Dimensional drawing IF2004/USB, dimensions in mm (inches)

4.2 Electrical Connections
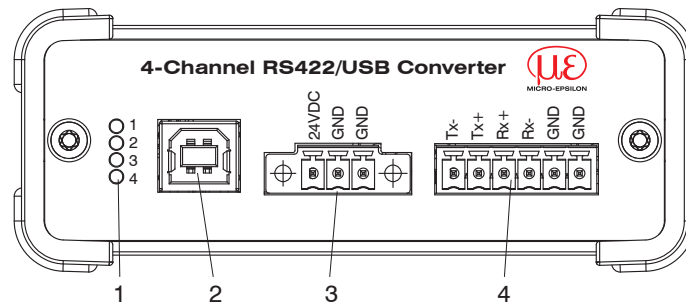
4.2.1 Connection Possibilities

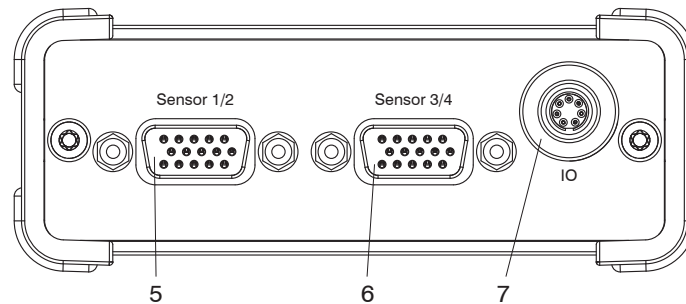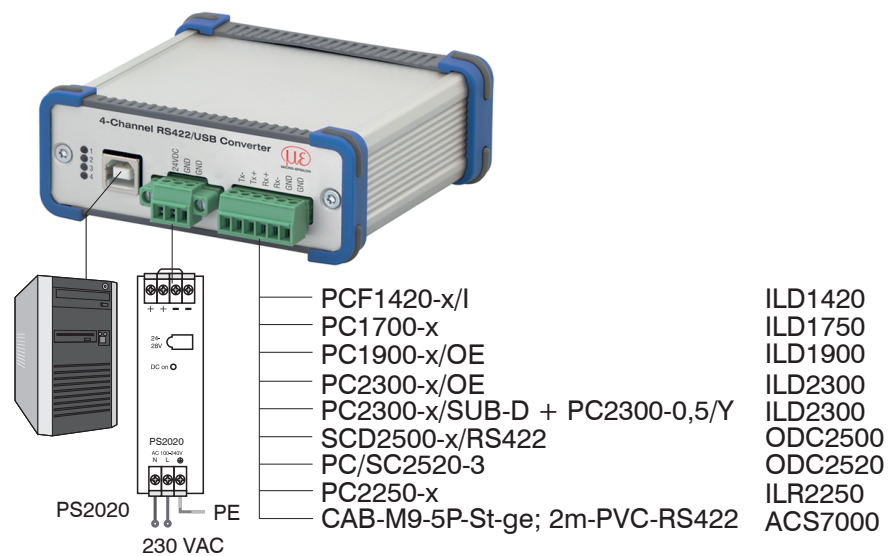*Fig. 3 Connectors and LEDs IF2004/USB - front side*

Fig. 4 Connectors IF2004/USB - rear side

Connectors and power LED:

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

Fig. 5 Overview connectors and LEDs

PCF1420-x/I	ILD1420
PC1700-x	ILD1750
PC1900-x/OE	ILD1900
PC2300-x/OE	ILD2300
PC2300-x/SUB-D + PC2300-0,5/Y	ILD2300
SCD2500-x/RS422	ODC2500
PC/SC2520-3	ODC2520
PC2250-x	ILR2250
CAB-M9-5P-St-ge; 2m-PVC-RS422	ACS7000

