oertli®
SWITZERLAND

CataRhex 3®
SERVICE MANUAL

VV016039E / VC821100

EYE SURGERY. SWISS MADE.

CAUTION:
U.S. Federal Law restricts this device to sale by or on the order of a physician.

CE
0297

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1 About this document

The service manual is a supplement to VV016038 CataRhex 3 instructions for use and describes safe and appropriate service and maintenance of the device.
The technical data of the unit can be found in the technical data chapter in the Instructions for Use.

Repairs to the device may only be performed by service technicians authorised by Oertli Instrumente AG and based on the last valid version of the service manual.

1.1 Warnings and symbols in this manual

Warning sign/word	Danger level	Consequences of non-compliance
DANGER!	Imminent danger	Death, serious injury
WARNING!	Possible danger	Serious injury
CAUTION!	Possible dangerous situation	Slight injury
NOTE!	Possible dangerous situation	Material damage

Explanation of the structure of a warning message using the example of a warning:

WARNING!
Indication of the source/cause of the hazard.
Indication of the nature of the hazard.
► Steps to take to avoid the hazard.

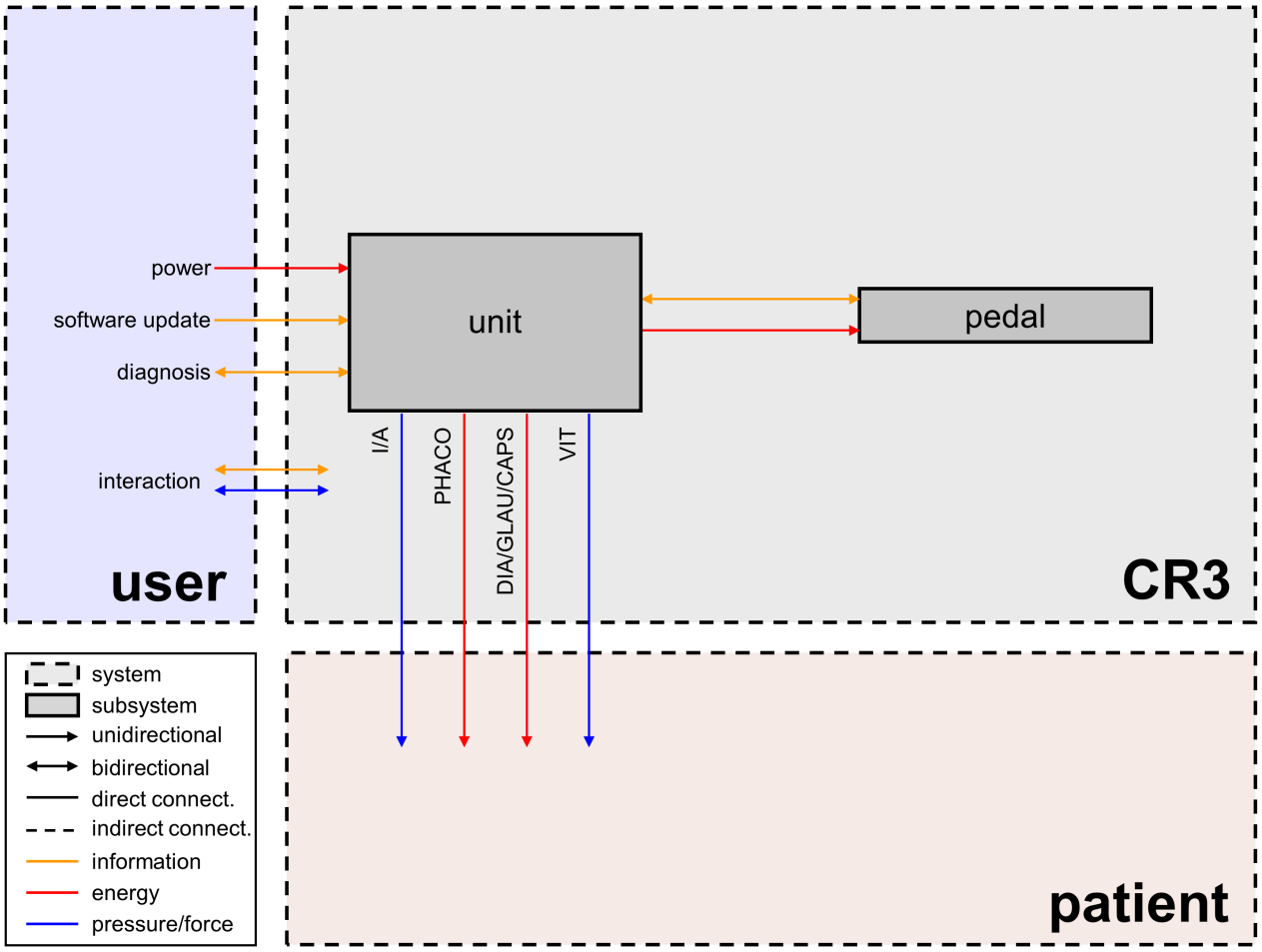
Symbol	Meaning
	Safety sign
	Electrostatic sensitive devices
	Information that makes working with the device easier

DANGER!
Electric shock.
Risk of death or serious injury.
► Unplug mains (the power cord) before opening the unit!

WARNING!
Faulty device is put into operation.
Improper repairs can endanger the safety of staff and patients.
► Repairs to the device may only be performed by service technicians authorized by Oertli and based on the last valid version of the service manual. Improper repairs compromise the safety of staff and patients and will void any warranty.

NOTE!
ESD protection not provided.
Electronics suffer ESD damage.
► ESD protection must be ensured before repair by the service technician. It is very important that both you and the device are earthed at all times.

