OPTIBRIDGE Handbook

USB interface cable for HART® devices

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KROHNE

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1.1 Software history

INFORMATION!
In the table below, "x" is a placeholder for possible multi-digit alphanumeric combinations, depending on the available version.

Release date	Electronic revision	Changes and compatibility	Documentation
2016-03-01	ER 1.0.X_	-	MA OPTIBRIDGE R01

1.2 Intended use

CAUTION!
The device is not approved for operation within the hazardous area. Operate the device outside the hazardous area only!

CAUTION!
Responsibility for the use of the devices with regard to suitability, intended use and corrosion resistance of the used materials against the atmospheric conditions lies solely with the operator.

INFORMATION!
The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

OPTIBRDIGE is an USB interface cable which allows to communicate with 2-wire HART® devices using a personal computer, the computer's USB port and suitable software.

1.3 Certification

CE marking

The device fulfils the statutory requirements of the following EU directives:

- EMC Directive 2014/30/EU

The manufacturer certifies successful testing of the product by applying the CE marking.

1.3.1 ATEX conformity

The manufacturer declares with the EU declaration of conformity on his own responsibility conformity with the protection goals of directive 2014/34/EU. Conformity with harmonised standards was checked in accordance with EN 60079-0:2012 and EN 60079-11:2012. The EU declaration of conformity is based on the EC type examination certificate: ZELM 16 ATEX 0557. You can download the EC Type-Examination-Certificate from the manufacturer's website.

The Ex marking reads as follows: II (1) G [Ex ia] IIC

1.3.2 Approval according to the IECEx scheme

Conformity with IECEx standards was tested in accordance with the IECEx Certification Scheme for Explosive Atmospheres acc. to IEC 60079-0:2011, IEC 60079-11:2012. The number of the IECEx certificate is:

IECEx ZLM 16.0005

You can download the IECEx certificate from the official IECEx website www.iecex.com or from the manufacturer's website.

1.4 Safety instructions from the manufacturer

1.4.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer's documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.4.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

1.4.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

1.4.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.

1.4.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

DANGER!
This warning refers to the immediate danger when working with electricity.

DANGER!
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

DANGER!
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

DANGER!
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.

WARNING!
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.

CAUTION!
Disregarding these instructions can result in damage to the device or to parts of the operator's plant.

INFORMATION!
These instructions contain important information for the handling of the device.

LEGAL NOTICE!
This note contains information on statutory directives and standards.

- HANDLING
  This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➲ RESULT
This symbol refers to all important consequences of the previous actions.

1.5 Safety instructions for the operator

WARNING!
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.
This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.

2.1 Scope of delivery

INFORMATION!
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

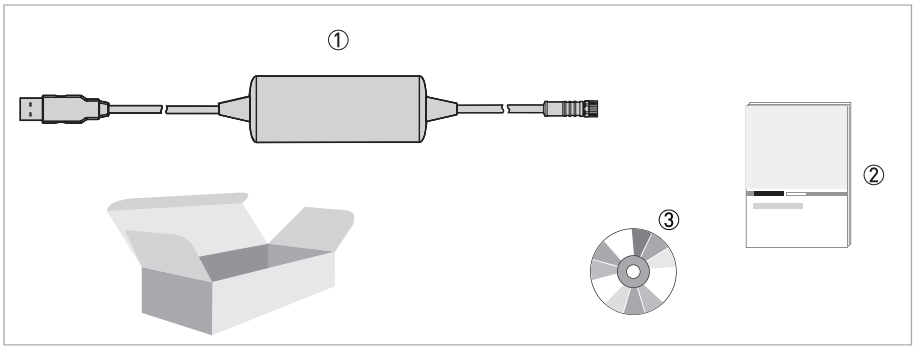

Figure 2-1: Standard scope of delivery

① Ordered device
② Documentation
③ CD with software

Accessories / spare parts

- Adapter cable M8-VP2 for OPTIBRIDGE - M8 connector (male) and VP cable connector for sensor with VP2-connector.
- Adapter cable M8-Strands for OPTIBRIDGE- M8 connector (male) and strands.

For further information contact your local sales office.

