

SmartHDM Quick Start Guide

HDM Sensors Modules



HDU Sensors



90XL Sensors



4 x 

HDC84
Display Module



This document describes the primary functions of the SmartHDM-System. The complete manual can be found at https://www.ibpmt.com/hdm_en/adoc_smart.asp?hdm_en/smarthdm_documents.htm

Safety Instructions

Read This First



For the patients and your safety, read and consider the safety instructions below carefully.

- The SmartHDM System is designed to be used by hemodialysis professionals to measure and display readings of the dialysate fluids used in hemodialysis delivery systems.
- Please read this User Guide in its entirety before using the SmartHDM-510 System.
- Review the complete user manual of the devices that the SmartHDM-510 System will be used in conjunction with.
- Keep away the device from unauthorized persons.
- Never use the SmartHDM-510 System on a dialysis machine to which a patient is connected.
- Never use the SmartHDM-510 System on a dialysis machine with a connected battery charger.
- Never use the SmartHDM-510 System in place of the hemodialysis machine's primary sensors.
- Operate the instrument only in a dry environment, and do not touch it with wet hands.
- Allow the system to acclimate to temperature.
- Ensure that no fluids intrude into the interior of the device or the sockets.
- Verify accurate function of the meter before taking measurements or whenever inaccurate readings are suspected.
- In case a measuring value does not change (potentially frozen), the sensor should be checked.
- In the event of a significant discrepancy between the measured value and the expected value, the sensor must be calibrated.
- Prevent electrostatic discharge on the connectors. This can lead to substantial damage to the SmartHDM-510 device and devices under test. Make sure the device is wholly discharged before touching the connectors or cables connected to the instrument.
- Only adjust the SmartHDM-510 System if you have understood the consequences to their full extent. Use only the recommended standards later in this manual.
- Do not use abrasive cleaning agents and/or full-strength bleach or acid to clean SmartHDM-510 System or the electrodes as this will cause damages.
- To avoid cross-contamination, disinfect sensors and modules that have been in contact with liquid regularly. We recommend the use of different sensors for use in conjunction with infected and non-infected dialysis machines. Mark the sensors accordingly to avoid confusion.
- Restart the SmartHDM-510 software on a daily basis to ensure the integrity of the database.
- In order not to overload the Android display module, do not connect more than ten sensors or modules. If the display module becomes too slow, reduce the number of sensors and modules.
- Devices with a battery do not arrive fully charged. The battery must be charged for at least two hours before use.
- Be careful when using headphones or speakers. Overuse can damage your hearing.
- Ensure that all sensors and sensor modules have valid calibration certificates.
- Prevent mechanical overstraining of electrical wires.
- The SmartHDM-510 system is not intended to be used in residential areas and cannot adequately protect radio reception in such environments.
- Do not open any SmartHDM-510 device. Repair may only be performed by an authorized service.
- The SmartHDM system is not intended to be used in residential areas and cannot adequately protect radio reception in such environments.

1 HDC-Display Modules

1.1 HDC64 Overview

The HDC64 is a smart mobile device with an Android operating system and a USB Hub. The USB Hub has four USB-A ports to directly connect sensors or modules.



Pole Clamp



The Pole Clamp allows the device to be attached to an infusion pole or may be used as a stand for the device. Push the Pole Clamp into the mounting holes on the back of the HDC64 and lock it in place. The clamp itself may also be turned.

Charging Port



The USB-C charging port may only be used to charge the device. The USB-A Hub may not be used while the device is charging.



For safety reasons and to ensure that the device recharges quickly, only the power supply that comes with the device may be used for charging. The power supply is Quick Charge™ 2.0 compatible.

Power Supply Mode Selection



The USB Hub may not be used while the device is charging.

Press the power supply button to select the power supply mode.

- Green indicates that the four USB-A ports (USB Hub) for the sensors are on and powered by the internal battery.
- Red indicates that the battery is charging.
- Flashing Yellow indicates that the system is waiting for the charger to be plugged in.
- Yellow indicates that the USB Hub is powered by the charging cable, but the battery is not charging. This option gives the user a little more time to finish a task before charging the device.