X = Cable length in m

Fig. 6 Connections front side

SCD2004/IO
IF2004/USB-Y
PCF1420-x/IF2008   ILD1420
PC1700-x/IF2008   ILD1750
PC1900-x/IF2008 (IF2008-y) ILD1900
PC2300-x/IF2008   ILD2300
PC/SC2520-3/IF2008   ODC2520
SCD2500-x/IF2008   ODC2500
SC2471-x/IF2008   IFC24xx, IMS5x00
PCF2250-x/IF2004   ILR2250-100
CAB-M9...RS422;Sub-D   ACS7000
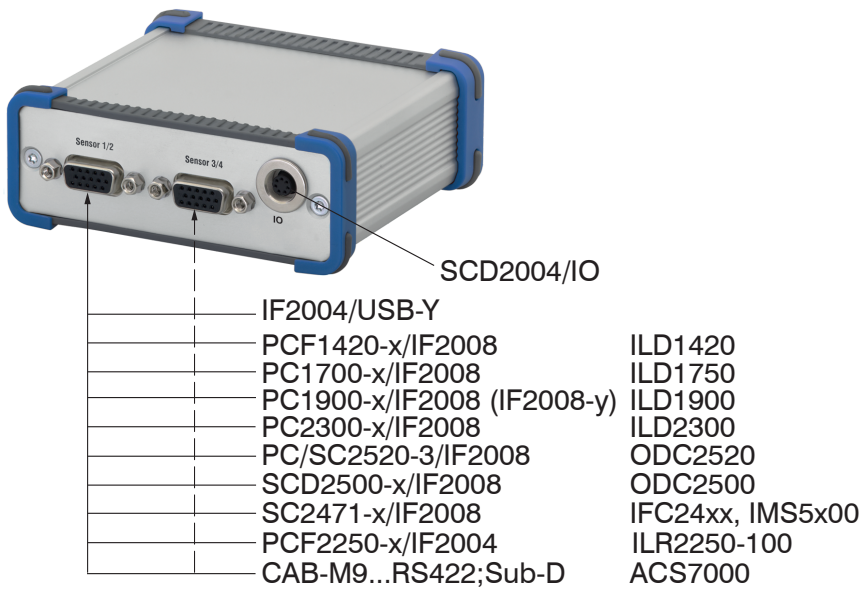
Fig. 7 Connections rear side

4.2.2 RS422 Connections to 6-Pole Terminal Block

4.2.2.1 Serial Numbers up to 000253

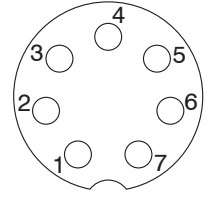| Terminal Converter	ILD1420 PCF1420-x/I	ILD1750 PC1700-x	ILD1900 PC1900-x/OE	ILD2300 PC2300/OE PC2300-0,5/Y	
Converter Tx-	Green	Gray	Green	Blue	
Converter Tx+	Yellow	Yellow	Yellow	Red	
Converter Rx+	Pink	Brown	Pink	Violet	
Converter Rx-	Gray	Green	Gray	Black	
Terminal Converter	**ILR2250 PC2250-x**	**ODC2520 PC/SC2520-x**	**ODC2500 SCD2500-x/RS422**	**ACS7000 CAB-M9-5P-St-ge**	
Converter Tx-	White	Brown	Yellow	White	
Converter Tx+	Brown	Green	Green	Brown	
Converter Rx+	Gray	Yellow	Brown	Green	
Converter Rx-	Pink	Gray	White	Yellow	

4.2.2.2 Serial Numbers from 000300

Terminal Converter	ILD1420 PCF1420-x/I	ILD1750 PC1700-x	ILD1900 PC1900-x/OE	ILD2300 PC2300/OE PC2300-0,5/Y	
Converter Tx-	Yellow	Yellow	Yellow	Red	
Converter Tx+	Green	Gray	Green	Blue	
Converter Rx+	Gray	Green	Gray	Black	
Converter Rx-	Pink	Brown	Pink	Purple	
Terminal Converter	**ILR2250 PC2250-x**	**ODC2520 PC/SC2520-x**	**ODC2500 SCD2500-x/RS422**	**ACS7000 CAB-M9-5P-St-ge**	
Converter Tx-	Brown	Green	Green	Brown	
Converter Tx+	White	Brown	Yellow	White	
Converter Rx+	Pink	Gray	White	Yellow	
Converter Rx-	Gray	Yellow	Brown	Green	