3 Block diagram CataRhex 3



4 Installation

4.1 General remarks

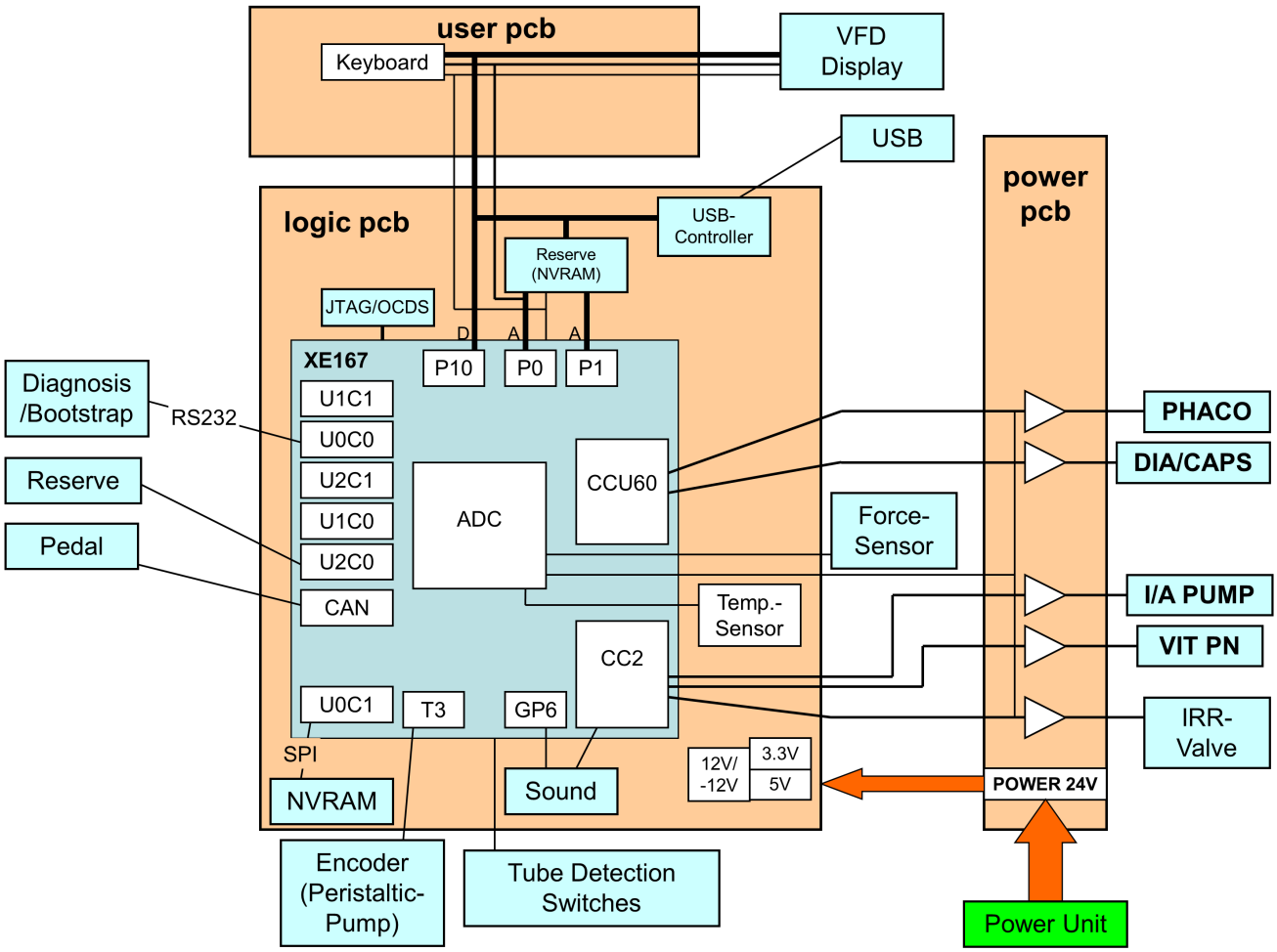
When placing the device, ensure clearance of at least 20cm around the ventilation openings. Do not cover the device when in operation.

4.2 Power supply

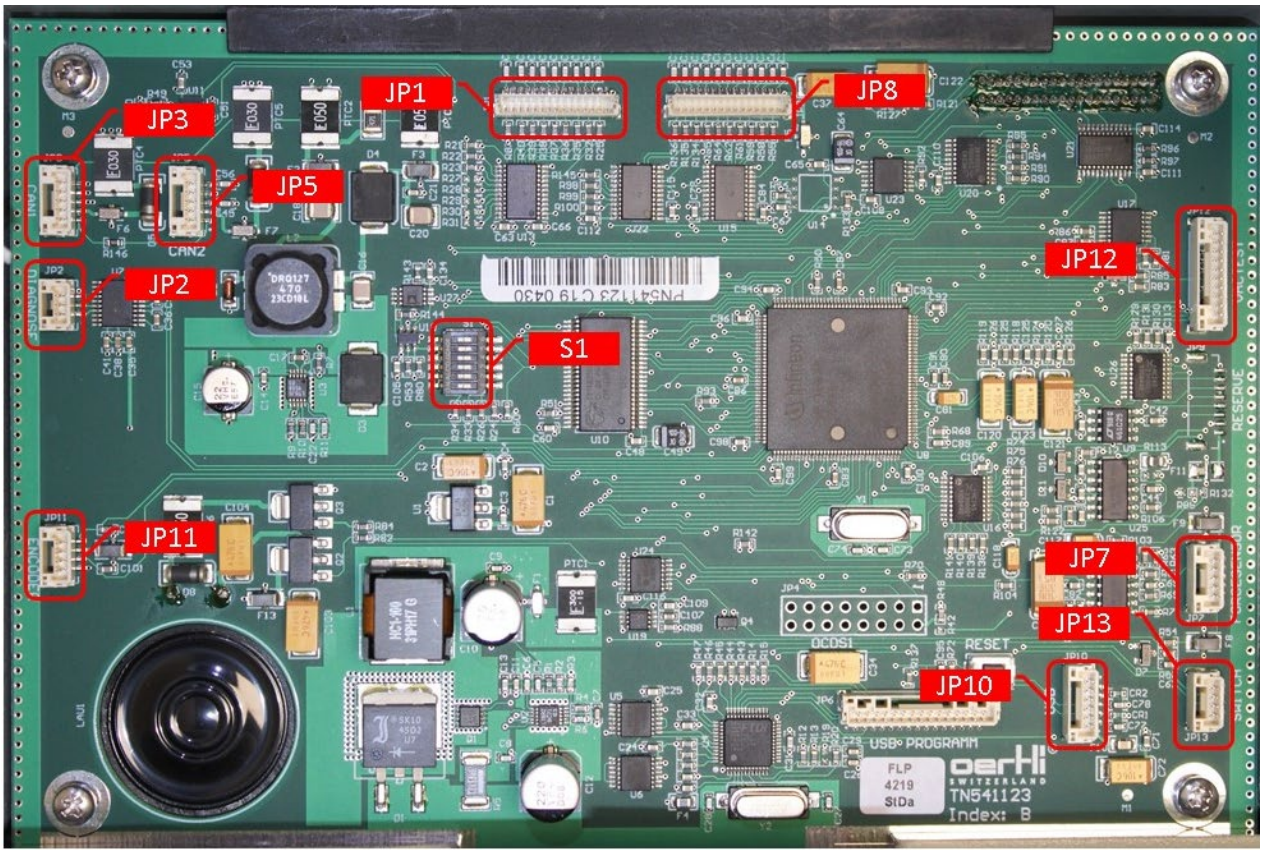
Type	Value	
Supply system	Voltage: Frequency: Output:	100 V-240 VAC 50 Hz-60 Hz 150 VA