1.2 HDC84 Overview

The HDC84 is a smart tablet device with an Android operating system. The USB Hub has four USB-A ports to directly connect sensors or modules.



The buttons on the front of the device function as a standard Android device.



Speaker volume



Shows the main menu.



A short press shows the home screen.
Long press shows the running apps.



Returns to the last screen.



F1 selects the SmartHDM LIST-Screen
F2 selects the SmartHDM GRAPHIC-Screen



Turn the device ON/OFF



USB Hub for the connection of sensors and modules

Pole Clamp



The Pole Clamp allows the device to be attached to an infusion pole or may be used as a stand for the device. Push the Pole Clamp into the mounting holes on the back of the HDC64 and lock it in place. The clamp itself may also be turned.

Charging Port



The USB-C charging port may only be used to charge the device. The USB-A Hub may not be used while the device is charging.



For safety reasons and to ensure that the device recharges quickly, only the power supply that comes with the device may be used for charging. The power supply is Quick Charge™ 2.0 compatible.

1.3 HDC85 Overview

The HDC85 is a smart tablet device with an Android operating system. The USB Hub has four USB-A ports to directly connect sensors or modules.



On/Off Button

Speaker volume buttons

Charger connector

USB-A-Interface for the connection of sensors and modules

Pole Clamp



The Pole Clamp allows the device to be attached to an infusion pole or may be used as a stand for the device. Push the Pole Clamp into the mounting holes on the back of the HDC64 and lock it in place. The clamp itself may also be turned.

Charging Port



The USB-C charging port may only be used to charge the device. The USB-A Hub may not be used while the device is charging.



For safety reasons and to ensure that the device recharges quickly, only the power supply that comes with the device may be used for charging. The power supply is Quick Charge™ 2.0 compatible.

Power Bank



For extended battery life, the HDC85 has a separate power bank.

The charge status of the power bank is displayed after switching it on.

When the power bank is switched on, the Android device is supplied and charged from the power bank.

2 Android OS

The Android OS (operating system) quick start guide may be found by opening the Google Play Store on your Android device and searching for “Android quick start guide”.

3 SmartHDM Software Installation

The latest version of the SmartHDM app is available through the Google Play store under Mesa SmartHDM.

To install the App, follow the Instructions in the Google Play Store. Mesa SmartHDM works with Android version 7 and higher.

If you want to change the overall size of the display on the SmartHDM screen, try adjusting the display in the Android settings under Display/Screen zoom or Display/Display Size to suit your needs.

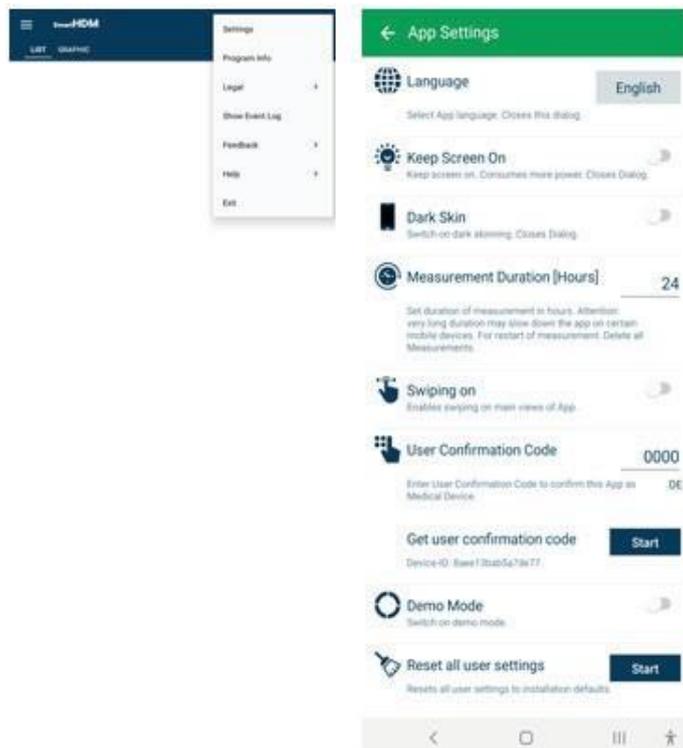
4 Medical Device

The SmartHDM System was designed for service and quality control of medical devices. SmartHDM is a medical device in the USA when used in conjunction with hemodialysis machines. In this case, only use the Mesa SmartHDM-510 version.