4.2.3 Digital Inputs (IO)

Pin 1	IN 1
Pin 2	IN 2
Pin 3	IN 3
Pin 4	IN 4
Pin 5	OUT 1
Pin 6	OUT 2
Pin 7	GND

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

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

Pin 1	Sensor 1/3 Tx-		Pin 11	Sensor 2/4 Tx-
Pin 2	Sensor 1/3 Tx+		Pin 12	Sensor 2/4 Tx+
Pin 3	Sensor 1/3 Rx-		Pin 13	Sensor 2/4 Rx-
Pin 4	Sensor 1/3 RX+		Pin 14	Sensor 2/4 Rx+
Pin 5	GND		Pin 15	GND
Pin 6	Sensor 1/3 TRG+		Pin 8	Sensor 2/4 TRG +
Pin 7	Sensor 1/3 TRG-		Pin 9	Sensor 2/4 TRG-
Pin 10	+24 V [1]		Pin 10	+24 V [1]

1) Power supply +24 V via power connection,

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.
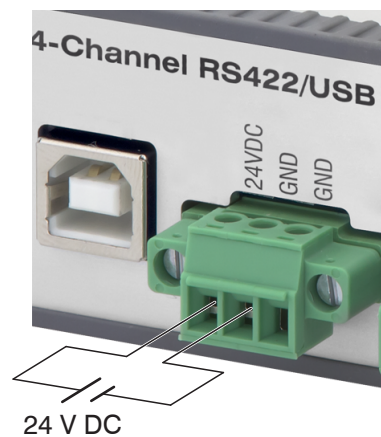

24 V DC

Fig. 8 Supply voltage connection

NOTICE

Voltage supply only for measuring devices, not to be used for drives or similar sources of impulse interference at the same time.

> Disturbance of the data output

MICRO-EPSILON recommends using the optionally available PS2020 power supply unit for the converter, see Appendix Optional Accessories.

5.   Installation of USB Driver

➡ Install the corresponding `FTDI Virtual COM Port Driver` before you use the converter for the first time.

You can find the current driver at:

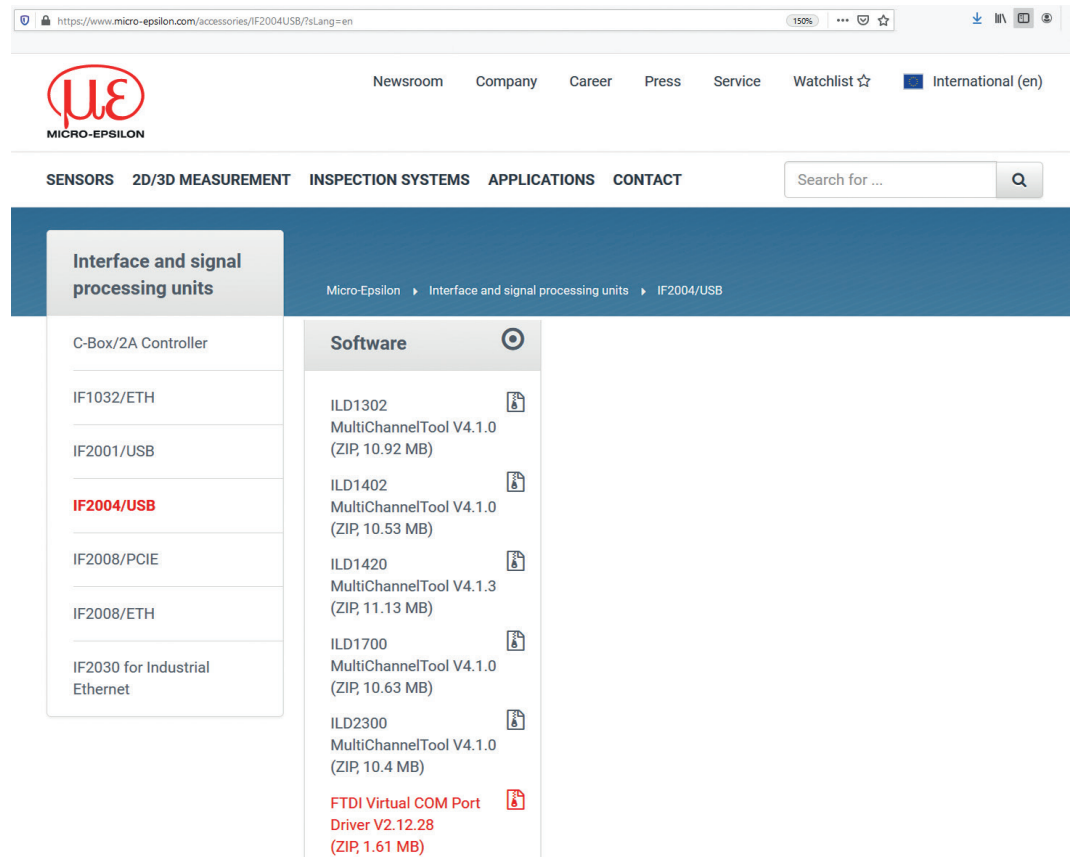http://www.micro-epsilon.com/download/drivers/FTDI_VCP_Driver.zip