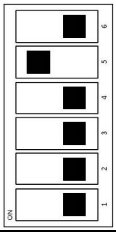
5 Device composition

5.1 Block diagram control unit

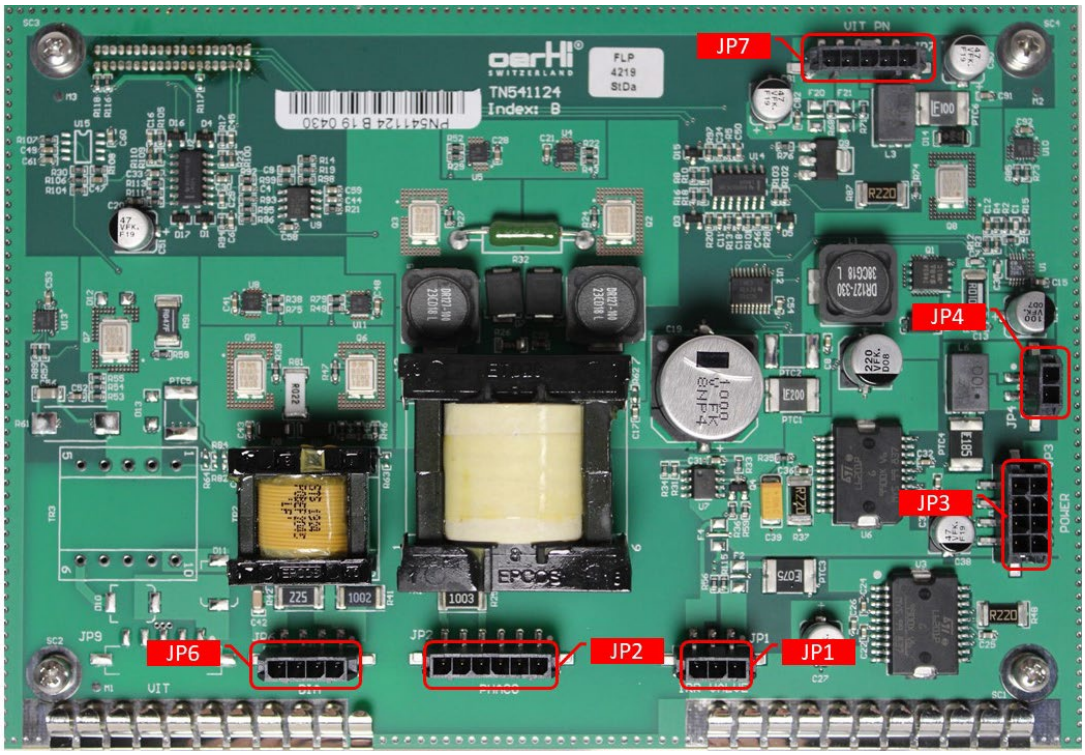


5.2 Logic PCB



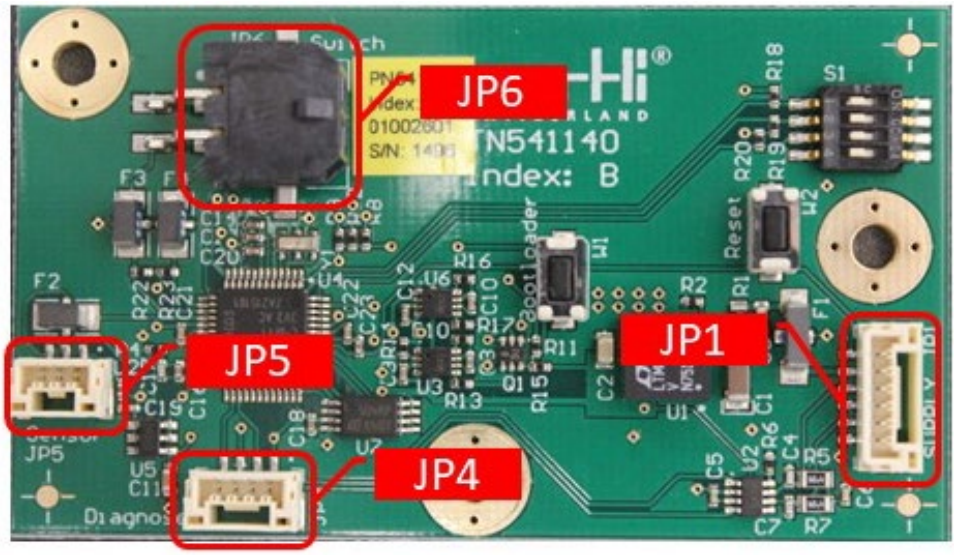
Number	Abbreviation	Function
JP1	-	Connection control unit
JP2	DIAGNOSE	RS232 interface (only for manufacturer)
JP3	CAN1	CAN connection pedal
JP5	CAN2	CAN reserve
JP7	FORCE SENSOR	
JP8	-	Connection control unit
JP10	USB	USB connection
JP11	ENCODER	Connection encoder of peristaltic pump
JP12	VACTEST	Remains open (only for manufacturer)
JP13	SWITCH	Connection of tubing set detection switch
S1	DIP-SWITCH	Controller start configuration, do not change 