2.2 Device description

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

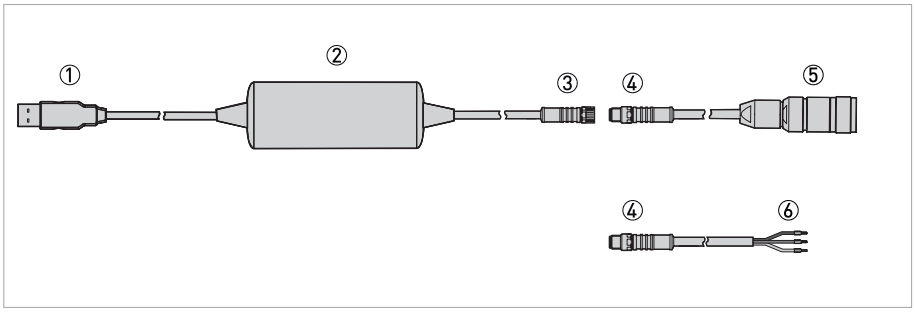

Figure 2-2: Construction of the device

① USB 2.0
② OPTIBRIDGE
③ M8 connector (female)
④ M8 connector (male)
⑤ VP cable connector
⑥ Strands

Adapter cable M8-VP2 for OPTIBRIDGE with M8 connector (male) ④ and VP cable connector ⑤ for sensor with VP2-connector (optional).

Adapter cable M8-Strands for OPTIBRIDGE with M8 connector (male) ④ and strands ⑥ (optional).

2.3 Nameplate

Figure 2-3: Example for a nameplate

① Manufacturer
② Device name
③ Order code
④ Serial number
⑤ Electronic revision (ER)
⑥ Manufacturing date / Ingress protection
⑦ Electronic/electric device waste marking
Observe the operation, installation instruction, CE-marking

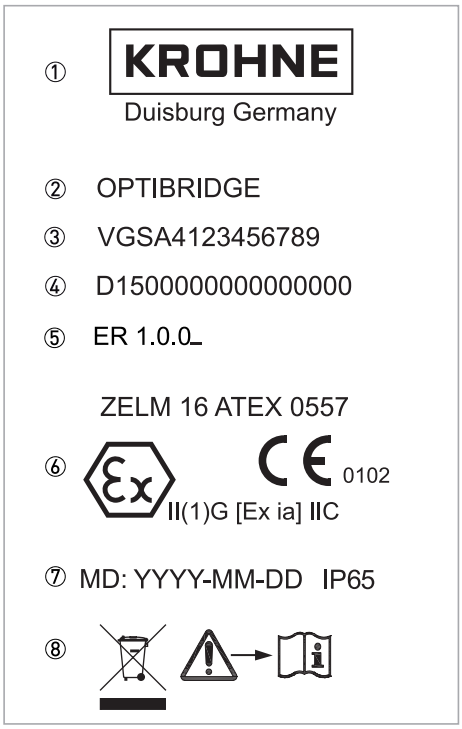

Figure 2-4: Example for a ATEX nameplate

① Manufacturer
② Device name
③ Order code
④ Serial number
⑤ Electronic revision (ER)
⑥ Approvals
⑦ Manufacturing date / Ingress protection
⑧ Electronic/electric device waste marking
Observe the operation and installation instruction

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

3.1 General notes on installation

CAUTION!
The device is not approved for operation within the hazardous area. Operate the device outside the hazardous area only!

DANGER!
All work on the electrical connections may only be carried out with the power disconnected.

DANGER!
Observe the national regulations for electrical installations!

WARNING!
During installation of the device make sure that you use ESD (electrostatic discharge) protection equipment.

WARNING!
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

INFORMATION!
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

INFORMATION!
Do a check of the packing list to make sure that you have all the elements given in the order.

INFORMATION!
Look at the device nameplate to ensure that the device is delivered according to your order.

3.2 Storage and transport

- Store the device in a dry, dust-free location.
- Avoid contact with water.
- Store the device in its original packing.
- Storage temperature: -40...+70°C / -40...+158°F

3.3 Electrical data

Connect the USB connector to a non-intrinsically safe USB interface with the data as follows:

- Nominal voltage: 5.0 V
- Minimal voltage: 4.65 V
- Nominal current: 250 mA
- Safety value Um = 253 V

Connect the M8 connector (sensor circuit) to an intrinsically safe circuit.

Observe the following maximum values for the sensor circuit when connecting:

- U_0 = 28.7 V
- I_0 = 73 mA
- P_0 = 0.53 W
- C_0 = 77 nF
- L_0 = 70 mH

3.4 Pre-installation requirements

WARNING!
Do not lengthened or shorten the cable with M8 connector (female). The total length of the device included adapter cable must not be longer than 3 m / 9.84 ft.. Use only the adapter cables, which are intended for the device.

System requirements:

- Windows 7 (32-bit / 64-bit)
- PACTware™ 4.1
- Administrator rights

INFORMATION!
The CD contains several software packages (DTM, drivers, etc.).
The software packages are free of charge and can also be downloaded from the manufacturer homepage.

INFORMATION!
It is recommend to run all setups as administrator (even if you are already logged in as administrator). Install the software from CD provided from the manufacturer or copy the setup to your local hard drive.

3.5 Installation procedure

WARNING!
During installation of the device make sure that you use ESD (electrostatic discharge) protection equipment.

