Technical Note

Document Version	Software Version	Revision date	Changes
Version 15.0	03.02.xx, 04.06.xx (BU, HBU, BUH)	01-Feb-2024	■ HBU/BU/BUH Removal of Control Panel installer.
Version 14.0	04.04.xx (BU, HBU, BUH)	01-Jun-2022	■ TEPI Support ■ TLS via USB interface
Version 13.0	03.02.xx, 04.03.xx (BU, HBU, BUH)	28-Feb-2021	■ One time password ■ Replace FTP with FTPS ■ Replace Telnet with SSH ■ System firewall ■ TLS 1.2 support ■ Modified header message handling
Version 12.0	04.02.xx (BU, HBU)	30-Jun-2020	■ One time password ■ Replace FTP with FTPS ■ Replace Telnet with SSH ■ System firewall
Version 11.0	04.01.xx (BU, HBU, BUH)	15-Oct-2018	■ HBU
Version 10.0	03.01.xx (BU, HBU, BUH)	31-Aug-2018	■ Telnet / FTP deactivation
Version 9.0	03.01.xx (BU, HBU, BUH)	31-Mar-2017	■ Windows 10 support for USB driver
Version 8.0	03.01.xx (BU, HBU, BUH)	15-May-2016	■ HBU/BU Control Panel replaced
Version 7.0	03.01.xx (BU, HBU, BUH)	02-Dec-2013	■ Windows 8 / 8.1 support for USB driver ■ Windows Server Operating System support for USB driver ■ Change of telnet login screen ■ Editorial changes
Version 6.0	03.01.xx (HBU, BUH)	20-Sept-2011	■ Multi-slot support for BUH ■ Dynamic baud rate change for HBU/BU ■ Re-work of BASEConf.xml structure ■ Windows 7 support for USB driver

Please send questions or comments about this document to your local Roche representative.

Intended use

The Technical Note provides the necessary technical information for system administrators and technicians to successfully connect the following Roche Diagnostics Point of Care devices to a Point of Care Data Management System (POC DMS).

This document describes how to connect

■ the Handheld Base Unit (also called the **HBU** in this document), REF 08408793190, and

■ the Base Unit (also called the **BU** in this document), REF 07671717190

■ the Base Unit Hub (also called **BUH** in this document), REF 05888760001, in combination with the Base Unit Light (also called **BUL** in this document), REF 08376824190

All devices listed serve the purpose of establishing communication between a data management system (host) and the respective Roche Point of Care testing instrument.

This version of the Technical Note describes the handling of a *Handheld Base Unit* or a *Base Unit* running the software versions **04.06.xx**, or a Base Unit Light/Base Unit Hub, running the software versions **03.02.xx**.

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NIS03-0128-15.0-MAN UDS - Technical Note

1   Definitions

Glossary and acronyms

Term/Abbreviation	Definition/Description
BU	Base Unit
BUL	Base Unit Light
BUH	Base Unit Hub
BUL-BUH	Configuration of BUH in combination with one or more BUL(s)
DHCP	Dynamic Host Configuration Protocol
DMS	Data Management System
DNS	Domain Name System
Domain name	Name of the domain where the computer with hostname is known. The domain is defined by one or more domain server(s)
FTPS	File Transfer Protocol (FTP) over TLS
Fully qualified domain name (FQDN)	hostname + domain name. Example: hostname = dms, domain name = roche.com → FQDN = dms.roche.com
HBU	Handheld Base Unit
Hostname	Name of the HBU in a network environment (if DNS is used)
ICI	Instrument Communication Interface
IP	Internet Protocol
IrDA	Infrared Data Association (defines communications protocol standards and specifications for the short-range exchange of data over infrared light, for uses such as personal area networks)
OS	Operating System
POCT	Point of Care Testing
POCT1-A	Medical communication standard for sending data packages between point of care meters and the data management system (DMS) in a hospital.
SIR	Serial infrared. "Raw" mode of the IrDA standard. Sending of single bytes possible. Cannot be used together with the IrDA stack
SSH	Secure Shell (cryptographic network protocol)
SSL	Secure Socket Layer (encrypted communication protocol); precursor of TLS
TCP	Transmission Control Protocol
TCP messages	Message received from Ethernet by means of the TCP/IP protocol

Term/Abbreviation	Definition/Description
TEPI	**T**rust **E**stablishment for **P**ost-market **I**nstruments. Specific POC instruments use the TEPI platform to retrieve TLS certificates from Roche (via the Roche proprietary TEPI protocol). These POC instruments will be able to connect to the **cobas infinity** edge platform. Contact Roche for a list of supported POC instruments and further details about the **cobas infinity** edge platform and the configuration of the TEPI platform.
TLS	Transport Layer Security (encrypted communication protocol); successor of SSL
USB	Universal Serial Bus
USB Configuration Switch	A hardware switch with three positions on the HBU/BU/BUH available for the user (see Fig 3-1)
XML	Extensible Markup Language

2   General

Common features of HBU, BU and BUL-BUH

The HBU/BU is used as a:

■   charger for the docked meter

■   converter of meter communication (IrDA) to wired Ethernet

■   converter of host communication (USB Comm) to meter communication (IrDA)

The BUL in combination with the BUH is used as a:

■   charger for the docked meter(s)

■   converter of meter communications (IrDA via BUL) to wired Ethernet (BUH)

■   converter of host communication (wired Ethernet, BUH) to meter communication (IrDA via BUL)

The BUL alone is used as a:

■   charger for the docked meter

NOTE: Use the Base Unit Light (BUL) only in conjunction with the Base Unit Hub (BUH) or for charging the meters.

Local Area Network: protection from unauthorized access

If this HBU/BU/BUH is connected to a local area network, this network must be protected against unauthorized access. In particular, it must not be linked directly to any other network or the Internet. Customers are responsible for the security of their local area network, especially in protecting it against malicious software and attacks. This protection might include measures, such as a firewall, to separate the device from uncontrolled networks as well as measures that ensure that the connected network is free of malicious code.

Wired network connection

If connected to a local area network, the HBU/BU/BUH must be protected against unauthorized access by means of a **strong password management**. Observe your own facility guidelines on password management where available, or apply the following rules:

Characteristics of strong passwords

■　Passwords must not contain the user's account name or parts of the user's full name that exceed two consecutive characters.

■　Passwords must not repeat the same character more than four times

■　Passwords must be at least eight characters in length.

■　Passwords must contain characters from at least three of the following four categories:

– English **uppercase alphabetic** characters (A through Z)

– English **lowercase alphabetic** characters (a through z)

– **Numeric** characters (0 through 9)

– **Non-alphabetic** characters (for example, !, $, #, %)

Examples of weak passwords

■　**uhxwze11** contains no upper case letter.

■　**UHXW13SF** contains no lower case letter.

■　**uxxxxx7F** contains the same character more than four times.

■　**x12useridF** contains a substring of the user ID longer than four characters.

Fig 2-1   Front and top side elements of HBU (1), BU/BUL (2) and BUH (3)

A   The *charging contacts* are used to:

–   charge the instrument's rechargeable battery pack

–   power the instrument while docked

–   detect that an instrument has been docked in order to trigger the automatic host communication via Ethernet using the POCT1-A Protocol

B   The *IR window* is used to:

–   establish the connectivity between the HBU/BU/BUL and the POC meter/device (either via serial infrared or via IrDA, depending on the use-case)

C   The *status LED* on the HBU/BU/BUL/BUH indicates:

Signal	Meaning
Lit (red)	Power supply is connected, application is starting up (not for BUL)
Lit (green)	Ready
Flashing (red)	Error condition
Lit (blue)	Configuration mode (not for BUL)

The following connection points are available at the back of the HBU/BU/BUL/BUH:

(HBU)

(BU)   (BUL)
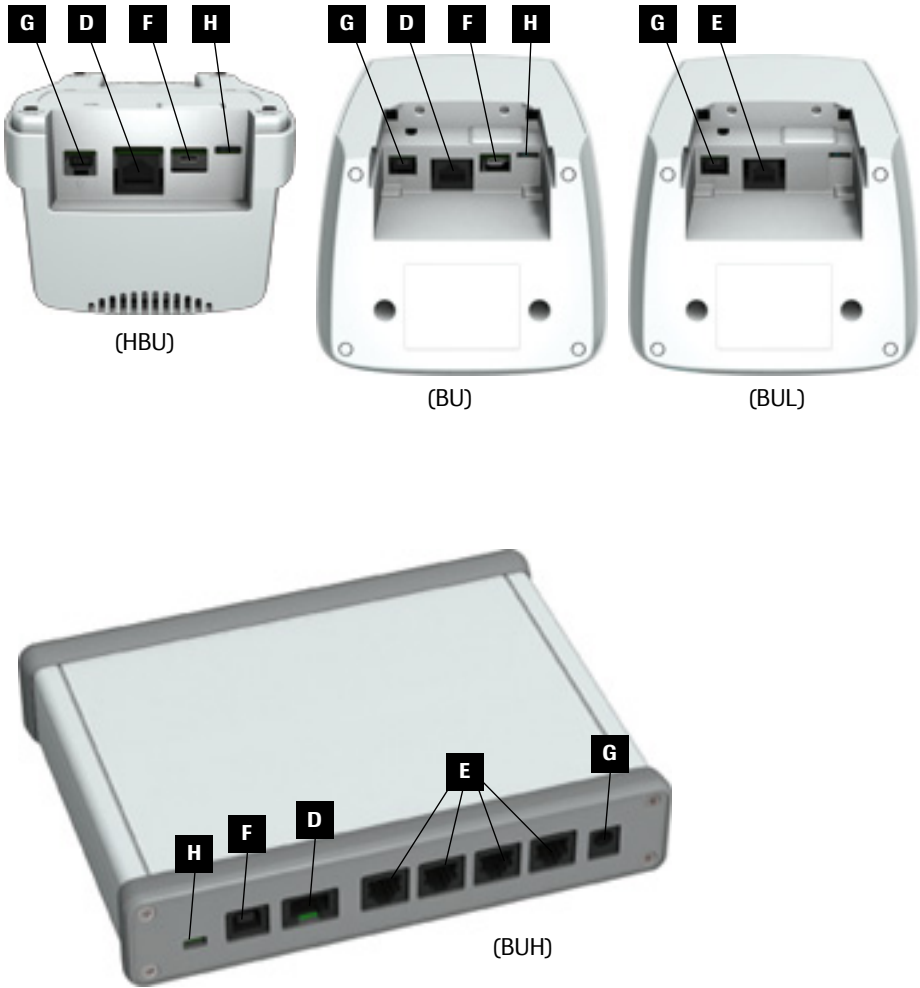

(BUH)

Fig 2-2   Connections at the back

D   *Network connection*: Ethernet/RJ45 port on HBU/BU/BUH, used for remote configuration and communication (see chapter 4, "Configuration Mode" and chapter 5, "Serial (Roche) & Ethernet (POCT1-A) Mode")

E   RJ25 port, used for communication and alternative power supply between BUH and BUL

F   *USB port*: used for local configuration (HBU, BU and BUH) and communication (HBU, BU) (see chapter 4, "Configuration Mode", chapter 5, "Serial (Roche) & Ethernet (POCT1-A) Mode" and chapter 6, "Serial (POCT1-A) Mode (HBU/BU only)")

G   *Power input jack*: used to power the HBU/BU/BUL/BUH and instrument (via charging contacts)

> **NOTE:** On the Base Unit Light, do **not** use power input jack **G** while the BUL is connected to a Base Unit Hub via an RJ25 cable. In this case power supply is provided directly by the BUH. Use the power input jack **G** only when using the BUL as a standalone charging device.