5.3 Power PCB



Number	Abbreviation	Function
JP1	IRR VALVE	Connection of irrigation valve
JP2	PHACO	Connection of phaco handpiece
JP3	POWER	Power supply for power supply unit
JP4	PUMP	Connection of peristaltic pump
JP6	DIA	Connection of diathermy handpiece
JP7	VIT PN	Connection of Vit-PN module

5.4 Pedal PCB (VE821015)



Number	Abbreviation	Function
JP1	SUPPLY	CAN, +24V of the CataRhex 3
JP4	Diagnose	RS232 interface: remains open (only for manufacturer)
JP5	Sensor	Vertical angle sensor
JP6	Switch	Left and right directional switch

6 Service mode operation

6.1 General information regarding service mode

After starting (RESET or network ON) you access the service mode by simultaneously pressing the AUX and VIT keys for at least three seconds.

To navigate, use the buttons below the display.

Lower line with symbols
These can be used to move the cursor.

- Direction arrows (▲) (▼) Use these direction arrows, to jump to the next or previous menu and to move the cursor up or down.
- Direction arrows (◀) (▶) Use these direction arrows to move the cursor left or right.
- Enter button (↵) Use the enter button, to confirm a selected function.

The function selected with the cursor will flash.

To exit the service mode, press the RESET button at any time.

The service mode is divided into the following different menus:

SURG-MEM INTERNAL	- Resetting of surgeon data for one or all surgeon memories. - Internal copying of surgeon data.
SURG-MEM USB	- Saving and retrieving data with USB stick. - Copying of surgeon data from USB stick.
PEDAL	Calibration of the pedal.
SENSOR SET	Calibration of the force sensor.
BUTTONS	Testing the buttons on the control panel and sound system.
VOLTAGES	Display of current device voltages.
TEMPERATURE	Temperature value of the sensor in the device.
ADDITIONAL FUNCTIONS	Generating request code, installing and uninstalling additional functions.

6.2 Display software (SW) version and serial number

The SW version and the device serial number will be displayed after entering the service mode.

Display:

```
SERVICE MODE       START
SNXXYYNNNN
SWCXX.YY.ZZ vX.Y.Z    BOOTYYY
              ▼ ▲        ◄ ►        ↵
```

SN***XXYYNNNN***	Serial number
SWC***XX.YY.ZZ vX.Y.Z***	SW version application programme
BOOT***YYY***	SW version boot programme

6.3 Setting default values

All the limit values (stored values), pedal control and ParaProg settings can be reset to the values recommended by the manufacturer in the SURG-MEM INTERNAL menu.

- In the SURG-MEM INTERNAL menu, select the surgeon storage location first or choose ALL for all surgeons by keeping the AUX key depressed while pressing the keys below <SELECT SURGEON>.
- Confirm <SET ALL PARAMETER DEFAULT?> by pressing the Enter button (↵).
- Confirm <CONFIRM DEFAULT?> by pressing the Enter button (↵).

6.4 Save and import surgeon data

It is possible to store all surgeon and system parameters on a USB stick in the SURG-MEM USB menu.

1. Insert the Oertli USB stick.
2. Open the service mode according to chapter ♦6.1.
3. Choose and confirm the needed option below.

<WRITE ALL TO USB>	All data (settings, ParaProg, pedal settings, system parameters) from all surgeons will be stored on the USB stick.
<READ ALL FROM USB>	All surgeon data (settings, ParaProg, pedal settings) of all surgeons will be restored from the USB stick (with the surgeon's name on the USB stick).
<READ SURGEON FROM USB>	All surgeon data (settings, ParaProg, pedal settings) of only one surgeon will be copied from the USB stick to a specified surgeon memory in the CataRhex 3 device. The surgeon name in CataRhex 3 will not be changed. **It is very important that the software version in the destination unit is equal to or higher than the software version in the unit containing the source data!**

Only use an Oertli service USB flash drive in conjunction with the CataRhex 3

Possible messages on the display	Error / action
Insert memory stick	Insert USB stick.
File not found	Surgeon data file with the name CR3S_DOC.BIN is not on the USB stick.
Copy data to USB (.)	Wait until data are written.
Copy data from USB (.)	Wait until data are read.
Memory stick removed; data saving incomplete	Do not remove the USB stick while writing.
Memory stick removed; data load incomplete	**NOTE!** **Surgeon data on the device may be inconsistent!** **Malfunction or destruction of the device.** ► Do not remove the USB stick while reading. Repeat surgeon data read.
File on memory stick is corrupted.	Surgeon data file is corrupted. Write the data from the source device to the USB stick again.
Data saved; remove memory stick.	Data transfer procedure was successful. Remove the USB stick!
Data read; remove memory stick.	Data access procedure was successful. Remove the USB stick!
USB ERROR	An error occurred. Please repeat the surgeon data access or transfer procedure.

In the menu SURG-MEM INTERNAL with the function <COPY SURGEON MEMORY> it is possible to copy all surgeon settings (settings, ParaProg, pedal settings) from one surgeon memory to another selectable memory position. The surgeon name from the destination will not be changed.

To copy and insert the surgeon memory follow the following steps:

1. Insert the Oertli USB stick.
2. Open the service mode according to ♦6.1.
3. Copy the surgeon memory according to ♦6.4.
4. Insert the Oertli USB stick into the new device.
5. Open the service mode according to ♦6.1 and import the surgeon memory.

Backup the physician data regularly, at least before and after each repair.

6.5 Checking and calibrating the pedal

The pedal settings can be checked and re-calibrated in the PEDAL menu. As part of this process, the mechanical positions are synchronised with the sensor values. These values are then stored in the pedal. This means that a calibrated pedal can also be operated with a different CataRhex 3 unit.

The CataRhex 3 unit will automatically detect whether another type of pedal is connected. SwissTech pedals can be used with CataRhex 3 as well. OS3 and Faros pedals cannot be used with CataRhex 3.