Fig. 9 View of IF2004/USB main page for the installation of the FTDI Virtual COM Port driver

➡ Now install the driver as follows [1]:

➡ Unpack the driver (zip file).

➡ Connect the sensor/controller with the USB converter.

➡ Connect the USB converter with a free USB port of a PC/notebook.

➡ Connect the converter with a power supply.

➡ Start the device manager under `Control panel > Hardware and Sound > Devices and Printers > Device Manager.`

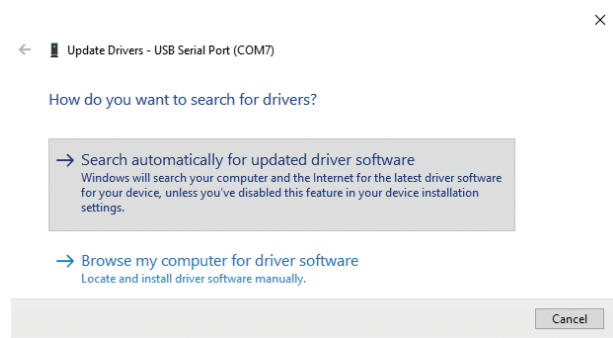➡ Right-click the entry `USB Serial Port` and select `Update driver...`
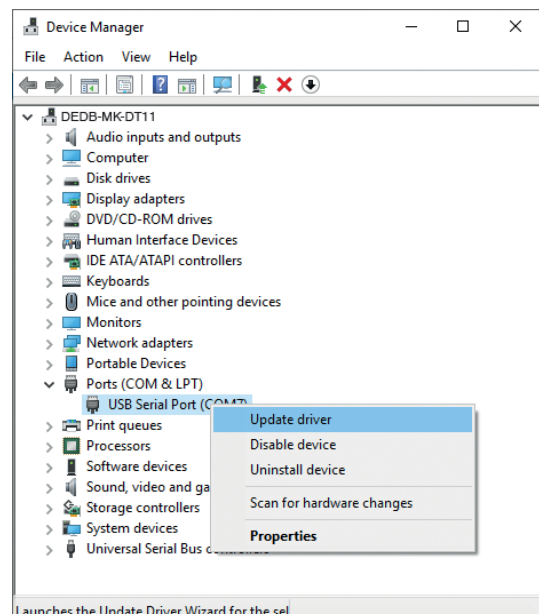
1) Valid for Windows 10

A window opens where you can choose among two possibilities:

1. Automatic Installation

➡ Choose `Search auto-matically for updat-ed driver software.`

Windows will search your computer and the Internet for the latest driver software for your device, unless you have disabled this feature in your device installation settings.