CAUTION!
- *Never shorten the cable length*
- *Store the device in its original packaging in a dry, dust-free location. Keep it away from dirt.*
- *Moisture inside the connectors must be avoided! Moisture may cause a short-circuit and deliver erratic readings! If moisture has entered the connector dry it with air (e.g. hot air gun).*

INFORMATION!
If the former SMARTBRIDGE device DTM is already installed you will get the following error message: "SMARTBRIDGE device DTM is already installed".
Uninstall the SMARTBRIDGE device DTM first and then execute the OPTIBRDIGE device DTM Setup.

The operation of the software device DTM requires the correct installation of the device driver. The driver software is part of the device DTM and will be installed automatically during the installation process. The driver software must be installed before connecting the device to the computer. Otherwise, the operating system can not find the interface to the associated driver.

- Log in as administrator.
- Insert the software CD into your computer CD drive and start the installation software.
- Follow the instruction according to the instructions displayed on the screen.
- The software is installed in the default program directory of your computer under subdirectory \KROHNE\OPTIBRIDGE DTM.
- Start installation of PACTware™ 4.1. It is recommended to install the ICS Generic HART® DTM and HART® Communication FDT as well in order to enable you to use generic HART® devices for communication with PACTware™.
- Start installation of the device DTM.

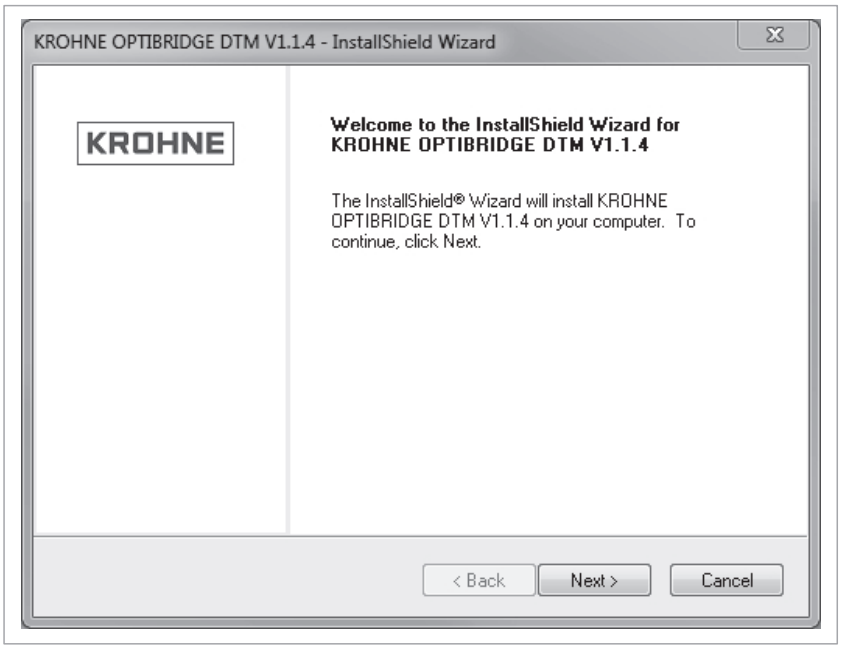

Figure 3-1: Installation procedure

3.6 Connecting the device

WARNING!
During installation of the device make sure that you use ESD (electrostatic discharge) protection equipment.

CAUTION!
The resistor (load) for HART® communication is already integrated in the OPTIBRDIGE.

CAUTION!
Moisture on the sensor connector must be avoided! Moisture may cause a short-circuit and a malfunction of the sensor!
If moisture has entered the connector dry it with air (e.g. hot air gun).

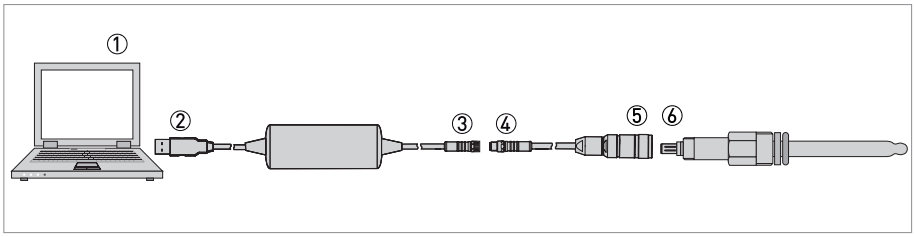

Figure 3-2: Connecting with adapter cable M8-VP2

① Primary master (PC / notebook with PACTware™ FDT/DTM)
② USB-connector
③ M8 cable connector (female)
④ M8 connector (male)
⑤ VP cable connector
⑥ Sensor connector

- Select the adapter cable suitable for your device.
- Plug in the USB connector ② into the USB port of the primary master ①.
- Connect the M8 cable connector (male) ④ with the M8 cable connector (female) ③ and tighten it by hand (max. 5 Nm).
- Screw the VP cable connector ⑤ on the sensor connector ⑥ and tighten it by hand (max. 5 Nm).