Display:

```
SERVICE MODE        PEDAL
VERTICAL POS 0   0%  NoSwitch   HW:001 SW:007
SET PEDAL?                YES      NO
              ▼ ▲         ◀ ▶        ↵
```

Pedal position (e.g. POS ***0)***	0 = Neutral 1 = IRR 2 = Aspiration 3 = Instrument active 4 = Reflux
0%, vertical deflection	0 ... 100% (per pedal position)
NoSwitch, horizontal deflection	NoSwitch = horizontal central LEFT = horizontal left RIGHT = horizontal right

Pedal calibration:

- Move the cursor to <SET PEDAL?> Select <YES> and press the Enter button (↵).
- Move the cursor to <REALLY CHANGE SETTINGS?> Select <YES> and press the Enter button (↵).
- Follow the instructions displayed.

When entering settings, ensure that the 100% end value can be read off for the horizontal and vertical deflection in each area (otherwise repeat the calibration).

6.6 Calibration of peristaltic sensor

The vacuum for the peristaltic pump is measured with the force sensor.

The offset adjustment for the force sensor can be made in the SENSOR SET menu.

Display:

```
SERVICE MODE       SENSOR SET
ACTUAL OFFSET: 0333    MEASURED OFFSET: 0338
CHANGE OFFSET:               YES      NO
              ▼ ▲         ◀ ▶        ↵
```

ACTUAL OFFSET: ***0333***	Saved offset value (latest adjustment)
MEASURED OFFSET: ***0338***	Measured force sensor offset value

Sensor calibration:

- Move the cursor to <CHANGE OFFSET?> Select <YES> and press the Enter button (↵).
- Remove the tubing system.
- Press the Enter button (↵) for <AFTERWARDSSTORE OFFSET:> Select <STORE>

6.7 Button and sound test

All buttons on the control panel, the tube switches and the loudspeaker can be tested in the <BUTTONS / SOUND> menu.

- When actuating the buttons, the following applies:
  - If a button is pressed, the name of the button will appear on the display.
  - If no button or more than one button is pressed, <NO OR MANY KEYS> is shown on the display.
- When the button below <SOUND> is actuated, a clear, continuous, loud acoustic signal can be heard as long as the button is pressed.
- To exit the <BUTTONS / SOUND> menu, press the Enter button (↵)
- When inserting the tubing system, the following applies:
  - If the tube system is correctly inserted, <BOTH TUBE SWITCHES> appears on the display.
  - If the tube system is only partially inserted, <TUBE SWITCH 1> or <TUBE SWITCH 2> appears on the display.
  - If the tube system is not inserted, <NO SWITCH> appears on the display.

6.8 Operating voltages

The operating voltages can be checked in the <VOLTAGES> menu.

The following applies:
+ 3.3V ±0.5V
+ 5.0V ±0.5V
+12.0V ±1.0V
- 12.0V ±1.0V
+24.0V ±2.0V

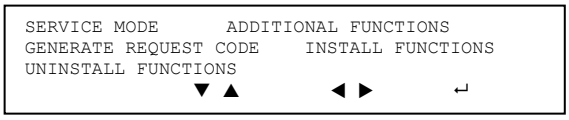
6.9 Temperature

The temperature in the device can be controlled in the <TEMPERATURE> menu.
The temperature sensor is located on the logic print.
The temperature in the device must not exceed 55°C.

6.10 Installation of HFDS (additional functions)

In the <ADDITIONAL FUNCTIONS> menu, request codes for the requirement of installation keys for additional functions can be generated. Moreover, the desired additional functions can be released using the installation key in this menu. A function that has been released can also be uninstalled again.

Display:



Generate a request code:

- Move the cursor to <GENERATE REQUEST CODE> and press the Enter button (↵).
- Select the desired function and press the button below <GENERATE>.
- The request code will appear on the display.
- Insert a USB stick.
- Press the button underneath <TO USB>. The request code will be stored on the USB stick.
- Wait until <Data saved; remove memory stick> appears on the display.
- The request code is now saved on the USB stick in the file <CR3SCODE.BIN>.
- Send the request code to Oertli.

Installation of additional functions:

- Move the cursor to <INSTALL FUNCTIONS> and press the Enter button (↵).
- If the installation key received from Oertli is in the file named CR3SK_XXYYNNNN, where XXYYNNNN is the serial number of the device, use a USB stick with this file.
- Move the cursor to <INSTALL FUNCTIONS> and press the Enter button (↵).
- The installation key will be read from the USB stick and appear on the display.
- Press the button below <INSTALL>. The installation key will be checked and, provided it is valid, installed. Otherwise <INVALID> will appear on the display.

Uninstallation of additional functions:

- Move the cursor to <UNINSTALL FUNCTIONS> and press the Enter button (↵).
- Select the desired function and press the button underneath <REMOVE>.
- Confirm uninstallation by pressing the button below <CONFIRM>.

6.11 VIT-PN corrective

The correction factor for the built-in VIT-PN unit can be set in the <VIT-DC CALIBRATION> menu. To access this menu, keep the VIT key depressed after start-up.

Display:

```
SERVICE MODE       VIT-DC CALIBRATION
VIT-DC CORRECTION 120%
CHANGE CORRECTION?          YES   NO
               ▼ ▲          ◀ ▶       ↵  EXIT
```

Change correction:

- Move the cursor to <CHANGE CORRECTION?> Select <YES> and press the Enter button (↵).
- The Vit-PN pump will start.
- Change the correction value with the left / right buttons.
- Move the cursor to <Finish?> Select <YES> and press the Enter button (↵).
- The Vit-PN pump will stop.
- Press the button below <EXIT> to leave the menu.

7 Installation and uninstallation of device components

The installation of components is done in the reverse order of their uninstallation. Each section specifically indicates any points which are important to observe.

DANGER!
Electric shock.
Danger to life or serious injury.
► Carry out a visual inspection of the earth connections after each repair according to ♦14 to end.

WARNING!
Repair not performed correctly.
Risk of reversible eye damage to the patient.
► A function test must be performed after each repair according to ♦14 to end.