H   USB configuration switch (with a removable cover on BU and HBU)

Connecting the BUL to the BUH

To connect the BUL to the BUH, follow these steps:

1   Plug the RJ25 cable (provided with the BUH) into the RJ25 port on the BUL.

2   Connect the other end of the cable to one of the RJ25 ports available on the BUH.

> **NOTE:** When the BUL is connected to the BUH via an RJ25 cable, make sure that you **pull** the power supply cable from power input jack **G** of the BUL. Power is provided by the BUH via the RJ25 connection.

3   Modes of Operation

A USB configuration switch (on the back of the device) is used to set the HBU/BU to 1 of 3 modes of operation.

Fig 3-1   USB Configuration Switch positions on HBU (left), BU (middle) and BUH (right)

Pos	Mode	Description
1	Configuration	The HBU/BU/BUH acts as a removable disk on the USB port. This method of communication with the HBU/BU/BUH includes writing and reading files using a mounted file system.
2	Serial (ICI) & Ethernet (POCT1-A)	The HBU/BU converts host communication sent via USB (USB Comm) to meter communication via IR (SIR), sent to the meter via the IR window of the HBU/BU. -or- The HBU/BU/BUH converts meter communication (IrDA) received on the IR window of the HBU/BU/BUL to wired Ethernet. Note: The HBU/BU/BUH cannot handle Serial & Ethernet conversion simultaneously. Both communication paths will be handled one after the other by means of timeouts.
3	Serial (POCT1-A)	The HBU/BU converts meter communication (IrDA) received on the IR window of the HBU/BU to serial communication via USB (USB Comm) (not used on BUH).

Note: The position of the switch may be changed from one mode to another while the HBU/BU is powered on. A reboot is not necessary in order to apply the new mode.

4   Configuration Mode

Configuration mode is the mode for communicating changes to the HBU/BU/BUH. In this mode, the HBU/BU/BUH acts as a removable disk on the USB port (mass storage device).

The file system, exported by the HBU/BU/BUH if set to configuration mode, contains the following files:

File name	Purpose	Comment
BASEConf.xml	This is the HBU/BU/BUH configuration file	This file has an XML format
BASEConf.log	Stores the result of the changes to the BASEConf.xml file	This file is created by the HBU/BU/BUH and is a reply from the system to user changes in BASEConf.xml file. If the HBU/BU/BUH configuration file has a wrong format or some of the values set are illegal, the error messages are shown in this file.
error.log	A list of all internal error numbers that ever occurred	The output of the error.log file is of interest for Roche service staff only. Note: The error.log file will not be updated with the internal errors during "configuration" mode.
status.log	Textual description of status messages, warnings and errors	This information is relevant for the user of the HBU/BU/BUH. Please refer to Appendix A for further explanation.
update.log	If a software update fails, this file shows the reason for the failure (last one only).	This file is only created by the HBU/BU/BUH if the software update fails. Normally, the HBU/BU/BUH restarts during the software update, and no "update.log" file will be found.
ROCHE HBU-BU-BUH Technical Note.pdf	Technical description of the HBU/BU/BUH.	This document.

(Handheld) Base Unit/Base Unit Hub configuration file *BASEConf.xml*

The HBU/BU/BUH configuration is changed by means of a file in XML format. This XML file contains the configuration parameters: BASEConf.xml (see Appendix B for an example of a configuration file).

The following parameters can be set in the configuration file:

Parameter	Description	Value
Network		
IPAddr [1]	IP address of the HBU/BU/BUH	IP address [2]
Hostname	Host name of the HBU/BU/BUH	empty string or a string of up to 63 characters. Allowed characters: A-Z, 0-9, "." and "-".
IPSubmask [1]	Subnet mask of the HBU/BU/BUH	subnet mask [2]
Gateway [1]	IP address of the network gateway	IP address [2]
DNSServer [1]	IP address of the DNS server of the network. If the DMS is configured with a DNS, the HBU/BU/BUH uses the DNS server to resolve the DNS name.	IP address [2]
NTPServer [1, 3]	This parameter may be set to the IP address or the DNS name of the Network Time Protocol (NTP) server for the synchronization of the system time of the BU/HBU. If DHCP is activated, this parameter will be ignored and the NTP servers offered via DHCP will be used. If this parameter is set to "disable" the BU/HBU will ignore the system time provided via NTP. The system time must be set manually (not BUH).	IP address [2] or DNS name (not case sensitive; up to 63 characters) or "disable". Allowed characters: A-Z, 0-9, "." and "-".
DHCP	Enable or disable the ability to obtain network settings from a DHCP server. This overrides the following settings: IPAddr, IPSubmask, Gateway, DNSServer, NTP-Server.	"enable" or "disable"
FTPS	Enabled or disabled FTPS access	"enable" or "disable"
SSH	Enabled or disabled SSH access	"enable" or "disable"

Parameter	Description	Value
→ DMS		
DMSHost	IP address or DNS (host) name of the data management system (DMS). If the DMS is specified by its DNS name, the DNS server must be specified, or DHCP must be set to "enable". The DMS host name must be a "fully qualified domain name", such as "dms.uds.com"	IP address [2] or DNS name (not case sensitive), a string of up to 63 characters. Allowed characters: A-Z, 0-9, "." and "-"
DMSPort	The HBU/BU/BUH uses this port number when connecting to the DMS Note: this port number is defined by the DMS	Value: 0 - 65535 0 – means not set
Encryption	Enable the ability to use (TLS) encryption between HBU/BU/BUH and the DMS; (Note: encryption is based on TLS 1.2 standards for BU/HBU/BUH, encryption for USB Comm mode is only supported for HBU/BU v04.04.xx and above. For supported encryption types see page 19).	"enable" or "disable"
DMSDisconnect	Minutes of POCT1-A communication inactivity until the HBU/BU/BUH closes the connection to the DMS	Value: 0 - 65535 0 means never disconnect
HeaderMessage[4]	Sending a header information message to DMS or meter (see also page 18 for additional information)	Value: 0 - 2 0 means no header information message will be sent 1 means the header information message will be sent to the DMS 2 means the header information message will be sent to the connecting meter
Header	Defined header information that will be sent within the header information message as an identifier (see also page 18 for additional information)	Sequence of up to 50 characters (not allowed: "<", ">" and "&")
→ DMS Slot ="x,y,z" [5]		
[one or more DMS parameters]	see above (see also page 19 for additional information)	see above

Parameter	Description	Value
→ **TEPI**		
TEPIHost	Description: This parameter may be set to the IP address or the hostname which is used to connect to the TEPI platform (<empty> means: A connection to the TEPI platform will not be initiated)	IP address [2] or DNS name (not case sensitive) used to connect to the TEPI platform. String of up to 63 characters. Allowed characters: A-Z, 0-9, "." and "-"
TEPIPort	This parameter will define the PORT number which is used to connect to the TEPI platform	Value: 0 - 65535 0 – means not set
Security		
→ **Login**		
Username	Username to log on to the HBU/BU/BUH (see also section "Controlled user access to the HBU/BU/BUH configuration")	A registered and valid username
Password	Password to log on to the HBU/BU/BUH (see also section "Controlled user access to the HBU/BU/BUH configuration")	The valid password of the User "Username"
→ **UserAdd**		
Username	Username of user to be added. Users are required for a controlled access. See also sections "Controlled user access to the HBU/BU/BUH configuration", "Remote Control (SSH)" and "Remote Data Transfer (FTPS)".	The username and password have the following restrictions: String of 25 characters maximum. The HBU/BU supports a maximum of 20 users. Characters allowed (ASCII 33 to 126):
Password	Password of user to be added	! ," ,# ,\$,%, &, ', (,), *, +, , ,- ,. ,/,0-9,: ;, ;, < ,= ,> ,? ,@ ,A-Z,[,\ ,] ,^ ,_ ,` ,a-z ,{ ,| ,} ,~
→ **UserDel**		
Username	Username of user to be deleted	Username

Parameter	Description	Value
System		
Diagnostics	A regular time interval (days) set up to trigger a self-test. The self-test initiates a reboot of the HBU/BU/BUH.	Value: 0 - 7 0 = never perform a self-test
NewDate	Date to be set [6, 7]	dd.mm.yyyy (27.04.2008)
NewTime	Time to be set [6, 7]	hh:mm:ss (09:05:00) 24 hour notation

1. If DHCP is activated, these parameters will be ignored and offered via DHCP.
2. 0.0.0.0 means no IP address or subnet mask set; IP addresses must be Ipv4 compliant
3. The NTP protocol delivers the current date and time as "Coordinated Universal Time" (UTC standard time). The HBU/BU does not support handling of time zones and daylight saving time.
4. If set, sending header information message is also applied in both modes, POCT1-A mode via Ethernet and via USB ('Serial')
5. See section "Multi-slot configuration (only applicable to BUH)" as explained on page 19
6. Note: If the date/time setting is changed and the new date is beyond the interval "old date + Diagnostics value", a self-test is triggered as soon as the HBU/BU/BUH leaves configuration mode (see also section 8, "Self-Test").
7. Always make sure that the device is set to the current date and time. Do not leave a device at its default date and time settings.

Header

The BU/HBU/BUH can be configured to send a header information message (parameter "HeaderMessage") to a data management system or a connecting meter (via infrared).