Connection diagram for any 2-wire HART® device.

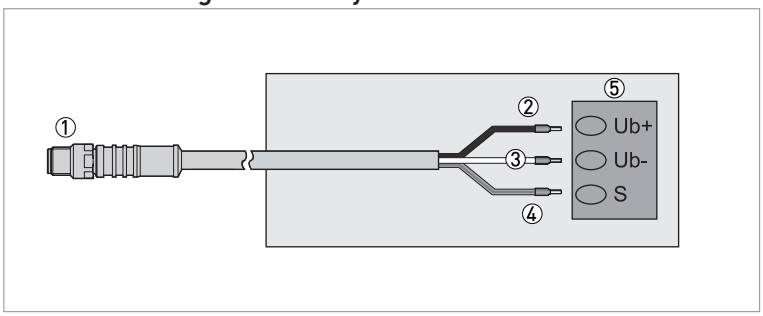

Figure 3-3: Connecting with adapter cable M8-strands

① M8 cable connector (male)
② Black - Ub+
③ White - Ub-
④ Yellow / Green - shield S
⑤ HART® slave

4.1 Starting up for the first time

INFORMATION!
To avoid injury and material damage, only operate the device under the following conditions:

- *Installation and connection in accordance with the manufacturer's instruction.*
- *Temperature and electrical data in accordance with the technical specifications.*
- *The equipment parts necessary for safety are effective in the long run, never disable them during operation!*

4.2 Operating the device with PACTware™

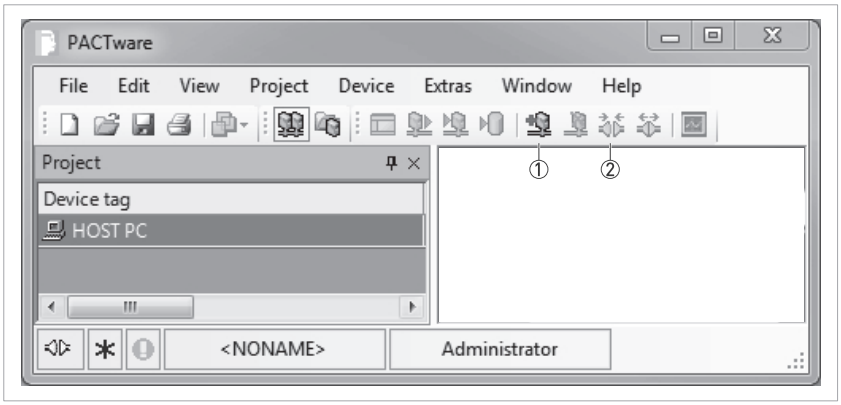

Figure 4-1: Operating the device

In order to use the device with PACTware™, perform as mentioned below.

- Open PACTware™ 4.1
- Add device ①
- Connect device ②

5.1 Configuration device DTM

The device DTM is a CommDTM for the interface device. The configuration can be accessed by selecting the function “Channel Configuration” offered by the device DTM.

- Integrate the software device DTM into any standalone frame application (e.g. PACTware™, FieldCare).

➲ The CommDTM is ready for use.

- Start the frame application to use the CommDTM.
- Update the device catalogue of the Frame Application

➲ The device DTM is registered and ready for work

The software device DTM can be integrated into any standalone frame application (e.g. PACTware™, FieldCare). After the installation of the software (shown on page 15), the CommDTM is ready for use. In order to actually use the CommDTM, it is necessary to start the frame application. Then, the device catalogue of the Frame Application has to be updated.

The device DTM is now registered and ready for work.

5.2 Offline configuration

5.2.1 Driver configuration

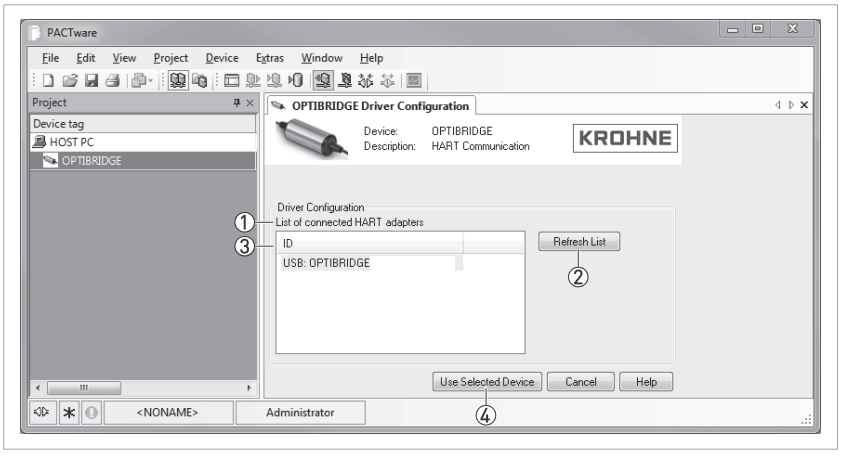

Figure 5-1: Driver configuration

This window is used to select one of the connected devices. The window can be accessed via menu "additional functions". The following features can be configured:

- "List of connected HART®adapters" ①.
- "Refresh List" ② - Refresh the list of connected HART® adapters.
- "ID (Init Device)" ③ - The selected device is initialised. This is useful to find the selected device if more than one device is connected.
- "Use Selected Device" ④ - This button closes the dialog. The selected device is used for communication.

5.2.2 Channel configuration

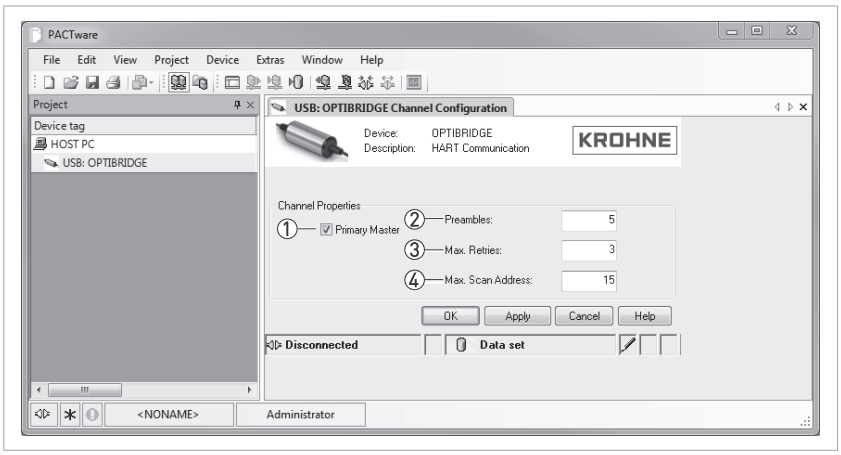

Figure 5-2: Channel configuration

The window is used to configure the channel. The window can be accessed via menu "additional functions". The following features can be configured:

"Primary Master" ① - The parameter Primary Master specifies whether the HART® master operates as the Primary master or as a Secondary master on the bus.

"Preambles" ② - The default setting for the number of preambles for communication with HART® bus devices. This value is used to establish the initial connection to a HART® device. The number of preambles to use for communication with the device is read from the device itself and used for communication afterwards.

"Max. Retries" ③ - This parameter specifies how often the HART® master retries to transmit information in case of an error.

"Max. Scan Address" ④ - This parameter represents the maximum polling address. The value must not exceed 63 for HART®7 (in HART® 5 or lower revisions the value must not exceed 15). The scan procedure of 64 polling addresses (0 - 63) requires several minutes.

5.2.3 Connecting Device DTM

INFORMATION!
To use the following functions the device DTM has to be connected via pressing the "connect" button in PACTware™.

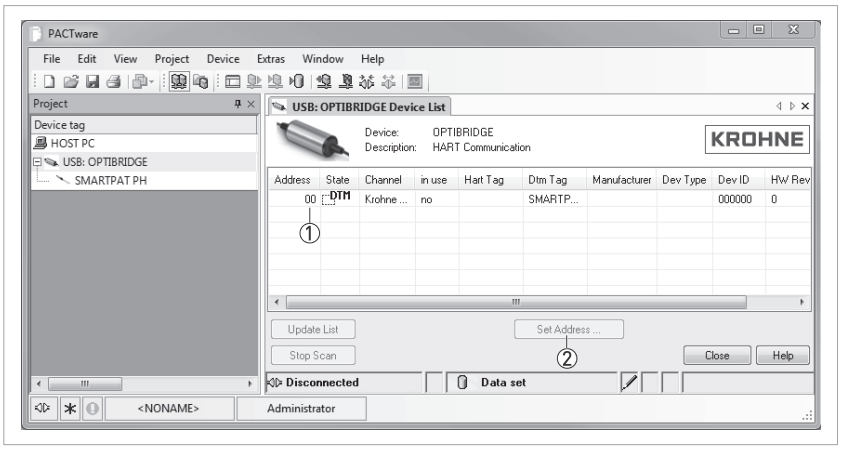

Figure 5-3: Device list

- The window ① lists all available devices and it can be accessed via menu "Additional functions".
- Add and select a device DTM and press the button "Set Address" ② to access the function.
- Make sure that the device DTM is added but not connected (offline).