Confirm activities performed on the device on the report sheet according to ♦14 to end.

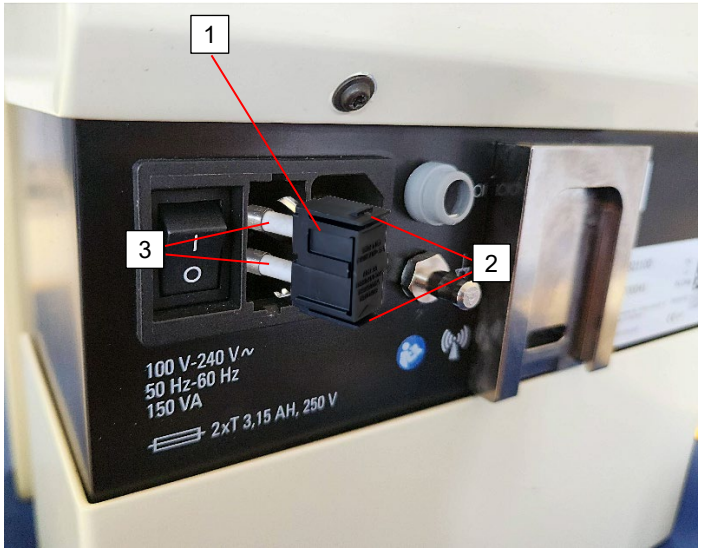
NOTE!
Incorrect handling of the Würth plugs.
Plugs can be damaged.
► Slightly lift the locking tab during unplugging.
► When unplugging, pull on the plug and not on the cable.
► When unplugging and plugging in, do not tilt the plug sideways.

NOTE!
Faulty plug connections.
Malfunction or destruction of the device.
► Perform a visual inspection of plugs and cables according to ♦5.

7.1 Replacement of fuses

VX520010 Replacement fuses

Work steps:



Step 1:

1. The fuse holder [1] can be pulled out by pressing the tabs [2] at the top and bottom of the fuse holder.
2. Replace defective fuses [3] with new ones of the same type. You will find the values indicated below the mains plug on the device.

DANGER!
Incorrect fuse type used
Risk of death or serious injury

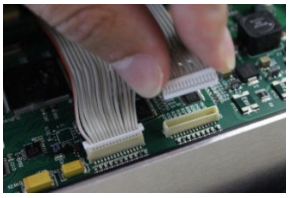
- ► Only use main fuses with the values: <T 3.15 AH, 250 V, high breaking Capacity>
- ► Do not use any makeshift fuses
- ► Do not short-circuit the fuse holder

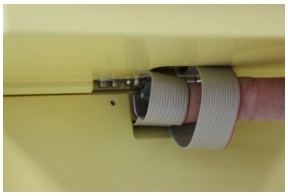
3. Insert the fuse holder.

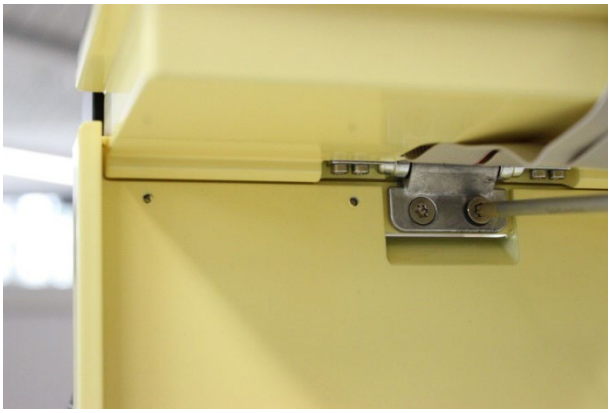
7.2 Replacement of control panel

VX210106 Control panel

Work steps:







Step 1:

1. Open housing according to ♦7.3, step 1

Step 2:

2. Disconnect both flat ribbon cables from the logic print.
3. Pull out both flat ribbon cables through the front frame of the housing.

Step 3:

4. Fold up the control unit.
5. Undo the two countersunk head screws on the torque hinge and take off the control unit.
6. Carry out assembly of the new control unit in reverse order of dismantling.

No operating unit can be installed which has already been used with another control device.

NOTE!
Error, Serial Nummber does not match.
Restricted device operation.

► Follow the instructions below: The VX210106 control unit may only be operated on the final device. When the device is switched on for the first time, the device serial number is loaded into the control panel and stored. This can only be deleted at the Oertli factory. If this instruction is not followed, the error message <Serial number does not match> appears on the device.

7.3 Open housing

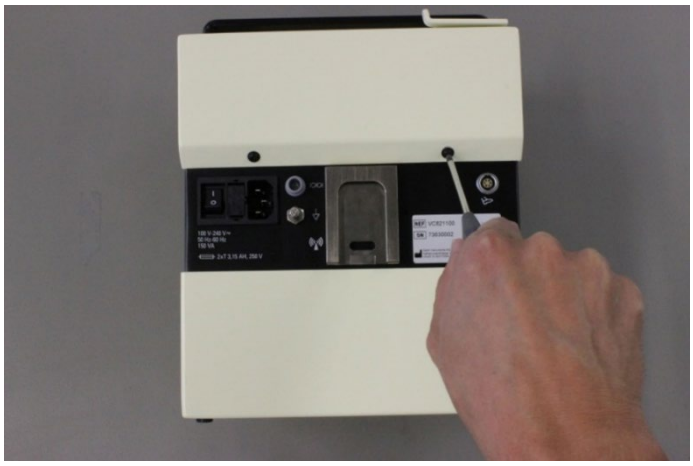
DANGER!
Faulty earth connection.
Risk of death or serious injury.
► When assembling the supporting structure and front frame, the grounding connection between the supporting structure and front frame must be plugged in!

VX210138 Upper cover plate with bottle / bag holder

Follow Step 1.