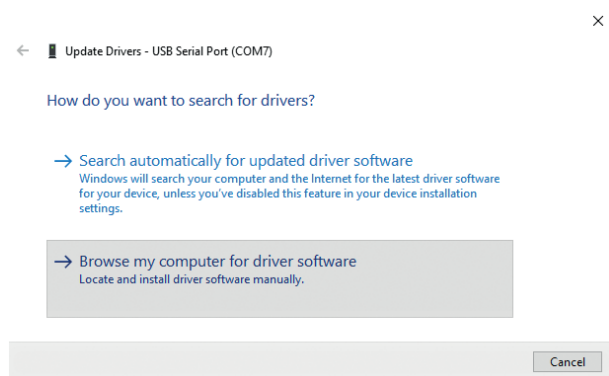The routine now starts the installation of the driver.

➡ Click on the `Close` button to complete the installation.
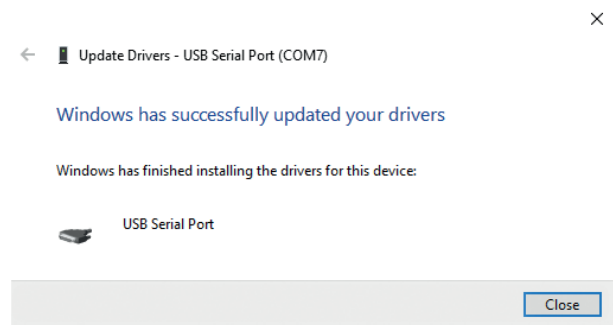
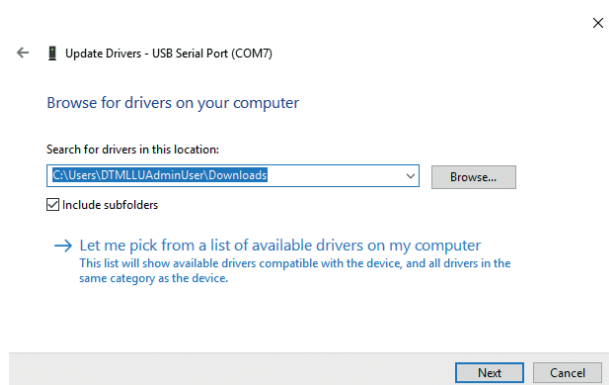### 2. Manual Installation

Locate and install the driver software manually.
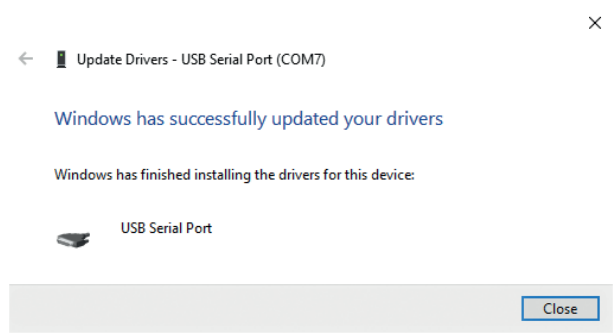
➡ Choose `Browse my computer for driver software.`

➡ Now use `Browse` to find the driver in the path where you saved it when you downloaded it from the web page.

➡ Go to `Next`.

The routine now starts the installation of the driver.

➡ Click on the `Close` button to complete installation.