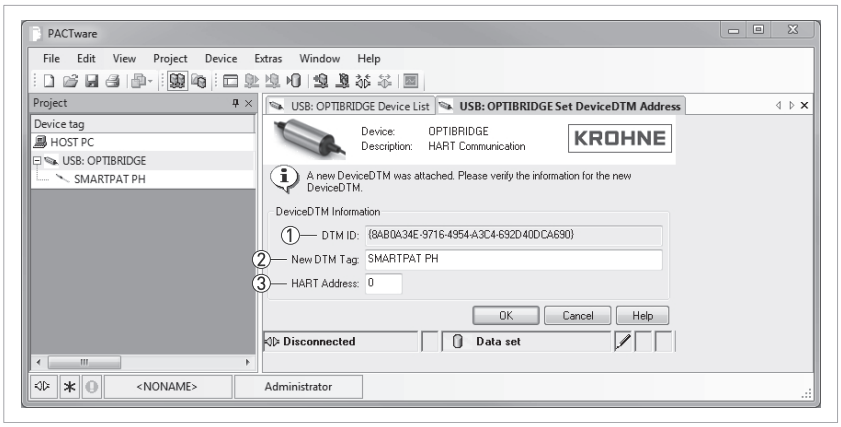

Figure 5-4: Set device DTM Address

When a device DTM is connected to the device DTM a window opens, that allows to set the DTM-TAG and the slave address of the device DTM.

"DTM ID" ①- This is the unique ID of the device DTM from the frame application.
It may vary among different frame applications.

"New DTM TAG" ② - Set a new TAG for the device DTM.

"HART Address" ③ - This is the address of the device that the device DTM should communicate with. This number is the polling address. The long address with device and manufacturer ID is acquired from the device when the connection is established.

If you are not sure about the polling address of your device, start the topology scan. With this function a list of connected devices with corresponding polling addresses will be listed.

5.3 Online configuration

5.3.1 Device list

INFORMATION!
To use the following functions the device DTM has to be connected via pressing the "connect" button in PACTware™.

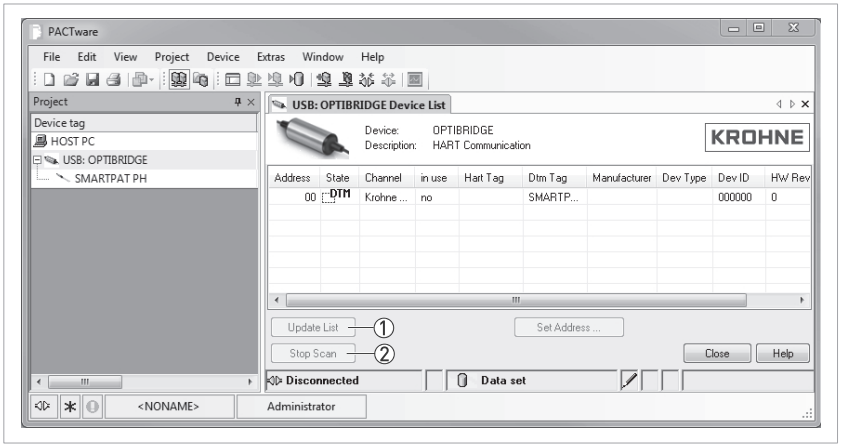

Figure 5-5: Device list

The window can be accessed via menu "additional functions"

The device DTM offers in addition to the function "Topology scan" an own window "Device List" to scan the HART® bus for devices. Press the button "Update List" ① to scan for devices. Press the button "Stop Scan" ② to stop the scan. The device list provides information about HART® devices that are connected to the HART® networks. If the device list is opened offline, it provides a list of Child DTMs without associated devices.

Address	The Polling address of the device.
State	State field is used to display an icon, that reflects the state of device configuration. The following icons are possible.
	This entry represents a Child DTM. This DTM is not associated to any existing HART® device.
	This entry represents an existing HART® device. No Child DTM is configured for this device.
	This entry represents a HART® device which is configured with a Child DTM.
Channel	This is the used channel of the device Comm DTM.
In Use	Status about whether the device DTM is connected.
HART TAG	TAG of the device stored in the device itself.
DTM TAG	TAG of the device DTM.
Manufacturer	Manufacturer of the device.
Dev Type	Device type of the HART® device.
Dev ID	Device ID of the HART® device.
HW Rev	Hardware revision of the device.
SW Rev	Software revision of the device.

The “Update List” button starts a new scan for devices on the HART® bus. The list will be dynamically updated during the scan whenever a device is found. During the scan the button “Stop Scan” is activated. The scan can be stopped at any time.