4.1 Registering your Device

Please register your device so that Mesa can keep you up to date with software changes. Click on "Start" under "Registration" in the app settings. Enter your data on the opening webpage. After entering your data, you will immediately receive the code for your device. Enter the code in the App settings. Until a registration code has been entered you will receive the message "Please register the app”.

Select Settings in the Main Menu and scroll down to User Confirmation Code.



5 SmartHDM General Use

The SmartHDM App displays measurement values, both digitally and graphically.

5.1 GENERAL FUNCTIONALITY



Header Area – allows the user to change settings and change the display

List Graphic +

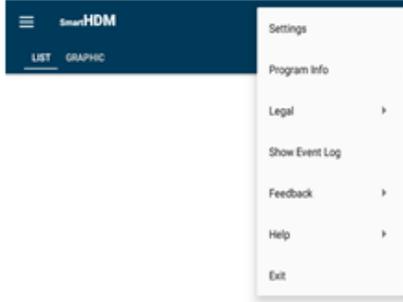
The + allows the user to add a Calculation Module or Bluetooth connections of found devices.

If the display of the looks different than the picture on the left, it can be changed by following the directions below:

- Open the Android Settings
- Select “Display”
- Select “Front and screen zoom”
- Change “Screen Zoom”

5.2 HEADER AREA FUNCTIONALITY

Button Function



Basic settings can be found by touching the three dots button.

- Program Info – Shows the App release version
- Legal - Terms and conditions and Privacy Policy
- Show Event Log - Shows complete Event Log
- Feedback - In case of App problems, the action log can be shared
- Help - Allows the user to download the Quick Start Guide or User Manual
- Exit - Terminates the App and ends the measurement



The List Menu allows the user to set up the List screen.



Drag and drop to change the order of a sensor in the list



Click to change the height of the display



Click to hide a sensor display



Change sensor display to a graphic

5.3 List Display Functionality

Depending on the connected devices, different readouts are shown.



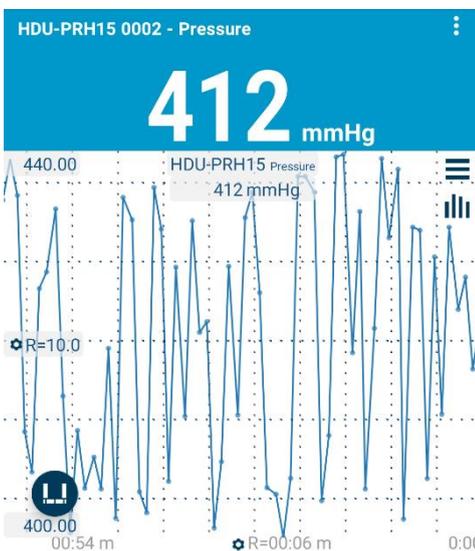
This readout tile is a one value display without any additional functionality in the display area.



This is a two-value display.
Here the upper value is the accumulated amount.



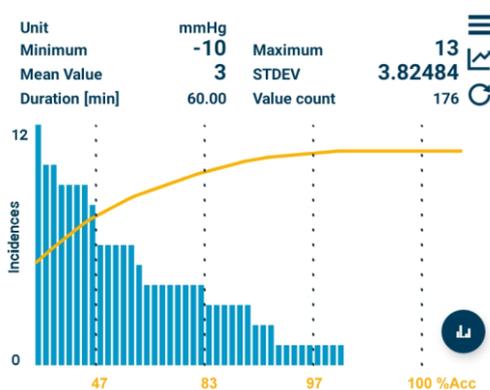
This is a two-value display showing a setting.
Here "Dialysis Machine Standard" shows the selected conductivity temperature compensation coefficient.