If sending a header information message is activated, the header information message will be sent as follows:

<STX><HEADER>|Mode:<MODE>|SN:<SN>|SW:<SW><ETX>

Where:

<STX>	is the Start Text character (02h)
<HEADER>	is the configured sequence of characters as contained in the parameter 'Header'
<MODE>	= "Ethernet" in case of 'Ethernet Meter2Host' mode = "USB" in case of 'USB Meter2Host' Mode
<SN>	is the serial number
<SW>	is the HBU/BU application SW version
<ETX>	is the End Text character (03h)

Note: The header information message will not be sent if the BU/HBU/BUH is configured to send a header information message directly to a data management system and detects that TLS encryption is enabled on the meter.

Multi-slot configuration (only applicable to BUH)

The default configuration as defined in the 'DMS' section of BASEConf.xml is applied to all BUH slots. Slots can be configured individually by adding one or more additional DMS sections with the attribute 'Slot="x"' (x can also be a comma separated list of more than one number). Up to 4 slot numbers (range 1-4) can be defined. The multi-slot configuration is used to overwrite individual or all parameters as defined in the general DMS section as default for all slots. For example, if the 'Header' parameter is to be different for slot number 2 then the following XML code would be added to BASEConf.xml behind the initial DMS section:

```
<DMS Slot="2">
    <Header>BUH Dev Slot 2</Header>
</DMS>
```

This function is used only with the Base Unit Hub to allow the definition of specific DMS parameters for up to 4 different BULs. These BULs can be connected to RJ25 connectors of the BUH (see Fig 2-2).

Encryption types

It is possible to apply encryption methods to the communication between HBU/BU/BUH and the DMS. Encryption is based on TLS 1.2; only high encryption ciphers are supported.

Changing the HBU/BU/BUH configuration

To change the HBU/BU/BUH configuration, the configuration file BASEConf.xml must be edited. This can be done either directly on the HBU/BU/BUH's removable disk, or via copying a configuration file from different file storages to the HBU/BU/BUH. The HBU/BU/BUH automatically detects changes in the configuration file when stored. Changes made to the configuration will be activated after successful identification of the configuration file's content.

Follow the steps as shown in Fig 4-1 in order to change the HBU/BU/BUH configuration.

Controlled user access to the HBU/BU/BUH configuration

The *controlled user access* functionality is enabled as soon as one or more users are defined in the HBU/BU/BUH. Define users by using the 'UserNameAdd' option of the configuration file.

If the controlled user access functionality is enabled, a valid username and password (parameters "Username" and "Password") must be entered in the configuration file of the HBU/BU/BUH in order to be able to change the configuration of the HBU/BU/BUH. The username and password must be entered only once in a session; a session starts when the USB configuration switch is set to position 1 (see Fig 3-1) and ends when changing the position of the switch again.

NOTE: Please make sure that you remember your username and password. Otherwise you will not be able to access the HBU/BU/BUH configuration. In case you have lost your username and password, a combination of username = "supervisor" and an individual password in the configuration file BASEConf.xml can reset your stored user list. Contact your Roche service representative for assistance.

Changing the configuration file

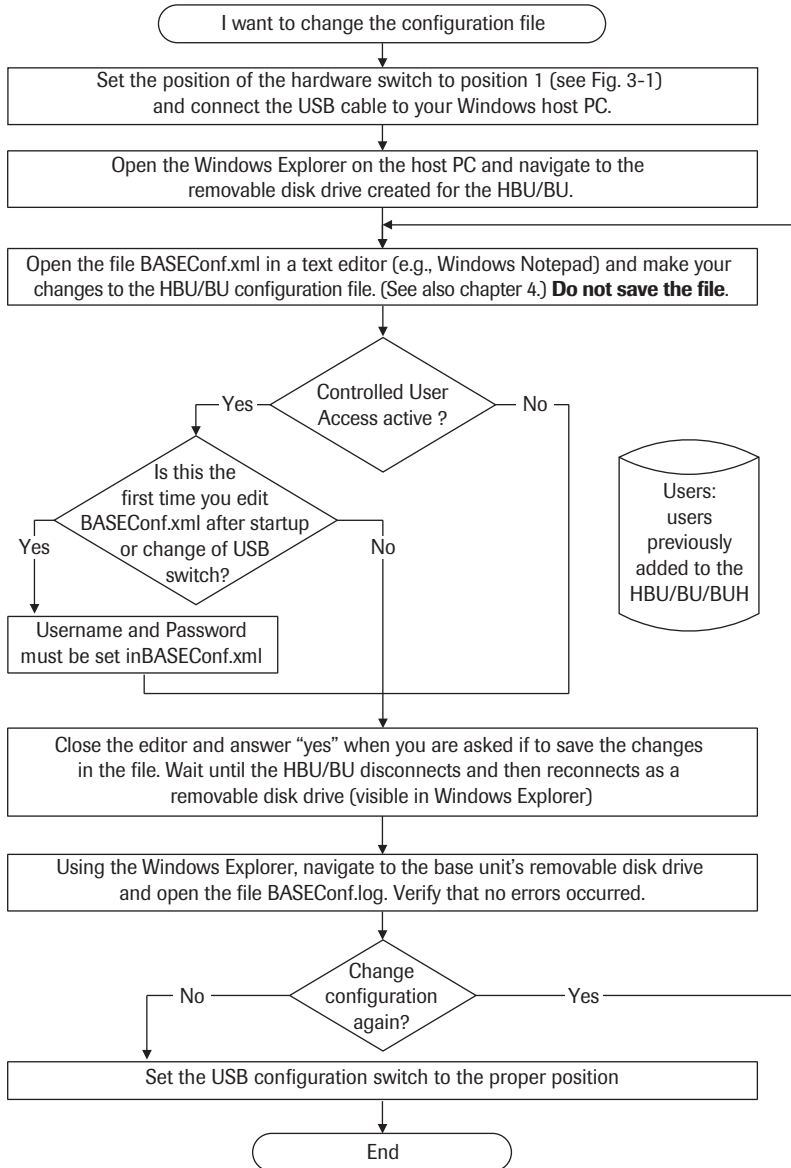To change the HBU/BU/BUH configuration file, follow these steps:

Fig 4-1   Workflow for HBU/BU/BUH configuration

Changing the configuration file

To change the HBU/BU/BUH configuration file, follow these steps:

1   Set the position of the hardware switch to position 1 (see Fig 3-1) and connect the USB cable to your Windows host PC.

2   Open the Windows Explorer on the host PC and navigate to the removable disk drive created for the HBU/BU/BUH.

3   Open the file BASEConf.xml in a text editor (e.g., Windows Notepad) and make your changes to the HBU/BU/BUH configuration file. (See also chapter 4, "Configuration Mode".)
     Do not save the file yet.

4   If this is the first change to the configuration file after start-up, or the position of the hardware switch was changed, and you have activated the 'controlled user access', set the username and password in the BASEConf.xml file. (If the configuration has been changed successfully before, this step is not necessary.)

5   Close the editor and answer "yes" when you are asked if you want to save the changes to the file. Wait until the HBU/BU/BUH disconnects and then reconnects as a removable disk drive (visible in Windows Explorer).

6   Using the Windows Explorer, navigate to the removable disk drive of the HBU/BU/BUH and open the file BASEConf.log. Verify that no errors occurred.

7   If you would like to change the configuration again, repeat steps 3 through 6.

8   Set the USB configuration switch to the proper position.

5   Serial (Roche) & Ethernet (POCT1-A) Mode

In this mode, the meter sends POCT1-A[1] messages via IrDA to the HBU/BU/BUL-BUH. The HBU/BU/BUH then forwards these messages to a connected DMS server using TCP/IP over Ethernet. Messages received from the DMS server are forwarded back to the meter, again via IrDA.
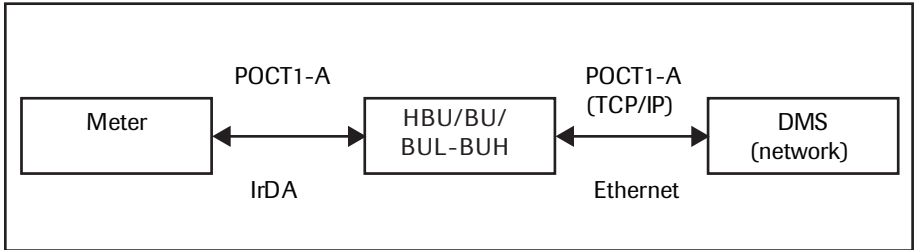

Fig 5-1   Ethernet communication principle

HBU only: In mode Serial & Ethernet, it is also possible for a host to send commands to the meter - using the USB Comm serial interface (not for BU) - when connected to a local computer. The host sends the commands[2] over USB, configured as a serial line, to the HBU, and the HBU resends these commands via SIR to the meter. SIR response from the meter is transferred back through the HBU to the host computer.[3]
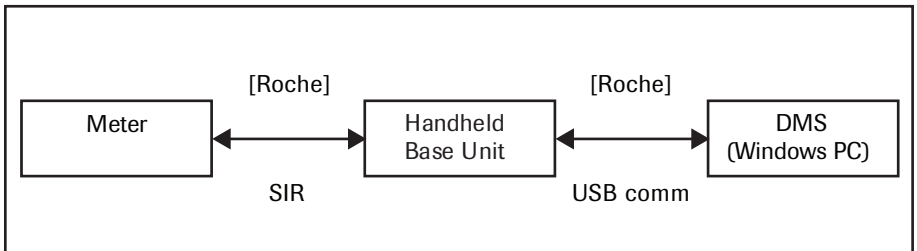

Fig 5-2   Serial communication principle

In mode Serial & Ethernet, the HBU/BU switches between different serial and Ethernet states depending on previous events and HBU/BU configuration.

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1. This mode will also establish a connection to the TEPI platform if configured accordingly. A connection to the TEPI platform is only supported by HBU/BU version 04.04.xx and above.
2. In this setting, a Roche specific communication protocol is used for serial communication with the respective meter located in the HBU.
3. See also section 6 and 7 for USB Comm communication principle, installation of USB driver and 'control panel application', as well as use of the 'control panel application'.