The button "Set Address" is used to open the window to change the polling address of the selected DTM and/or slave device.

5.3.2 Changing polling address

INFORMATION!
Do not change the polling address if not necessary!

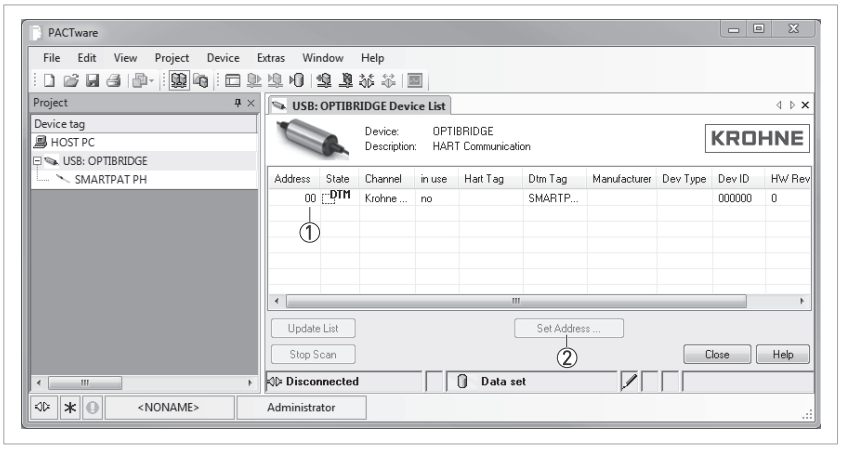

Figure 5-6: Device list

Select a Device DTM in the window Device List and press the button "Set Address" to access the window.

- Select a device DTM ①
- Click on "Set Address" ② button

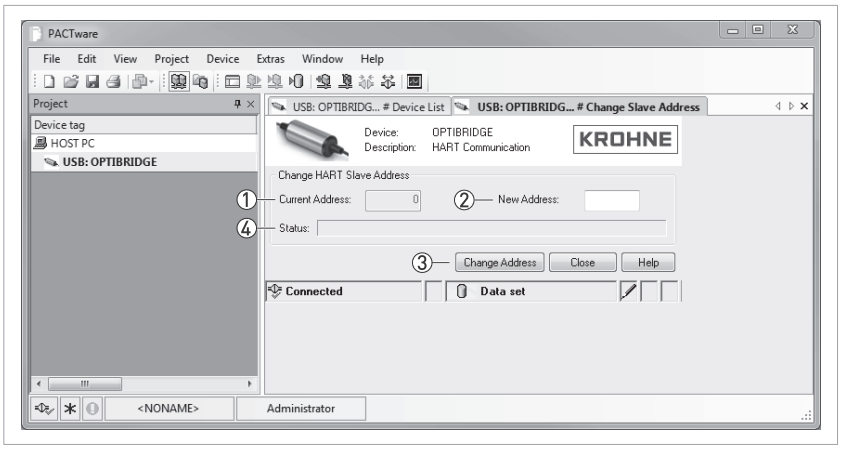

Figure 5-7: Changing slave address

With the help of this window the polling address for a device can be set to a new value. This window can be accessed only if the slave is connected to the device via VP connector and no DTM for this slave is added and connected.

Current address ① - This is the current address of the device on the HART® bus. The content of this field is set automatically when the window is opened.

New address ② - This is the desired new address for the device.

Change address ③ - Press this button to transfer the address change.

Status ④ - Information about status of the address change.

5.3.3 Set DTM and Device address

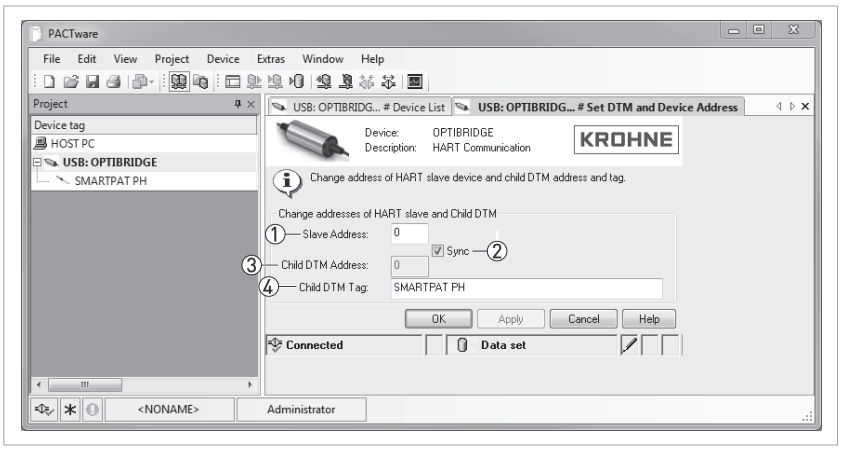

Figure 5-8: Set DTM and Device address

Select a Device DTM in the window "Device List" and press the button "Set Address" to access the window.