Touch somewhere on the value field opens the graphic for this measurement value.

Use the horizontal lines to change the Graphic Settings
Use the vertical lines to change to the statistical view

Statistic View



Use the horizontal lines to change the Graphic Settings
Switches back to the Graphic View
Starts a new statistical calculation

The Pareto distribution allows an assessment of the measured value stability

Switches to the histogram view

For the interpretation of the different diagrams, please read the user manual.

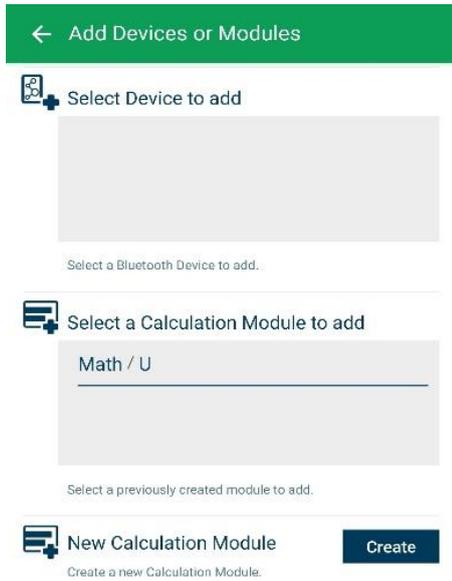


Shows settings for the particular sensor.

5.4 Add Devices and Calculation Module



Opens the Add Devices and Calculation Modules functions



Selection for compatible Bluetooth devices. Make sure Bluetooth is enabled on your Android device.

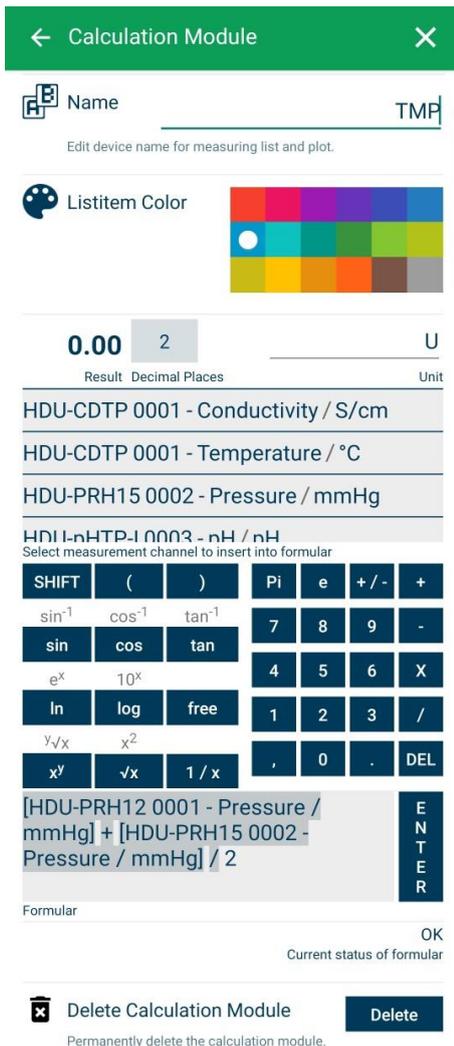
Selection of Bluetooth devices. Make sure Bluetooth is enabled on your Android device.

Selection of created calculation modules to add to the list view. Note that Calculation module functions are not available in the SmartHDM-510 Medical Device version.

Create a new calculation module

Create a new calculation module

5.5 Calculation Module



Change or set the name of the calculation module

Choose the Color of the List item of the Module

Set the decimal places and the Unit

Select a sensor or other module value to include in the calculation.

Select desired calculation functions.