NOTE: *The time for returning from the state 'SIR' back to 'IrDA' is 5 seconds. If the host sends a serial command to a device where the device response time exceeds a timeout (60 sec), the HBU/BU will return to the 'IrDA' state before the device responds. In the 'IrDA' state, the HBU activates the IrDA stack again, and the serial response from the device will be lost. If you want to use SIR communication with a response time of more than 60 seconds, you will have to set the DMS IP address to "0.0.0.0" and disable DHCP. This will force the HBU/BU to stay in the state 'SIR' only – no IrDA communication from meter to host will be possible in this case.*

Minimum configuration for "Ethernet communication principle"

The following parameters must be set *as a minimum* in the configuration file in order to ensure the correct operation of the HBU/BU/BUH on mode Serial & Ethernet if used with Ethernet communication:

Parameter	Description
IPAddr	A valid IP address
IPSubmask	Verify that the default subnet mask is correct for the network the HBU/BU/BUH is to be used in. Modify if necessary.
- or -	
DHCP = enable	IP address will be assigned by server/DMS
DMSHost	Must be the IP address of the DMS
DMSPort	A valid port number

Minimum configuration for "Serial communication principle" (HBU only)

On the host computer you must initialize the serial port (port created by USB serial) with the following parameters:

Parameter	Description
Baud rate	value depends on meter (or communication use case)
Data bits	8
Parity	none
Stop bits	1
Flow control	none

Note: The Baud rate set on the host computer is automatically detected and applied to the SIR Baud rate on the HBU.
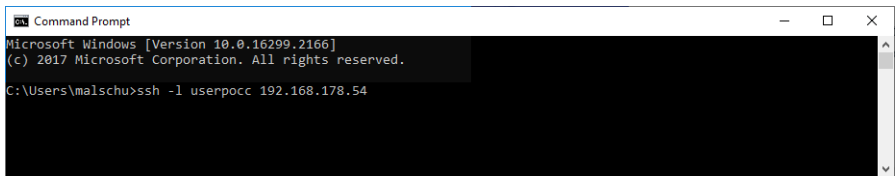
Remote Control (SSH)

Within the 'Serial & Ethernet Mode' it is possible to control the HBU/BU/BUH remotely if the HBU/BU/BUH is connected to the network. In order to be able to connect to the HBU/BU/BUH from any point within a network, the Ethernet (network) settings of the HBU/BU/BUH need to be configured once in configuration mode (see chapter 4, "Configuration Mode"). Furthermore it is necessary to add at least one combination of 'username' and 'password' (by using the parameter UserNameAdd in the BASEConf.xml file, see chapter 4, "Configuration Mode") to the HBU/BU/ BUH – this combination is later used for the remote login to the HBU/BU/BUH. The SSH interface can be completely deactivated within the BASEConfig.xml file.

Once the network settings have been configured and the HBU/BU/BUH is powered up, the remote control functions of the connected HBU/BU/BUH can be accessed by executing the command 'ssh' (e.g. from a DOS command window):
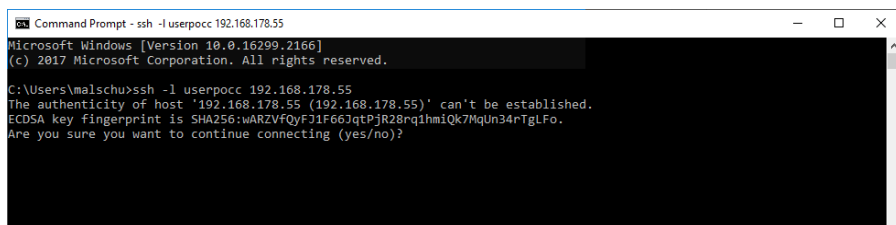
> C:\ >ssh -l [username] [IP address or network name]

Note: Either the IP address or the network name of the HBU/BU has to be provided instead of […].
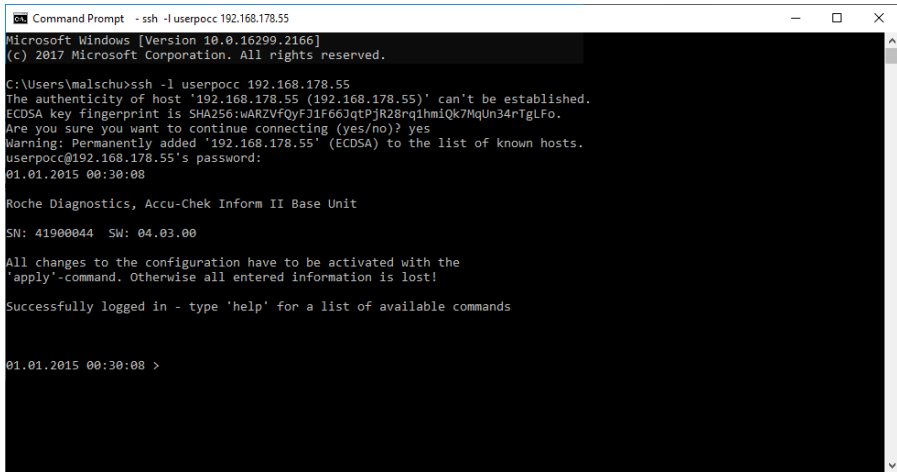

Once executed, the computer shows the received fingerprint of the HBU/BU/BUH. Confirm this information with 'yes' to continue (an entry for known hosts will be created).

The login prompt of the HBU/BU/BUH remote control interface shows up and a valid password has to be entered.

```
Command Prompt   - ssh  -l userpocc 192.168.178.55                                    —    □    ×
Microsoft Windows [Version 10.0.16299.2166]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\Users\malschu>ssh -l userpocc 192.168.178.55
The authenticity of host '192.168.178.55 (192.168.178.55)' can't be established.
ECDSA key fingerprint is SHA256:wARZVfQyFJ1F66JqtPjR28rq1hmiQk7MqUn34rTgLFo.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '192.168.178.55' (ECDSA) to the list of known hosts.
userpocc@192.168.178.55's password:
01.01.2015 00:30:08

Roche Diagnostics, Accu-Chek Inform II Base Unit

SN: 41900044  SW: 04.03.00

All changes to the configuration have to be activated with the
'apply'-command. Otherwise all entered information is lost!

Successfully logged in - type 'help' for a list of available commands


01.01.2015 00:30:08 >
```

Note: The software version shown in this or the following screenshots will change with updates.

In order to remotely control the HBU/BU functions and to alter the HBU/BU settings, a list of commands is provided. These can be reviewed during the remote session by entering the command: "help".

Remote control commands can be executed either with or without a valid parameter. If a command requiring a parameter is executed without a parameter, the HBU/BU will react in two ways:

1   If the command is used to alter a single value, the HBU/BU will return the current value of the parameter, and will not apply any changes

2   If the commands 'useradd' or 'userdel' are executed without a parameter, the system will respond with 'FAIL', since these commands could not be executed properly

NOTE: In case of a change of parameters that would alter the network communication to the HBU/BU, the related command (e.g., 'ipaddr') will not change the respective parameter immediately (as to do so could potentially result in a loss of communication to the HBU/BU, which is not intended). Therefore, the HBU/BU collects all changes before they are applied.

■　　The command 'new' can be used to review the list of parameters that are intended to be changed.

■　　By executing the command 'apply', the HBU/BU will alter all parameters that have been previously changed and apply these new settings to the system – thus potentially resulting in a (controlled) loss of communication to the HBU/BU.

All remote commands to be executed on the HBU/BU/BUH are listed below.

Command	Parameter/Default Value	Description: This command...
Help commands		
help	will show a list of all following commands in the format: 'Command' <TAB> 'Values(s) / Default' <TAB> 'Action / Response' Providing the following header line: "Command:" <TAB> "Format / Default:" <TAB> "This command …"	
?		= 'help' command
Network setup commands		
ipaddr	[valid IP address] / 0.0.0.0	will change IP address of HBU/BU/BUH
hostname	[up to 63 characters] / <empty>	will change the host name of the HBU/BU/BUH. Allowed characters: A-Z, 0-9, "." and "-".
ipsubmask	[valid submask] / 255.255.255.0	will set the mask of the network subset
gateway	[valid IP address] / 0.0.0.0	will define the IP address of the gateway
dnsserver	[valid IP address] / 0.0.0.0	will define the IP address of the DNS server
ntpserver	[valid IP address or name up to 63 characters or "disable"] / 0.0.0.0	will define the IP address or the DNS name of the Network Time Protocol server. Allowed characters: A-Z, 0-9, "." and "-". (note: 0.0.0.0 means not initiated) for HBU/BU (not BUH)
dhcp	enable, disable / disable	will enable / disable the DHCP client
ftps	enable, disable / enable	will enable / disable FTPS access
ssh	enable, disable / enable	will enable / disable SSH access

| Command	Parameter/Default Value	Description: This command...
DMS setup commands		
dmshost	[valid IP address or name up to 63 characters] / 0.0.0.0	will define the IP address or the DNS name of the Data Management System. Allowed characters: A-Z, 0-9, "." and "-". (note: 0.0.0.0 means not initiated)
dmsport	[valid port number] / 0	will define the PORT number of the Data Management System
encryption	enable, disable / disable	will enable/disable encryption over Ethernet; based on TLS 1.2 standards for BU/HBU/BUH. Encryption for USB Comm mode is only supported for HBU/BU v04.04.xx and above. For supported encryption types see page 19)
dmsdisconnect	[integer value from 0-20] / 5	will define the minutes of communication inactivity until the HBU/BU/BUH closes the connection to the DMS - if set to 0, the DMS is not disconnected
headermessage	[integer value from 0-2] / 0	Sending a header information message to DMS or meter 0 means no header information message will be sent 1 means the header information message will be sent to the DMS 2 means the header information message will be sent to the connecting meter
header	[up to 50 characters] / <empty>	a sequence of up to 50 characters that will be sent as an identifier
TEPI setup commands		
tepihost	[valid IP address, name up to 63 characters] / hbm.tepi.navify.com	will define the IP address or the hostname which is used to connect to the TEPI platform. Allowed characters: A-Z, 0-9, "." and "-". (note: <empty> means not initiated)
tepiport	[valid port number] / 443	will define the PORT number which is used to connect to the TEPI platform

Command	Parameter/Default Value	Description: This command...
Security setup commands		
useradd	[name,password] / -	will add a new user - the format is: name,password (string length limited to 25 characters each); if the user is already present, the related password will be changed
userdel	[name] / -	will delete the defined user
Reporting commands		
userlist	-	will show the names of the known users
current	-	will show the current setup parameters (equivalent to BASEConf.xml)
new	-	will show the new setup parameters that will be activated when using the 'apply' command
status	-	will show the contents of the file status.log
error	-	will show the contents of the file error.log
version	-	will show the current software version of the HBU/BU/BUH
Execution commands		
newdate	[dd.mm.yyyy] / <empty>	will set the date - format: dd.mm.yyyy
newtime	[hh:mm:ss] / <empty>	will set the time - format: hh:mm:ss
apply	-	will trigger changes in configuration based on any command issued before
reset	-	will set the configuration back to factory default (changes will be triggered after issuing the 'apply' command)
reboot	-	will initiate a power cycle
Other commands		
diagnostics	[integer value from 0-7] / 1	will set a time interval to trigger a regular self-test (in days); 0 = never perform a self-test
exit	-	will end the SSH session and discard any changes that have not been "apply"ed before exit

Remote Data Transfer (FTPS)

Within the 'Serial & Ethernet Mode' it is possible to transfer data to and from the HBU/BU/BUH remotely, if the BU is connected to the network. In order to be able to connect to the HBU/BU/BUH from any point within a network, the Ethernet (network) settings of the HBU/BU/BUH need to be configured once in configuration mode (see chapter 4, "Configuration Mode"). Furthermore it is necessary to add at least one combination of 'username' and 'password' (by using the parameter UserNameAdd in the BASEConf.xml file, (see chapter 4, "Configuration Mode") to the HBU/BU/BUH – this combination is later used for the remote login to the HBU/BU/BUH. The FTPS interface can be completely deactivated within the BASEConfig.xml file.