> Update Drivers - USB Serial Port (COM7)
>
> Windows has successfully updated your drivers
>
> Windows has finished installing the drivers for this device:
>
> USB Serial Port
>
> Close

6. Digital Inputs

The IN1 ... IN4 digital inputs are connected internally to the supply ground via a pull-down resistor. The digital inputs switch with a TTL high level.
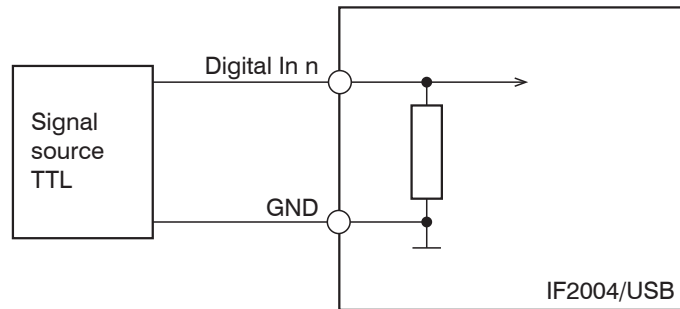

Fig. 10 Circuitry of digital inputs

i You require programming skills in order to use the IF2004/USB!

Please use the Micro Epsilon Data Acquisition Library (MEDAQLib) when programming the IF2004/USB. It can be found in the download area of the respective sensor or controller on the website or at

https://www.micro-epsilon.de/link/software/medaqlib

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 other programs,

- converts the data for you,

- works independently of the used interface type,

- stands out due to identical functions for the communication (commands),

- offers 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 routine at:

https://www.micro-epsilon.de/download/

https://www.micro-epsilon.de/link/software/medaqlib

8.   sensorTOOL

You can open the web page of a sensor via the `sensorTOOL` program. The web interface contains, among other things, the current settings of the sensor and the periphery. Operation is only possible while there is an RS422 connection to the sensor.

The sensor is connected to a PC/notebook via the IF2004/USB and the supply voltage must be applied.

➡ Start the program `sensorTOOL`.

You can find this program online at

https://www.micro-epsilon.com/download/software/sensorTOOL.exe.
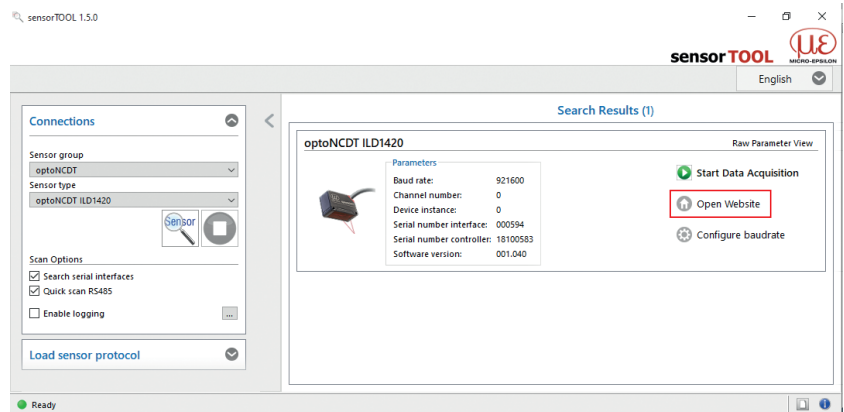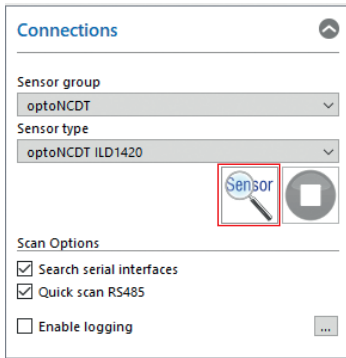
➡ Select the connected sensor.

➡ Click the `Sensor` button with the magnifier symbol.

The program will now search for connected sensors on the available interfaces.

You need an HTML5-compatible web browser on a PC/notebook.

➡ Select a desired sensor.

➡ Click the `Open Website` button.

Fig. 11 Auxiliary sensor search program and home page

9.   Disclaimer

All components of the device have been checked and tested for functionality in the factory. However, should any defects occur despite careful quality control, these shall be reported immediately to MICRO-EPSILON or to your distributor / retailer.

MICRO-EPSILON undertakes no liability whatsoever for damage, loss or costs caused by or related in any way to the product, in particular consequential damage,
e.g., due to

- non-observance of these instructions/this manual,

- improper use or improper handling (in particular due to improper installation, commissioning, operation and maintenance) of the product,

- repairs or modifications by third parties,

- the use of force or other handling by unqualified persons.