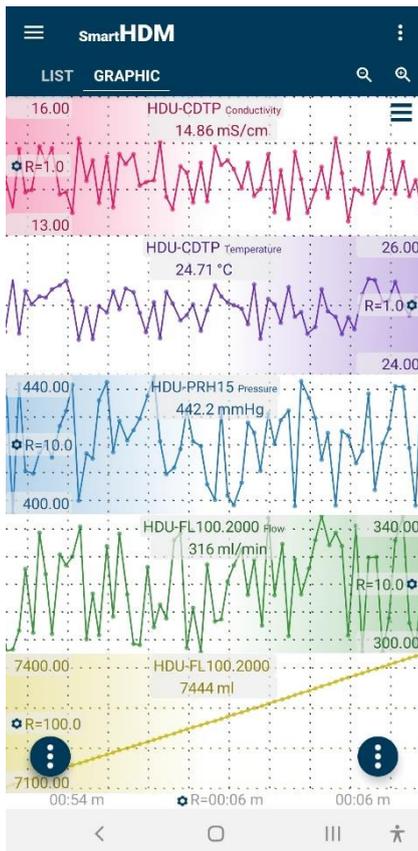
Field for entering the desired formula. Press enter to confirm.

Logic check for the formula. Valid after pressing Enter.

Deletes this calculation module.

5.6 Graphic Display Functionality

Depending on the connected devices, different readouts are shown.



Heading – allows selecting settings and the two main displays, **List or Graphic**

Zooming and Graph Settings

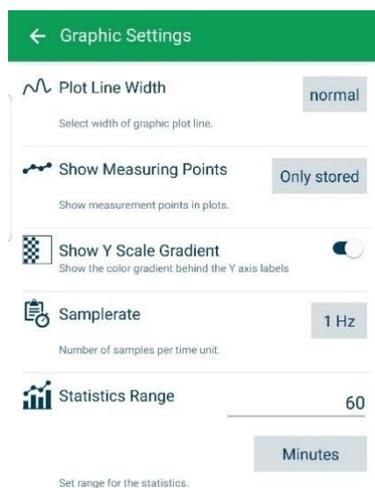
- By holding a graphic on the far-left corner or far right corner (depending on the positioning of the Y scale Options, also recognizable by the color gradient), you can move a graph manually and overlay it on another graph.
- To zoom in on the time scale use a pinching motion.
- By swiping left or right, you can scroll through the time scale (if swiping on, in the main app setting is deactivated)

Android Function Buttons



Zoom in or out for all plots.

Access Graph Settings



Change the Plot Line Width between thin, normal and thick in the graph

Change which measuring points are shown in the graphic

Turn on/off the color gradient on the Y-scale

Change the Sample rate for all devices

Set the range for the statistical evaluation

Choose between Minutes or Stored Values



The graphic Side Bar (top left corner) allows the user to change the Graphic Screen display



Touch and drag to change the order of the channels in the graph



Enable or disable a channel to be displayed



Allows toggling the position of the Y Scale Gradient (If selected in the Graphic Settings)



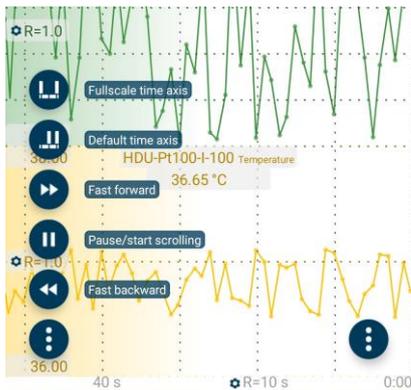
Access Y-Scale settings



Function Buttons



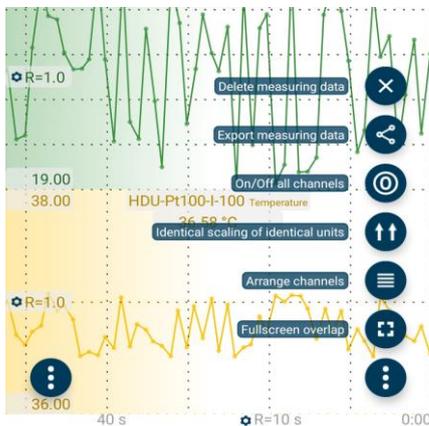
Left function button leads to the following commands:



For more details, read the SmartHDM user manual.