Once the network settings have been configured and the HBU/BU/BUH is powered up, the remote data transfer functions of the connected HBU/BU/BUH can be accessed using ftps[1] (e.g. with an extra tool like WinSCP or FileZilla).

Launch the FTPS tool of your choice and start a new connection[2]. A connection prompt to enter the IP address or network name of the HBU/BU/BUH, protocol (FTP) and encryption (indirect encryption) shows up. Additionally a valid combination of username and password has to be entered in order to proceed.

---
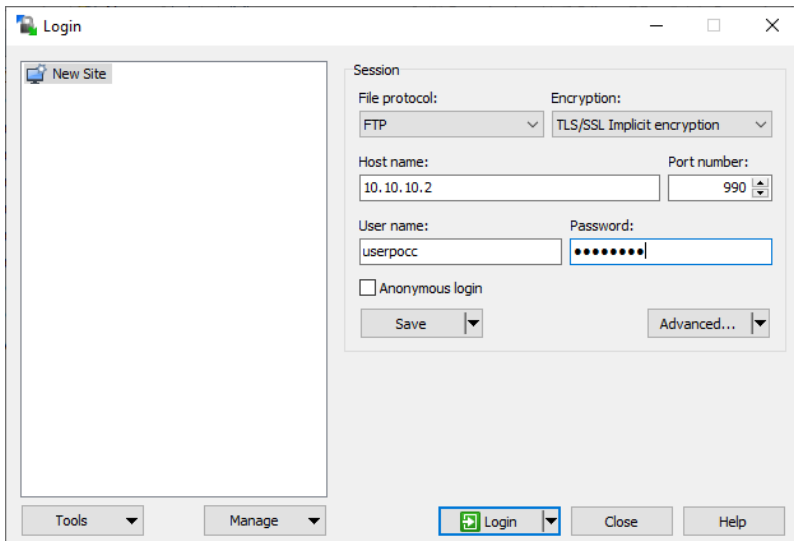
1. For using ftps it may be necessary to open the ports 10990-10994 in your computer's firewall.
2. The workflow described here is based on using the WinSCP (S)FTP client and could differ when using other tools.

When connecting for the first time, the certificate fingerprint of the HBU/BU/BUH will be shown. Confirm this information with 'Yes' to proceed.
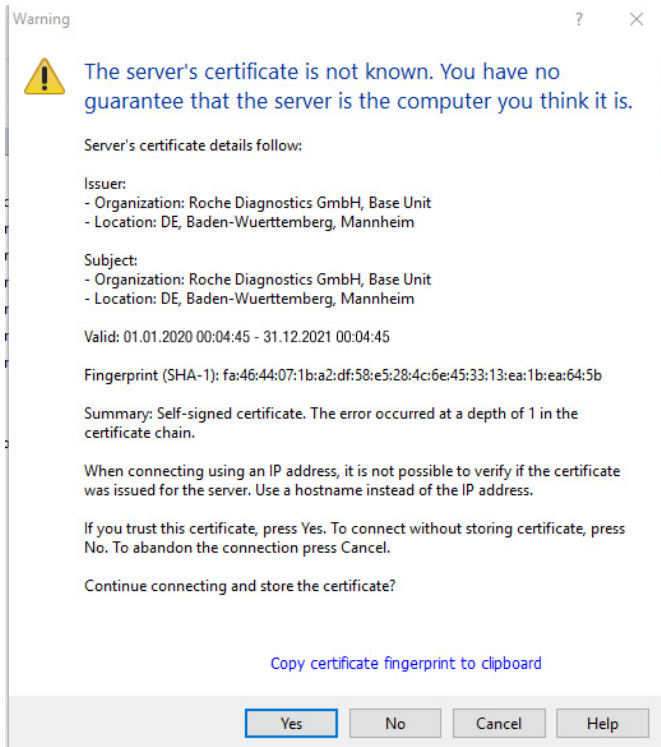
Files can be copied to the HBU/BU/BUH using the corresponding features of the choosen tool.
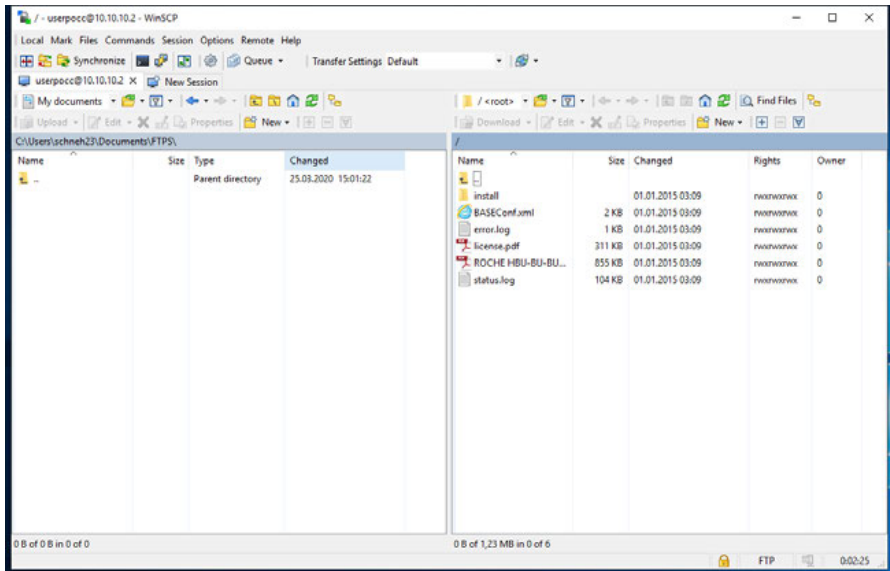
6   Serial (POCT1-A) Mode (HBU/BU only)

In this mode, the meter sends POCT1-A[1] messages via IrDA to the HBU/BU. The HBU/BU then forwards these messages to a connected PC using USB Comm (= serial communication via USB). Messages sent from a PC are backwarded to the meter, again via IrDA.
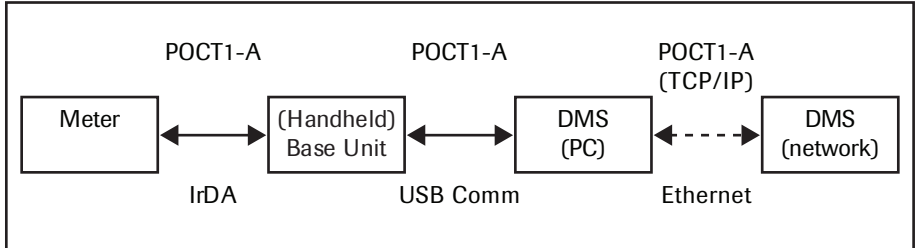

Fig 6-1   Serial communication principle

In order to use this mode, the following prerequisites have to be fulfilled:

■   The USB Comm driver and control panel application must have been installed (see page 34)

■   The Roche HBU/BU control panel application must be running (see page 38)

■   The HBU/BU USB configuration switch must be set to position 3 (see Fig 3-1)

■   The HBU/BU must be powered on

■   The HBU/BU must be connected to a PC via USB cable

■   Optional: The PC is connected to a network (see features of the control panel application on page 38)

As soon as the HBU/BU is connected to the PC, the Windows operating system will install[2] the new 'USB device' in the background ('New Hardware Found' …); this will take a couple of seconds. After the installation the connected HBU/BU will be visible as a new entry via the 'Roche HBU/BU - Control Panel' application (see section 7 for further explanation).

---

1. This mode will also establish a connection to the TEPI platform if configured accordingly. A connection to the TEPI platform is only supported by HBU/BU version 04.04.xx and above.
2. Administrator rights may be required to successfully run the installation of the new hardware.

7   USB Driver and Control Panel Installation (HBU/BU only)

USB Comm driver and control panel installation for mode "Serial (Roche) & Ethernet (POCT1-A)" and mode "Serial (POCT1-A)"

If you want to communicate via USB in mode "Serial (Roche) & Ethernet (POCT1-A)" or in mode "Serial (POCT1-A)", you have to install a MS Windows USB driver in order to enable the serial communication over USB (USB Comm). Besides the USB driver, an additional software application will be installed[1] in order to allow access to specific information required for USB operation - this application is called 'control panel'. Perform the following steps in order to install the USB Comm driver and the control panel application.

1   Download the *ROCHE HBU-BU USB Install.exe* in the latest version from eLabDoc on navifyportal.roche.com. In eLabDoc select Document Type = "Software Information".

2   Launch the application *ROCHE HBU-BU USB Install.exe*, located on your computer (by double-clicking the file)[2]

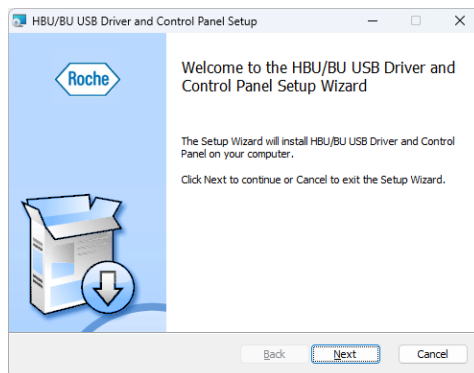3   Follow the steps in the installation process

Fig 7-1   HBU/BU USB Driver Setup (Installation) flow - start screen

---

1.   The USB driver and control panel application (version 03.01.01) work with the following MS Windows operating systems: Windows 10 (32/64 Bit) and Windows 11.