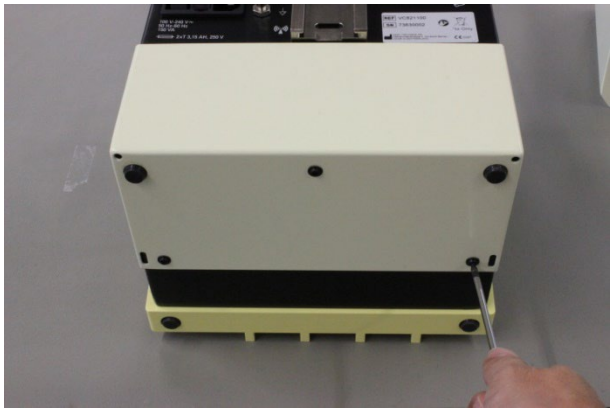
VX210139 Lower cover plate

Follow step 2.



Step 1:

1. Unscrew the two screws on the upper cover plate and remove the upper cover plate.



Step 2:

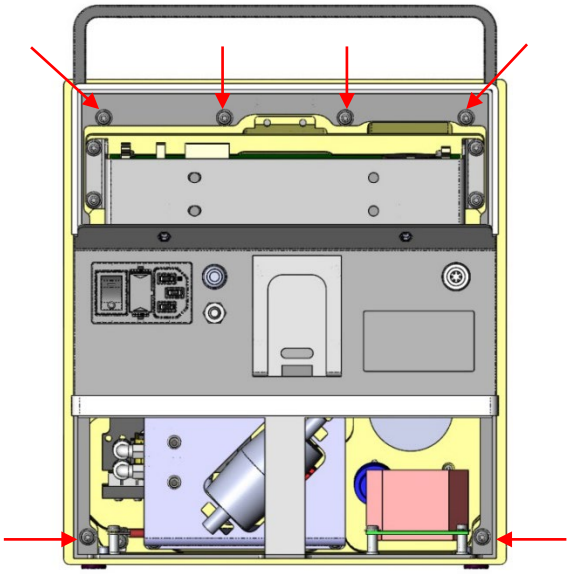
2. Unscrew the three screws on the lower cover plate and remove the lower cover plate.

Step 3:

3. Cut off the cable tie from the <CAN> and <DIAGNOSE> cable.

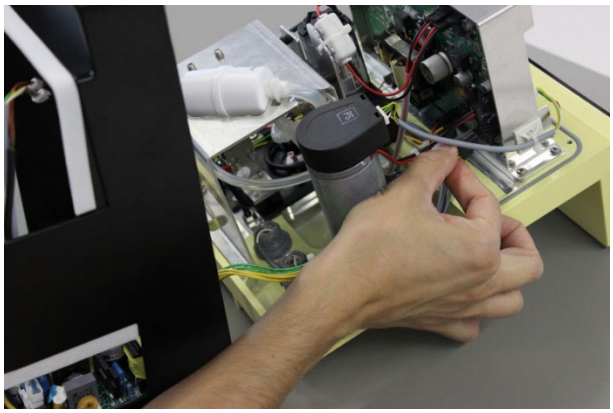
Step 4:

4. Disconnect the <CAN> and <DIAGNOSE> plugs from the logic print.



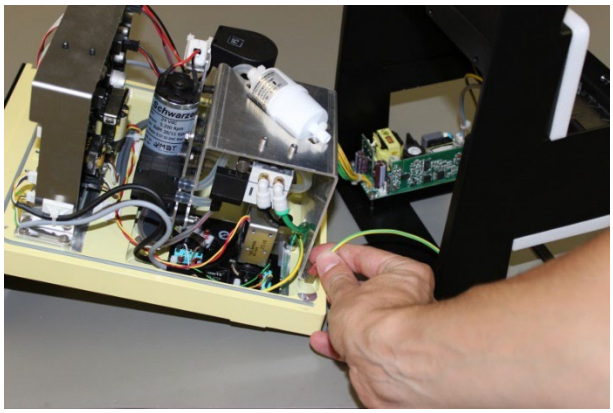
Step 5:

5. Undo six screws on the supporting structure and carefully remove the supporting structure from the front frame.



Step 6:

6. Disconnect the cable from the power supply on the power print.



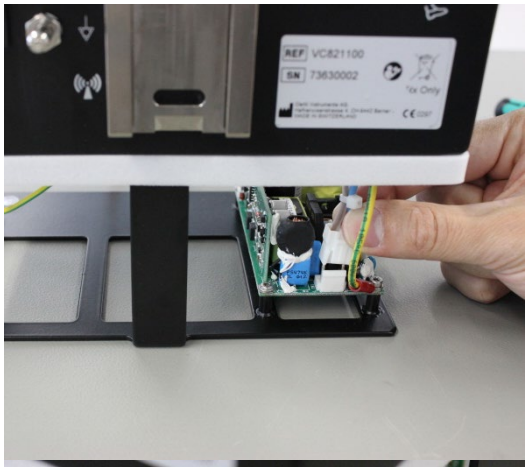
Step 7:

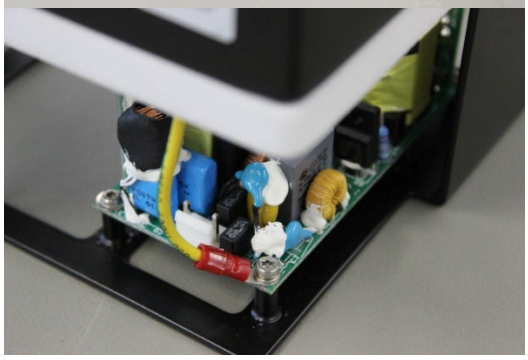
7. Unplug the grounding cable from the supporting structure of the front frame.