Right function button leads to the following commands:



For more details, read the SmartHDM user manual.

5.7 Sensor Sub Menus

As an example, the following menu shows the settings for HDU-CDTP conductivity/temperature sensors. SmartHDM remembers settings of sensors and rewrites the sensor settings every time the sensor is connected again.

Conductivity

Serial Number 9999310400000001
Serial number of the device.

Measuring Range 0.00 ... 200.00
Measuring range of measuring channel. mS/cm

Range Temperature 0.00 ... 100.00
Measurement range of temperature sensor. °C

Last Calibration 17-01-07
Calibration is valid for one year.

Name HDU-CDTP
Edit device name for measuring list and plot.

Listitem Col

Unit mS/cm
Select unit for plot.

Number of decimal places 2
Set number of decimal places, does not change measurement accuracy.

Temperature Compensation Coefficient
Only use this function if you have fully understood it. Please also read the SmartHDM-User-manual.
Select temperature compensation coefficient type.
Dialysis Machine Standard
Value 25°: 2.000 - 37°: 2.070 %/K

Adjustment
Only use this function if you have fully understood it. Please also read the SmartHDM-User-manual.
mS/cm 14.0
Select "Reference Solution" as Temperature Compensation Coefficient. Enter the value of the reference solution. Solution must be between 13,50 and 14,50 mS/cm. Arrange solution temperature between 24,8 and 25,2 °C.

Adjust Adjust
Adjust conductivity by pressing Adjust button. After adjustment, calibrate the conductivity.

Result

| | |
|---------------|-------------|
| Conductivity | 13.51 mS/cm |
| Temperature | 25.17 °C |
| Cell Constant | 0.53 1/cm |

Conductivity and Cell Constant may change after adjustment.

Adjustment Reset Reset!
Reset adjustment to factory values.

Firmware Version 0.1.2
Version of firmware in measuring device.

Device Status OK
Last status reported by device.

Serial Number of the connected Sensor

Measuring Range of the connected Sensor

Last Time the Sensor has been calibrated. Format YYYY/MM/DD

Allows modifying the name of the measuring channel. If a "blank" is entered in the list display only the measuring unit will be displayed.
Note: This function is only available in the base settings of the HDM-Modules.

Allows selecting the color of the list measuring tile.

The selected unit is used in the Graph display only. In the List display the available units update automatically.

Sets the number of decimal places to be displayed. Changing this does not affect the accuracy of the sensor.

Allows selecting the conductivity temperature compensation coefficient.

For more details please read the user manual.

Note: This function is not available with 90XL sensors.



Use the adjustment functions only if you are fully aware of their consequences. Wrong adjustment values will lead to false measurement values which could create a hazard for patients. Please calibrate the sensor after adjustment.

To adjust the conductivity sensor, please read in the user manual the chapter about conductivity calibration and follow the procedure.

Note: This function is not available with 90XL sensors.

Current reading of conductivity, temperature and cell constant.

This function allows resetting the conductivity adjustment back to factory settings.

Note: This function is not available with 90XL sensors.

Shows the firmware version of the device.

Shows the device status errors of the device.

Note: This function is not available with 90XL sensors.

6 HDU-Sensors and Interfaces

6.1 Interface Cable

In conjunction with HDC sensors or other Android devices, each HDU sensor needs the cable below.



Part No: 31.0485.20

- HDU-Sensor cable USB-A, 1.8 m/ 5.9ft 31.0485.20 Needed in conjunction with the HDC Devices.
- HDU-Sensor cable USB-C, 1.8 m/ 5.9ft 31.0485.31 To be used in conjunction with Smartphones.

6.2 HOOK & MECHANICAL INTERFACE



Most of the HDU Sensors come equipped with a hook that allows the sensor to be hung.

Most of the HDU-Sensors feature a mechanical interface that allows the sensor to be connected to different adapters i.e., flow-through and pressure adapter.

6.3 HDU-CDTP TEMPERATURE AND CONDUCTIVITY SENSOR

The device can be used as a flow-through or dip sensor.