2.   Administrator rights may be required to successfully install the USB driver and execute the application.
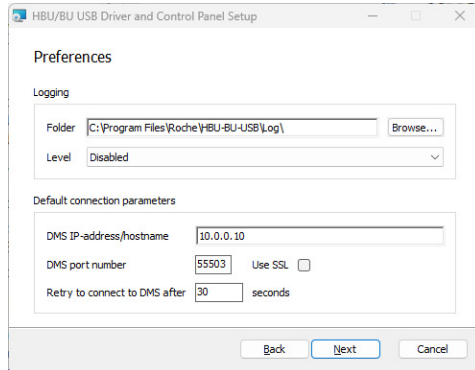
Fig 7-2   HBU/BU USB Driver Setup (Installation) flow - setting the preferences

The preferences screen is shown within the installation process and provides the following settings:

Logging:

■ Folder: location where LOG-Files shall be stored (in case Logging is enabled)

■ Level: disables or enables logging of communication data, defines the depth of logging

Default connection parameters:

Note: These parameters will be applied by default to any new HBU/BU that is connected in mode "Serial (POCT1-A)".

■ DMS IP address/hostname: valid IP address or hostname, to which the POCT1-A communication data from the connected HBU/BU is to be transferred[1]

■ DMS port number: valid port number, on which the DMS listens to incoming POCT1-A messages[2]

■ Retry to connect to DMS after: retry timeframe (seconds) used by the control panel application to connect to the DMS (e.g. in case the DMS was not available)

■ Use SSL: in case selected, the communication between the control panel and the DMS will be secured via TLS (successor of SSL) encryption. With version 03.01.01 the Control Panel is able to detect an already secured TLS communication from BU/HBU. No additional TLS secure will be performed in this case.

Uninstalling the driver is possible via the Microsoft 'Add or Remove Programs' option.

---

1. This parameter may be set to the IP address or the hostname which is used to connect to the TEPI platform.
2. This parameter may be set to the port number which is used to connect to the TEPI platform.

USB Comm Driver and Application Silent Mode Installation

The installer for the Roche HBU/BU Driver and Control Panel application setup also supports silent mode installation. When using this mode, note the following:

■ Silent mode only suppresses the GUI of the installer application. It does not suppress any Windows setup dialog that may appear. The release version of the setup provides WHQL-signed drivers. So no Windows setup dialogs are expected.

■ The setup is not a console mode application, even when running in silent mode. This means that when executed on the command line, the command prompt returns immediately while the setup is still running. To get the setup exit code, it should be started by an application that is able to wait for another process.

■ The caller (administrator who executes the silent installation) is responsible for providing user guidance in the form of messages or prompts in line with the exit codes of the setup (see "Exit Codes" on https://learn.microsoft.com/en-us/windows/win32/msi/error-codes).

■ The setup installs the control panel and service and pre-installs the USB drivers on the PC. After it has completed this task successfully, the user can connect the device to the system at a later point in time in order to complete the installation. If the device is already connected and is not running in mass storage mode, it is necessary to disconnect and reconnect the device. The caller of the setup has to inform the user about this required step.

■ After the device has been (re-)connected or switched to serial or POCT1-A mode, the system assigns the pre-installed drivers to the device. This means that the device is not accessible in serial or POCT1-A mode until this final installation step has been completed successfully.

Command Line Parameters

Parameter	Description
--gui off --command X	Setup with or without gui (on / off) and run mode (X=silentinstall, silentuninstall, install or uninstall)
--passthrough INSTDIR= "target path"	Installation directory on the target system. If not specified the default installation directory is used.
--passthrough LOGLEVEL=n	Log level (0 = disabled .. 3 = very detailed)
--passthrough LOGFOLDER= "target path for log files"	The parameter has to specify a local folder. Network folders, DVD drives etc. are ignored by the Comm-TCP service and will be replaced by the default log folder. Maximum number of characters allowed is 260.
--passthrough HOSTNAME= "IP address or host name"	Only ASCII characters are valid. Maximum number of characters allowed is 300.
--passthrough PORTNUMBER=n	If specified, the port number has to be in the range from 0 to 65535.
--passthrough SSL=1	Enable TLS (successor of SSL) encryption (0 = disabled, 1 = enabled)
--passthrough CONNRETRY=n	Specifies the seconds until the service retries to connect to the specified host. A value of 0 is not allowed.

Example

```
setup.exe --gui off --command silentinstall --passthrough INSTDIR=
"c:\MyCompany\MyProduct" LOGLEVEL=3 HOSTNAME="192.168.1.10"
LOGFOLDER="c:\log" CONNRETRY=14 PORTNUMBER=3303 SSL=1
```

Roche HBU/BU - Control Panel Application

After installing the HBU/BU USB Comm driver and control panel application, the following new icon will show up in the notification area of the Windows task bar:

BU icon in task bar ⟶
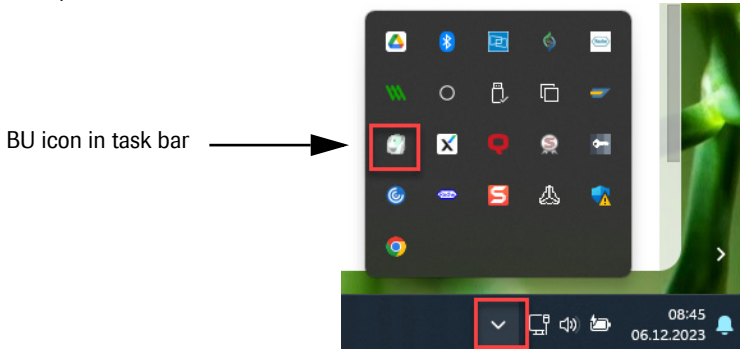
This icon indicates the presence of the "Roche HBU/BU Control Panel" application, which is used to quickly identify a newly connected HBU/BU and its virtual COM port (port number is automatically assigned by the Windows operating system).

Note: If it does not start automatically, the USB Comm port application can be started manually by executing the link in the Microsoft Windows 'Autostart' folder (> START > Programs > Startup).

In order to get a list of any connected HBU/BU via USB (Comm) and its associated COM port, the following window (see below) can be launched by double-clicking the 'BU Icon' shown in the Windows task bar. For each connected HBU/BU the respective 'Serial Number' and the Operation Mode ('Serial' = Mode 2; 'POCT1-A' = Mode 3)[1] will be shown.

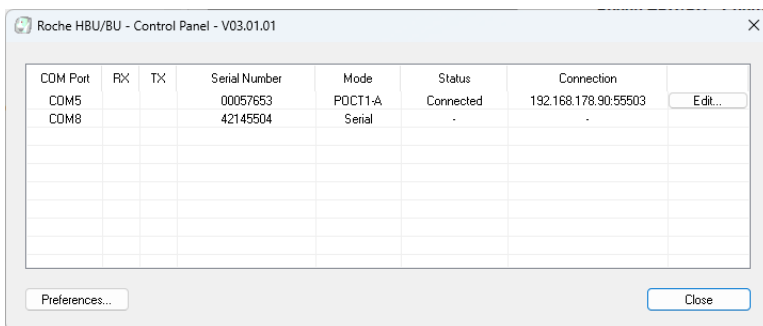| COM Port	RX	TX	Serial Number	Mode	Status	Connection	
COM5			00057653	POCT1-A	Connected	192.168.178.90:55503	Edit...
COM8			42145504	Serial	-	-	

Fig 7-3   Roche HBU/BU - Control Panel - List of all connected HBU/BUs (via USB Comm)

1.   'Mode 2' see chapter 5, 'Mode 3' see chapter 6. Even if shown "POCT1-A" the control panel is also able to communicate TEPI messages, if configured.

Mode 'Serial':

If the mode 'Serial' was chosen, and indicated in the HBU/BU control panel (see Fig 7-3 for COM8), it is possible to communicate from the local PC with a device docked in the HBU via the respective COM port. A bidirectional communication is possible (using the Roche specific communication protocol), depending on the respective device located in the HBU and its related communication settings. Note: The baud rate configured with the virtual COM port will be automatically identified by the HBU and applied to its own SIR baud rate settings.

Mode 'POCT1-A':

If the mode 'POCT1-A' was chosen, the control panel application offers an extended functionality, by providing a 'gateway service' to a remote server (e.g. point of care data management system - DMS or TEPI platform) that is located in the connected network (e.g. hospital network). In order to connect to a remote server, the respective network information needs to be configured. Whether configuration was successful or not is indicated by the field 'Connection', which can contain the values 'Not configured' (see COM9 in Fig 7-3) or network specific settings (such as ip / hostname : port number) in case a configuration was applied (see Fig 7-6). A configuration of these parameters can be achieved by either defining default values during installation of the Control Panel application (see Fig 7-2) or by pressing the 'Edit' button, which allows the individual definition of network parameters for the connected HBU/BU in Mode 'POCT1-A' (see Fig 7-4).

Additional information shown for POCT1-A mode:

■   RX / TX: Indicators for ongoing communication activities between the remote server and the device located in the HBU/BU

■   Status: Indicator for the status of the connection to the remote server, the status field could have the following values if 'Connection' is configured:

  – 'Connected' → COM port opened and connection to the DMS established

  – 'Not connected' (in red letters) → COM port opened, but DMS connection down (see Fig 7-6)

  – 'Not available' → COM port could not be opened (e.g. configured, but bound to another application)

  – '-' → COM port opened, but connection to DMS not configured
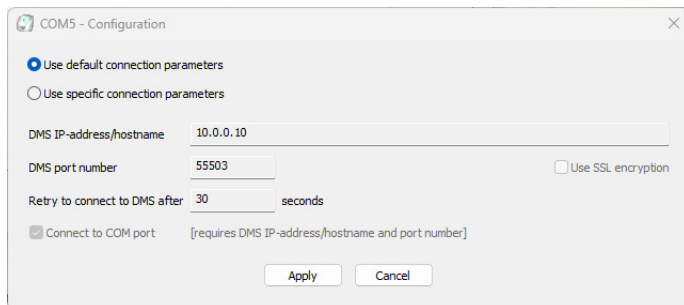
Fig 7-4   Roche HBU/BU - Control Panel - Configuration screen for specific COM Port (POCT1-A mode only)

Preferences:

The preferences screen will appear once during (non-silent) installation of the USB driver and Control Panel application (see Fig 7-2). It is also possible to access the preferences screen via the main screen of the Control Panel application (see Fig 7-3) - the settings are identical to those explained with Fig 7-2.