This limitation of liability also applies to defects resulting from normal wear and tear (e.g., to wearing parts) and in the event of non-compliance with the specified maintenance intervals (if applicable).

MICRO-EPSILON is exclusively responsible for repairs. It is not permitted to make unauthorized structural and / or technical modifications or alterations to the product. In the interest of further development, MICRO-EPSILON reserves the right to modify the design.

In addition, the General Terms of Business of MICRO-EPSILON shall apply, which can be accessed under Legal details | Micro-Epsilon https://www.micro-epsilon.com/impressum/.

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

10.   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
Koenigbacher Str. 15
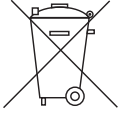94496 Ortenburg / Germany

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

11.   Decommissioning, Disposal

In order to avoid the release of environmentally harmful substances and to ensure the reuse of valuable raw materials, we draw your attention to the following regulations and obligations:
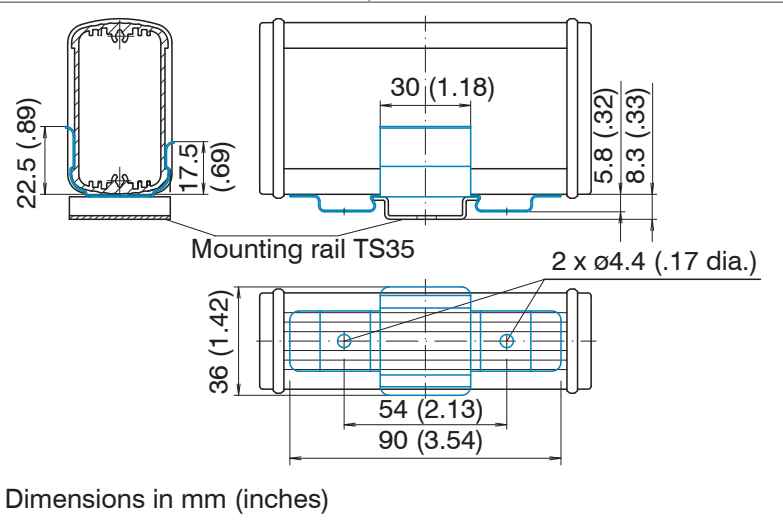
- Remove all cables from the sensor and/or controller.

- Dispose of the sensor and/or the controller, 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.

- You are obliged to comply with all relevant national laws and regulations.

For Germany / the EU, the following (disposal) instructions apply in particular:

- Waste equipment marked with a crossed garbage can must not be disposed of with normal industrial waste (e.g. residual waste can or the yellow recycling bin) and must be disposed of separately. This avoids hazards to the environment due to incorrect disposal and ensures proper recycling of the old appliances.

- A list of national laws and contacts in the EU member states can be found at https://ec.europa.eu/environment/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en.
  Here you can inform yourself about the respective national collection and return points.

- Old devices can also be returned for disposal to MICRO-EPSILON at the address given in the imprint at https://www.micro-epsilon.de/impressum/.

- We would like to point out that you are responsible for deleting the measurement-specific and personal data on the old devices to be disposed of.

- Under the registration number WEEE-Reg.-Nr. DE28605721, we are registered at the foundation Elektro-Altgeräte Register, Nordostpark 72, 90411 Nuremberg, as a manufacturer of electrical and/or electronic equipment.

Appendix

Optional Accessories

DIN rail mounting clip		Installation of the converter on a DIN rail or for direct wall mounting
	 Mounting rail TS35 2 x ø4.4 (.17 dia.) 30 (1.18) · 5.8 (.32) · 8.3 (.33) 22.5 (.89) · 17.5 (.69) · 36 (1.42) 54 (2.13) · 90 (3.54) Dimensions in mm (inches)	
PS2020		Power supply for DIN rail mounting, input 230 VAC, output 24 VDC/2.5 A

X9751304-B062032HDR