The flow-through adapter can be disconnected for immersion usage by pressing the release button.

The preferred orientation of the adapter is vertical. The axial connector must point down (see picture). Before measurement, shake the adapter slightly so that air bubbles trapped inside can pass off through the outlet.



The setting for the temperature compensation coefficient of first time connected sensors will be set to the value last time used on the Android display device.

Never touch the carbon ring electrode surfaces with your fingers or other objects.

To avoid deposits in the conductivity electrode, the flow channel must be flushed with RO water after use.

If you want to disinfect the flow channel, connect the HDM module to a dialysis machine and start a disinfection program.

6.4 HDU-FL Flow Sensor



After use make sure to rinse the flow sensor with deionized water for a couple of minutes.

Use the sensor only in the indicated flow direction.

Incorrect flow direction can damage the sensor.

Please clean the inlet filter on a regular basis.

6.5 HDU-pH-I Interface for pH-Electrodes

To counteract aging and storage effects, the pH-Electrode must be readjusted cyclically. For accurate measurements, a three-point adjustment is necessary directly before the measurement. Use the supplied pH buffer solutions for adjustment.



HDU-pH-Interfaces are supplied with a basic adjustment. Ideal voltage values are used to simulate the corresponding pH levels. The results in the calibration certificate document of the device show the simulated pH levels.

It is mandatory to adjust the pH electrode in connection with the pH-Interface device before the first measurement.

Use the adjustment functions of the SmartHDM App only if you are fully aware of their consequences. Wrong adjustment values will lead to false measurement values and in consequence these false values lead to hazards for patients. Detailed instructions can be found in the user manual.

6.6 HDU-pt100-I Interface for PT100-Sensors



For high accuracy, use module and sensor calibrated together.

Rugged Pt100 temperature sensor family.