The new device address must not be in use and no Device DTM may have open connections to the source address. The device DTM checks these requirements before the address change is attempted. If any of these requirements is not fulfilled or the change of address itself fails for other reasons, an error message is displayed in the status field.

With the help of this window it is possible to change the address of a HART® slave device together with the address of a connected Device DTM. This window is opened by the “Set Address” button in the device list window for list entries that represent devices with assigned DTMs.

"Slave address" ① - The new address for the HART® slave device.

"Sync" ② - If this feature is activated, the values are kept in the slave address and DTM address fields.

"Child DTM address" ③ - The new address for the Device DTM.

"Child DTM TAG" ④ - The TAG of the Device DTM.

6.1 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!
For more precise information, please contact your local sales office.

6.2 Returning the device to the manufacturer

6.2.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

CAUTION!
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

- *Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.*
- *This means that the manufacturer can only service this device if it is accompanied by the following certificate (see next section) confirming that the device is safe to handle.*

CAUTION!
If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

- *to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,*
- *to enclose a certificate with the device confirming that is safe to handle and stating the product used.*

6.2.2 Form (for copying) to accompany a returned device

CAUTION!
To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

Company:		Address:
Department:		Name:
Tel. no.:		Fax no. and/or Email address:
Manufacturer's order no. or serial no.:		
The device has been operated with the following medium:		
This medium is:		radioactive
		water-hazardous
		toxic
		caustic
		flammable
		We checked that all cavities in the device are free from such substances.
		We have flushed out and neutralized all cavities in the device.
We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.		
Date:		Signature:
Stamp:		

6.3 Disposal

CAUTION!
Disposal must be carried out in accordance with legislation applicable in your country.

Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste**.
The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.

7.1 Technical data

INFORMATION!

- *The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.*
- *Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).*

Design

Connectors	USB 2.0, M8 cable connector (female)
Connectors Adapter cable M8-VP2	M8 connector (male), VP cable connector (female)
Connectors Adapter cable M8-strands	M8 connector (male), strands

Operating conditions

Ambient temperature	0...+55°C / +32...+131°F
Storage temperature	-40...+70°C / -40...+158°F
Altitude	0...2000 m / 6600 ft
Relative humidity	5...95% rH, not condensing

Installation conditions

Ingress protection	IP65 (not for USB 2.0)
Weight	Approx. 400 g / 0.88 lbs

Materials

Housing	Stainless steel 1.4301, AISI 304 (V2A), PP

Communication

Field communication	HART® 7 - FSK 1200 physical layer definition on top of the current loop

Electrical connections

Power supply	No external supply required. Interface is powered via USB port.
Supply voltage	5 V (via USB 2.0)
Output voltage	24 V +/-10% (towards sensors)
Maximum ripple	0.2 V p-p (47 Hz...125 Hz)
Maximum noise	1.2 mV rms (500 Hz...10 kHz)
Maximum series impedance	403 Ohm

Approvals and certificates

CE	
This device fulfils the statutory requirements of the EC directives. The manufacturer certifies successful testing of the product by applying the CE mark.	
Electromagnetic compatibility	EMC Directive 2014/30/EU
Ex	IECEx: [Ex ia] IIC
	ATEX: II (1)G [Ex ia] IIC, Directive 2014/34/EU

7.2 Dimensions

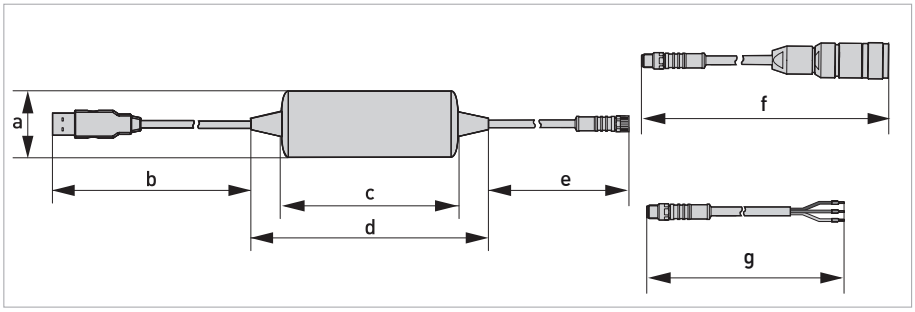

Figure 7-1: Dimensions

	Dimensions [mm]	Dimensions [inch]
a	Ø35	Ø1.38
b	300	11.81
c	85	3.35
d	130	5.12
e	1700	66.93
f	300	11.81
g	300	11.81

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