Fig 7-5   Roche HBU/BU - Control Panel - General Configuration screen (Logging and Default Settings for POCT1-A mode)

Fig 7-6   Roche HBU/BU - Control Panel - Configured but not yet connected COM Port in POCT1-A mode (DMS not yet listening or TEPI not connected)

8   Self-Test

The HBU/BU/BUH performs a self-test at regular intervals to check its integrity. These intervals are defined in the setup parameter 'Diagnostics' (see chapters 4 and 5). The self-test forces the HBU/BU/BUH soft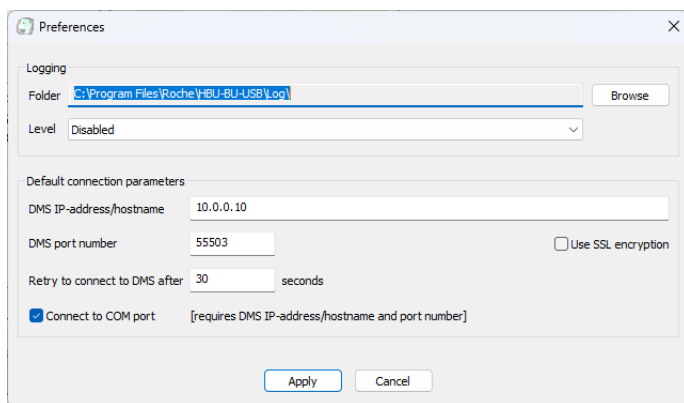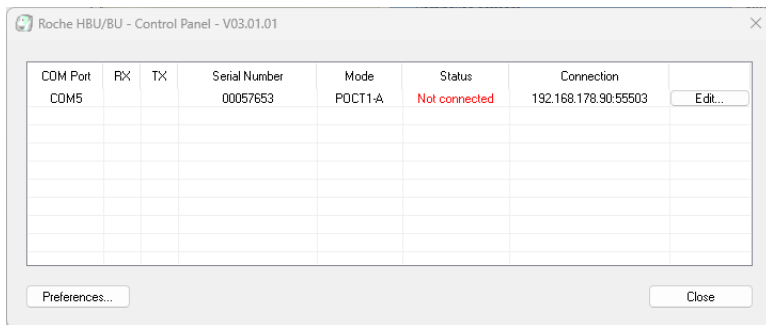ware to reboot. To avoid an interruption of communication between meter and host, the HBU/BU/BUH will only reboot when it has been idle for at least 5 minutes. The self-test procedure itself takes 3 minutes maximally. During this time, no communication between meter and host is possible. No self-test will occur as long as the HBU/BU/BUH is in configuration mode.

After the successful completion of a self-test, the HBU/BU/BUH returns automatically to the same configuration and state as before the test. No user action is required.

As part of the self-test, the HBU/BU/BUH checks the integrity of its internal memory. In case of failure, two different scenarios are possible. The HBU/BU/BUH will start flashing red in order to indicate the error state and will either:

■   stay in configuration mode even if the USB configuration switch is set to a different mode, and no serial or Ethernet communication to or from the HBU/BU/BUH will be possible, or

■   will not go into an operation mode.

In either case, the user must repower the HBU/BU/BUH manually. If the self-test fails again, the HBU/BU/BUH should be returned to Roche Diagnostics.

Software Updates

The HBU/BU/BUH offers two ways of updating its own software: local or remote.

Software Update - Local

The new software version is provided as a data file by Roche Diagnostics. In "Configuration" mode (as an alternative to 'remote' software update) it can be copied to the USB removable disk drive of the HBU/BU/BUH to trigger the software update.

To update the HBU/BU/BUH software locally:

1   Set the position of the hardware switch to position 1 (see Fig 3-1) and connect the USB cable to your Windows host PC.

2   Open Explorer on the host PC and navigate to the removable disk drive created by the HBU/BU/BUH.

3   If no session is active, start a session by setting the username and password of a user in the configuration file. Save the configuration file. (See chapter 4.)

4   Once a session is started, copy the update file to the root of the removable disk drive. Wait until the HBU/BU/BUH disconnects and reconnects the removable disk drive again. This may take some time. If the removable disk drive still contains the update file, an error occurred and the software was not successfully updated. A description of the error can be found in the newly created file "update.log". If no file "update.log" is present, open the file "status.log" and verify that the latest entry in the system software versions contains the expected values.

Software Update – Remote

The new software version, provided as a data file by Roche Diagnostics, can be uploaded to the HBU/BU/BUH remotely (as an alternative to 'local' software update).

IMPORTANT NOTE: Before you run a remote software update, ensure that this software update will not delete your network settings. Check the information provided by ROCHE Service with every software installation package for the HBU/BU/BUH/ for details. (If the remote update could impact your network settings, access the HBU/BU/BUH locally instead to install the software update.)

To update the HBU/BU/BUH software remotely:

1   The hardware configuration switch must be in position 2, the HBU/BU/BUH must be configured for and connected to a network.

2   Open a 'DOS' command window (Windows 'Start > Run > cmd') and execute a remote control session with FTPS (as defined in Chapter 4, section "Remote Data Transfer (FTPS)")

3   Once a session has been started, upload the update file to the HBU/BU/BUH, by using the 'put' command. Shortly after successful upload of the update file, the remote connection to the HBU/BU/BUH will be lost. Wait approximately 5 minutes, before you attempt to reconnect to the HBU/BU/BUH.
In order to verify that the software update was successful, check the "status.log" file (either by remote control or remote data transfer) to see if the latest entry with the system software versions contains the expected values.

9   Questions and Answers

How can I determine the current date and time of the HBU/BU/BUH?
Set the USB configuration switch to position 1 (configuration mode) and connect the HBU/BU/BUH with a USB cable to your windows host PC. Open the Windows Explorer and navigate to the root of the removable disk drive. The date and time of the HBU/BU/BUH is equal to the date and time of the files in the root directory. These files are newly created at the time the switch is set to configuration mode and thus show the corresponding date/time information, based on the HBU/BU/BUH clock setting (**not** the clock setting of the connected PC).

How can I tell which usernames are defined on the HBU/BU/BUH?
A list of currently defined usernames is printed to the "status.log" file on the removable disk drive. You can access this file in configuration mode. Alternatively, the list of users can be called up by the "userlist" command when the HBU/BU/BUH is in remote control mode. Newly added users will appear once the HBU/BU/BUH is started again.

How do I get the IP address received via DHCP?
The IP address received via DHCP is printed to the "status.log" file in the removable disk of the HBU/BU/BUH. If the DHCP option was just set in the configuration file, the HBU/BU/BUH must first be restarted in order to receive an IP address.

What software is installed on the HBU/BU/BUH?
The HBU/BU/BUH Software consists of four separate parts: boot loader, kernel, rootfs, and application. All of these parts have a separate version number.

What software versions and hardware does my HBU/BU/BUH run?
The HBU/BU/BUH writes the software version numbers and the hardware identity number to the file "status.log", accessible via USB removable disk, during each start up of the HBU/BU/BUH.

In case of any trouble with your HBU/BU/BUH, please report this information to your Roche service representative.

Why does the HBU/BU/BUH remain in configuration mode with LEDs flashing?
As part of the self-test, the integrity of the HBU/BU/BUH internal memory is checked. In case of a failure, the HBU/BU/BUH will stay in configuration mode even if the USB configuration switch is set to a different mode, and no serial or Ethernet communication to or from the HBU/BU/BUH is possible.

Appendix A: Messages, Warnings, and Errors

The column messages in chapters 4-6 contain placeholders starting with % that are replaced in the actual message in the log file, following this schema:

- ■   %s is replaced by a string (which may also be a number)

- ■   %d, %ld, %lu is replaced with a number.

- ■   %02d is replaced by a two-digit number e.g., 12 or 03

- ■   %08x is replaced by a 8-digit number in hexadecimal format

Status Messages

Status (Message)	Description
BASEConf.xml OK	Text written to the BASEConf.log file. The user has changed the BASEConf.xml file and the HBU/BU/BUH has identified the file without errors. The HBU/BU/BUH has activated the new settings.
New update image loaded. Rebooting BASE	User copied an update image to the removable disk. The HBU/BU/BUH application has verified that the image is correct and has rebooted the HBU/BU/BUH. The boot loader takes care of the installation of the new software.
Connected to Host, IP=%s, Port=%d	The HBU/BU/BUH has successfully connected to a server with the reported IP address and port number.
BASE successfully initiated	The initialization of the HBU/BU/BUH hardware and software modules was successful. The initialization is done on power up or reboot
Connected to meter %s, daddr: %08x saddr: %08x	The HBU/BU/BUH accepts a connection from an IrDA device. "%s" is replaced with the nickname of the device. "daddr" is the meter IrDA address. "saddr" is the IrDA address of the HBU/BU/BUH.

Status (Message)	Description
Starting task %s	The HBU/BU/BUH software is entering a new state. "%s" is replaced by: *ConfigMode:* The HBU/BU/BUH enters this state if the USB configuration switch is set to switch position 1. *MeterWait:* The HBU/BU/BUH is waiting for a connect from a meter (switch position 2 or 3) or an ICI command from the USB-Comm connection (switch position 2). *TransferMessages (Ethernet)* - or - *TransferMessages (Serial):* The HBU/BU is transferring POCT1-A / TEPI messages either via Ethernet or Serial (USB) communication (BUH: only via Ethernet). The HBU/BU/BUH enters this state if a meter has connected to the HBU/BU/BUH (see also "MeterWait" above). In this state the HBU/BU/BUH only receives and transmits POCT1-A / TEPI messages and no ICI commands. *CommunicateICI:* The HBU/BU enters this state if it receives an ICI command. (see also "MeterWait" above). In this state the HBU/BU only receives and transmits ICI commands and no POCT1-A / TEPI messages. *SSH*: A remote control session was initiated.
Previous error reset	The HBU/BU/BUH status LED stops flashing red. If an error occurred during the operation of the HBU/BU, the status LED flashes. The main task of the HBU/BU/BUH is to receive and retransmit messages. If a POCT1-A / TEPI message or an ICI command has been successfully handled, the HBU/BU/BUH status LED stops flashing.
Executing selftest. Rebooting BASE	The HBU/BU/BUH executes a self-test by means of self-rebooting.
Self diagnostic pending	The defined period has elapsed since the last self-test and the HBU/BU/BUH enters a mode where it waits for inactive communication for 10 minutes so it can begin the self-test.
User '%s' is unknown or wrong password	A username was set in the BASEConf.xml file, tag <Username>, but the username is unknown or the password, tag <Password>, was not correct
User authentication required	No username was set in the BASEConf.xml file, tag <Username>, although the "controlled user access functionality" is enabled.
User list:%s	List of users previously defined with tag <UserNameAdd> in the BASEConf.xml file.