Air General - Dip Surface Laboratory

Computer Interface



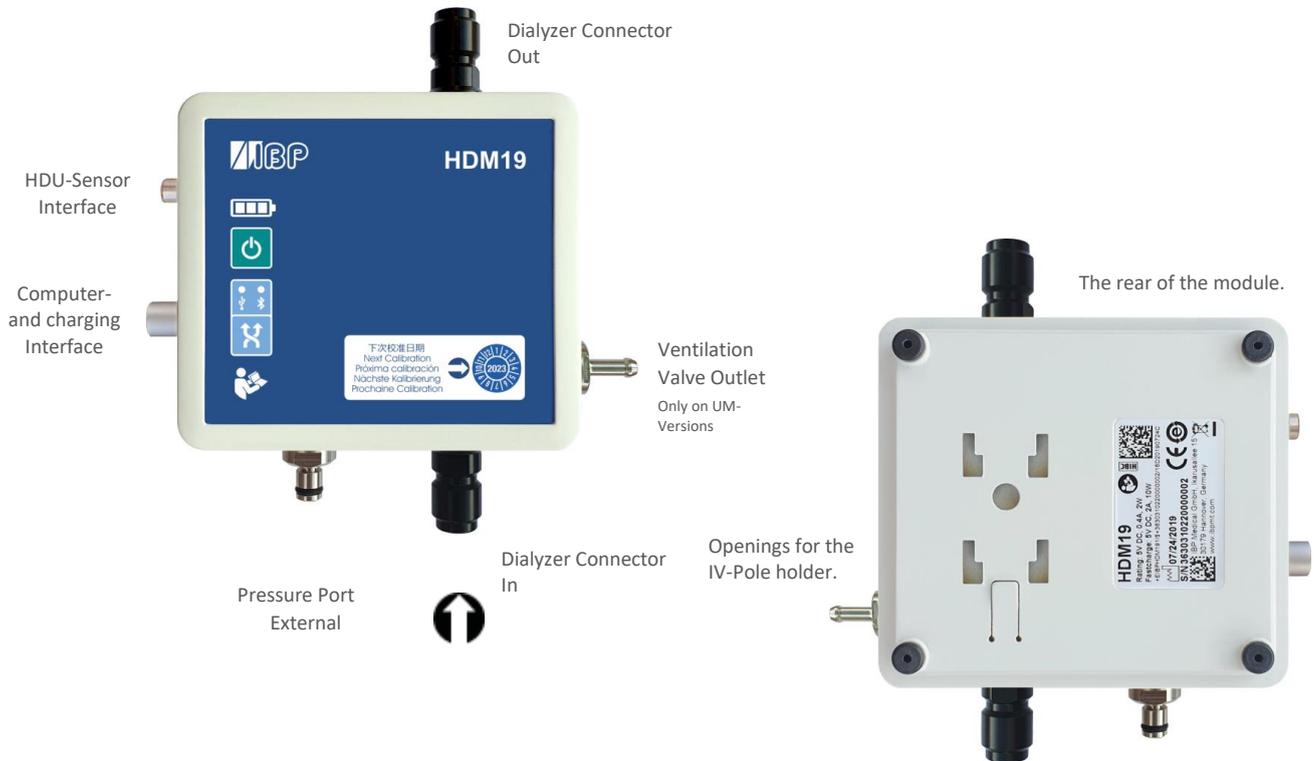
Pt100 Interface



7 HDM18 and HDM19 Modules

Hemodialysis Sensor Modules.

7.1 OVERVIEW



7.2 Handling



These indicators and buttons are only available on the HDM19

ON/OFF Button

In case of communication via USB Connection, the device can not be switched OFF.

Connection indication for USB Bluetooth

Connection Selection

Ventilation Valve

The ventilation valve allows opening the flow-through measuring cell to the environment. **This option can be used in the calibration of Fresenius dialysis machines.**



To be able to switch the valve from the SmartHDM App, please activate the ventilation valve function in the module settings menu. This displays a button for the valve in the list display.



The Pole Clamp allows the device to be attached to an infusion pole or may be used as a stand for the device. Push the Pole Clamp into the mounting holes on the back of the module and lock it in place. The clamp itself may also be turned to keep the device upright on a flat surface.

Charging



For safety reasons and to ensure that the unit is quickly recharged, please use only the power supply delivered with the device. The power supply is Quick Charge™ 2.0 compatible. Do not extend the interface cable while charging the device.

Bluetooth Connection



To communicate with the HDM19 via Bluetooth, please turn on the Bluetooth connection on the Android device. In case of radio interference with other sources like WLAN, a stable Bluetooth connection is not possible. For safety reasons, the SmartHDM software will then terminate the communication. Alternatively, please use the USB connection. If measured values are frequently displayed as "error", please also connect the device via the USB interface.

Rinsing & Disinfecting



To avoid deposits in the conductivity electrode, the flow channel must be flushed with RO water after use. If you want to disinfect the flow channel, connect the HDM module to a dialysis machine and start a disinfection program.

8 90XL Sensor Modules

With a special USB interface cable 90XL sensors may be connected to the SmartHDM. The SmartHDM app automatically detects the various sensors. Not all advanced 90XL functions are supported by the HDC system.



Further information on the sensors can be found in the User's Guide of the 90XL Meter.

The order data of the interface are as follows:

Part Number: 31.0486.20 SmartHDM USB-A to 90XL Module Cable



Connecting a sensor



When connecting a sensor to the SmartHDM system, first connect the sensor to the interface cable then connect the cable to the USB port.

Adjustment pH sensor

The 90XL pH module must be calibrated before use. For first time use, the calibration must be made using both pH7 and pH4 solutions. After that, calibration only needs to be done using the pH 7 solution. Further details can be found in the SmartHDM user manual.



Adjustment

Only use this function if you have fully understood it. **Please also read the SmartHDM-User-manual.**

Please always follow this procedure:

Rinse pH probe in rinse solution, remove pH probe, discard rinse solution, place pH electrode in pH buffer, press Confirm or Save when readings are stable.

pH 7.00

Confirm

Adjustment of pH4 is mandatory!

pH 4.00

Restore factory values

The screenshots in this manual are for illustration purposes only. The design on your screen may differ from the illustrations in this manual.

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