Status (Message)	Description
DHCPC: Base Configured with Ip %s	If the HBU/BU/BUH retrieves its network settings from DHCP (tag <DHCP> set to "enable" in BASEConf.xml), the HBU/BU/BUH prints this message to tell its current IP address
No lease from DHCP	The HBU/BU/BUH did not get an IP address from the DHCP server.
Base version info: BL=% KN=% RF=% AP=% HW=% BOM=% HW_IDENT_NO=% SN=%	The HBU/BU/BUH always writes this message at power up and reboot. The message lists the version numbers of the different HBU/BU/BUH system parts.
BASE configuration changed successfully	The user has changed the BASEConf.xml file and the HBU/BU/BUH has parsed the file without errors. The HBU/BU/BUH has activated the new settings.
Changing BASE configuration failed	The user has changed the BASEConf.xml file and the HBU/BU/BUH has parsed the file with errors. The HBU/BU/BUH has rejected the new settings.
EEPROM accessed by user %s	The HBU/BU/BUH EEPROM memory was accessed by an authenticated user.
SSH login failed for user	An error occurred while logging in the user. The username or password was not correct.
SSH command '%s' has been executed.	Logging of every executed SSH command.

Warnings

Warning (Message)	Description
Config file is not correct. Default config file created	An error occurred while identifying the internal BASEConf.xml file (not the BASEConf.xml stored in removable disk). This message may only occur at HBU/BU/BUH startup.
Poll failed with %s. %s restarted	Internal software error while waiting for messages from the meter or DMS.
BASE was restarted by the watchdog. (Eventcounter: %d)	Message printed at startup if the HBU/BU/BUH has been restarted by the internal watchdog. "%d" tells how many watchdog restarts already occurred.
%s is a reserved username	The tag <UserNameAdd> in the BASEConf.xml file contained a reserved username. Try another username.
BASE handles only one update file. More files found	The HBU/BU/BUH found more than one file with extension "*.update" on the removable disk. The HBU/BU/BUH supports the installation of only one software update at a time.

Errors

Error (Message)	Description
Invalid parameter in configuration file %s=%s	A tag in the file BASEConf.xml contains an illegal value or a value out of range. The first %s contains the name of the tag and the second %s the value itself. Refer to Chapter 4 for valid parameter values.
Failed to read the config switch state	The HBU/BU/BUH software was not able to read the USB configuration switch. The HBU/BU/BUH may not respond to changes in the position of the switch. The HBU/BU/BUH still runs normally in the currently selected mode.
Timeout connecting to %s, Port: %d	The HBU/BU/BUH has received a POCT1-A message from the meter and wants to resend the message to the DMS. The DMS with the IP address %s doesn't respond to a 'connect' within a certain time limit. In case of mode Serial (POCT1-A), %s is replaced with "DMS (USB mode)", %d is replaced with "0".
%s: decompressing the file %s failed	Configuration mode only: Internal error during decompression of the file system image file. This file is stored as a tar file on the HBU/BU/BUH. If this error occurs, the HBU/BU/BUH stops operating.
eeprom read, id %s	Error reading a parameter from the EEProm. %s is the name of the parameter. The impact on the HBU/BU/BUH of this error depends on what parameter is missing.
Failed starting ethernet device with IP=%s.	The Ethernet driver could not be started. The HBU/BU/BUH is not able to access the Ethernet.
Name of file (ext: %s) too long	The file name of an update image (%s = update) should not exceed 240 characters.
Handling xml file %s, ERR= %lu	An internal error occurred while identifying an XML file.
The format of the update image '%s' ist not valid for this device	The internal format of a software update file is corrupted. Try to get a new copy of the file.
Internal system error. Update image '%s' could not be evaluated	An internal error in the HBU/BU/BUH update system makes a software update impossible.
File image '%s' %ld bytes to big for container %ld bytes	Update image is too big for the HBU/BU/BUH update system. Try to get a new copy of the software update file.
Update image '%s' is not valid for this device or the version is incompatible	The software update is not intended for the HBU/BU/BUH, or the version of the software in the update is not compatible with software already on the HBU/BU/BUH or with the hardware.

Error (Message)	Description
%s: Function %s failed with %lu	Internal error in the library functions.
Failed to initiate the BASE	The initialization of the HBU/BU/BUH hardware and software modules failed. The initialization is done on power up or reboot.
Failed to initiate IRDA	An error occurred while starting the IrDA protocol stack, most likely because of a hardware problem. The HBU/BU/BUH stops operating.
%s: Function %s failed. Errno=%d - %s	Error in a call to an operating system function. The last %s is replaced with the reason for the failure.
Function %s failed. %s. File: %s	Error while testing an xml file for well-formed or conformity against a DTD. The error is not caused by wrong values or values out of range.
Function %s failed. %s. File: %s. Line: %d	Error while testing an xml file for well-formed or conformity against a DTD. The error is not caused by wrong values or values out of range. The error can be traced to a line in the identified file.
%s: open file %s failed. Errno=%d - %s	The HBU/BU/BUH has an internal file system and the HBU/BU/BUH software was not able to open a file. This error may occur during adding, deleting, or reading of usernames and passwords.
Failed to open IR device in SIR mode	The HBU/BU wants to send and receive ICI commands over IR but fails to open the device in the correct mode. This error stops the HBU/BU from operating.
running bootloader V%s expected V%02d.%02d.%02d%s.	The HBU/BU/BUH application was written for another boot-loader version than the one currently found on the HBU/BU/BUH. This error stops the HBU/BU/BUH from operating.
running kernel V%s expected V%02d.%02d.%02d%s.	The HBU/BU/BUH application was written for another boot-loader version than the one currently found on the HBU/BU/BUH. This error stops the HBU/BU/BUH from operating.
running rootfs V%s expected V%02d.%02d.%02d%s.	The HBU/BU/BUH application was written for another root file system version than the one currently found on the HBU/BU/BUH. This error stops the HBU/BU/BUH from operating.
could not resolve '%s' to an IP address. %s	The HBU/BU/BUH failed to retrieve the IP address for a host name from the DNS. The name of the host is "%s" and is set in the BASEConf.xml, tag "<DMS>." This error may occur if the DNS is not correctly configured on the HBU/BU/BUH or the host name does not exist in the network domain.
Too many users. The system supports only 20 users.	The HBU/BU/BUH is able to store max. 20 users. If you try to add more users than supported, this message occurs.

Error (Message)	Description
Failed to open USBComm	The HBU/BU could not open a connection by means of "USB-Comm". This error may occur if the switch is set to position "Serial & Ethernet" and the USB cable is not connected to the host or the host is turned off. This error also occurs if the HBU/BU tries to open "USB Comm" before the host has configured it. This message is handled as a warning that means that the status LED will not flash red. See also message "USB serial connected"
Failed to start mass storage	The HBU/BU/BUH uses internal drivers to handle the USB interface. The driver for mass storage could not be started. This error may stop the HBU/BU/BUH from operating.
Failed to stop mass storage	The HBU/BU/BUH uses internal drivers to handle the USB interface. The driver for mass storage could not be stopped.
Failed to start USBComm	The HBU/BU uses internal drivers to handle the USB interface. The driver for serial over USB could not be started.
Failed to stop USBComm	The HBU/BU uses an internal driver to handle the USB interface. The driver for serial over USB could not be stopped.
CRC failure in EEPROM - USB switch disabled.	The HBU/BU/BUH has detected an error in the internal configuration memory. The self-test sequence was not finished successfully. Functionality is reduced to configuration mode only.

Appendix B: Example of a Configuration File (BASEConf.xml)

```xml
<?xml version="1.0" encoding="UTF-8"?>
<!--
Date: 26.05.2022
Time: 09:01:00
SN: 0000000000000000
SW: 04.04.00
Note: you might be restricted by user rights, uploading or
changing the BASEConf.xml file locally (via USB mass storage).
-->
<Config>
    <Network>
        <IPAddr>10.0.0.85</IPAddr>
        <Hostname></Hostname>
        <IPSubmask>255.255.255.0</IPSubmask>
        <Gateway>0.0.0.0</Gateway>
        <DNSServer>0.0.0.0</DNSServer>
        <NTPServer>0.0.0.0</NTPServer>
        <DHCP>disable</DHCP>
        <FTPS>enable</FTPS>
        <SSH>enable</SSH>
        <DMS>
            <DMSHost>10.0.0.10</DMSHost>
            <DMSPort>5503</DMSPort>
            <Encryption>disable</Encryption>
            <DMSDisconnect>5</DMSDisconnect>
            <HeaderMessage>1</HeaderMessage>
            <Header>Generic Header</Header>
        </DMS>
        <TEPI>
          <TEPIHost>hbm.tepi.navify.com</TEPIHost>
          <TEPIPort>443</TEPIPort>
        </TEPI>
    </Network>
    <Security>
        <Login>
            <Username></Username>
            <Password></Password>
        </Login>
        <UserAdd>
            <Username></Username>
            <Password></Password>
        </UserAdd>
        <UserDel>
            <Username></Username>
        </UserDel>
    </Security>
    <System>
        <Diagnostics>1</Diagnostics>
        <NewDate>01.06.2022</NewDate>
        <NewTime>09:06:00</NewTime>
    </System>
</Config>
```

Appendix C: Technical Data

Technical Data for the Base Unit, Base Unit Light and Handheld Base Unit can be found in the Operator's Manuals of the respective systems.

Technical Data	Base Unit Hub	Base Unit Hub Power Supply
Height	35 mm / 1.38 in	50 mm / 1.97 in
Width	169 mm / 6.65 in	79 mm / 3.11 in
Length	127 mm / 5 in	149 mm / 5.87 in
Weight	470 g	350 g
Operating temperature	3 to 50 °C 37 to 122 °F	0 to 40 °C 32 to 104 °F
Storage temperature (long-term storage)	-25 to 69 °C -13 to 156 °F	-40 to 70 °C -40 to 158 °F
Air pressure	0.7 to 1.06 bar 70 to 106 kPa	N/A
Relative humidity (storage)	< 95%	< 95%
Input voltage	+12 V DC	100 to 264 V AC
Input current	2000 mA	1500 mA
Input frequency	DC	50 to 60 Hz
Data transfer rate	IR: 9.6K - 115K bps Ethernet: 10 Mbps half-duplex	N/A