7.4 Replacement of mains socket with mains switch & fuse holder

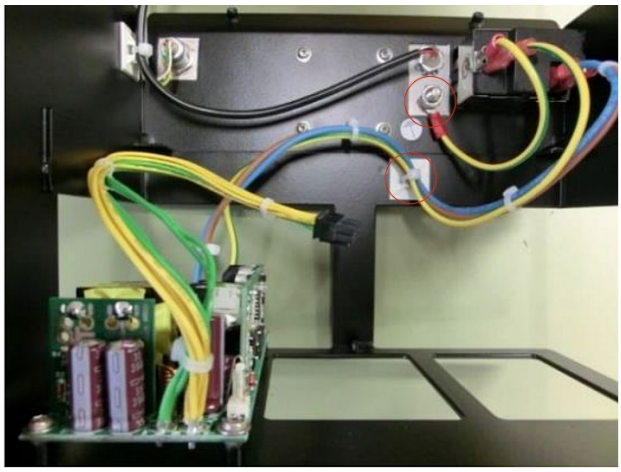
VX400388

Work steps:

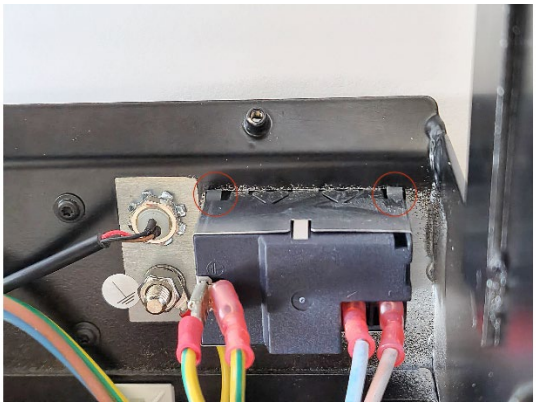




1. Open housing according to ♦7.3.
2. Disconnect mains switch cable from power supply
3. Remove the screwed earth connection.



4. Remove the cable tie
5. Remove the Equipotential bonding by removing the nut.



6. Press the 4 Secure clips in each corner to take out the entire mains socket.

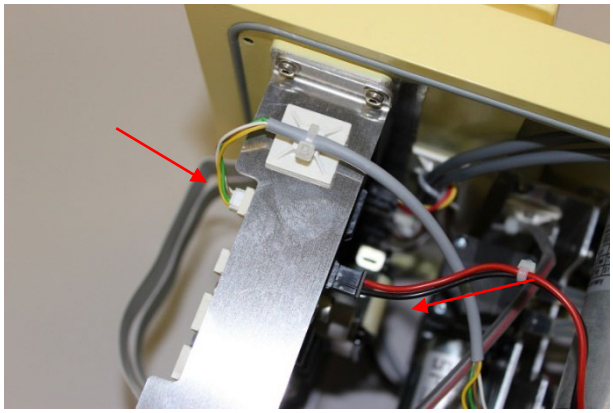
The assembly of the components is done in the reverse order of disassembly.

7.5 Replacement of peristaltic pump

VX310075 pump motor

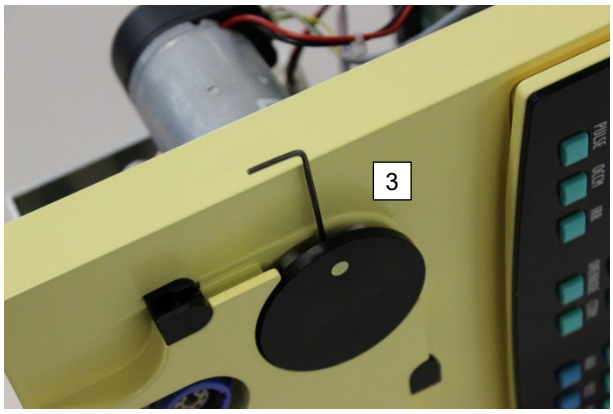
VX210046 pump wheel

Work steps:



Step 1:

1. Open housing according to ♦7.3.
2. Unplug the <PUMP> cable from the power print, then disconnect the <ENCODER> cable at the logic print.

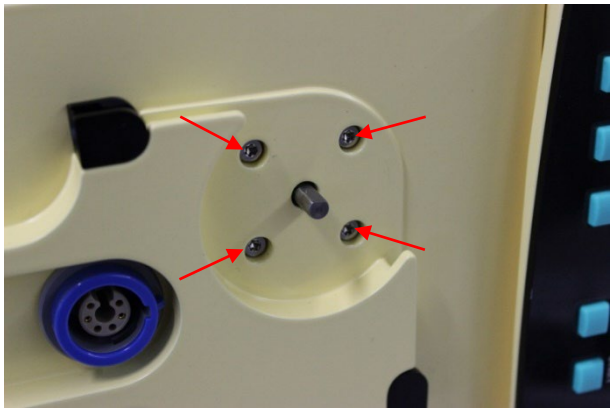


Step 2:

3. Turn the pump wheel until the stud points to the side.
4. Undo stud with Allen wrench.

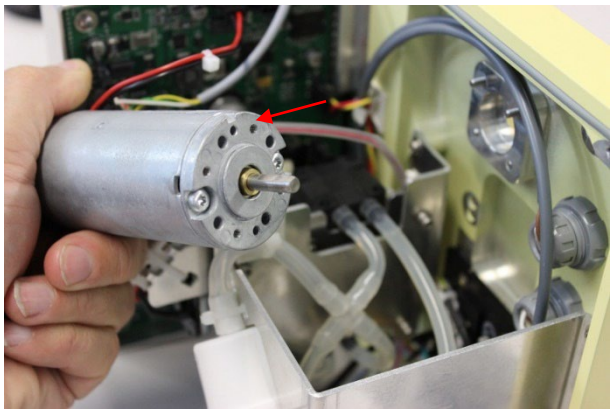
Before removing the Pump wheel, apply heat to the middle of the wheel and heat it up between 70° and 90° for a smooth removal.

5. Remove pump wheel.



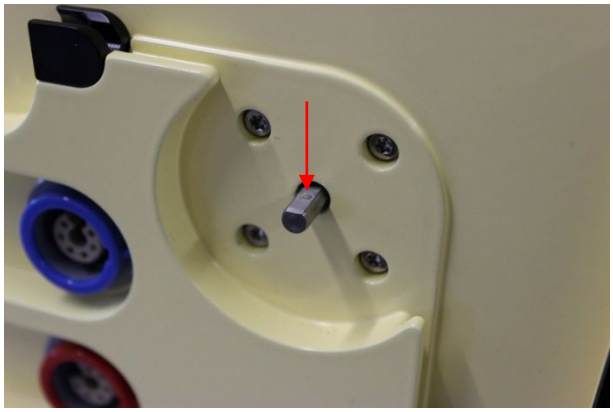
Step 3:

6. Undo the four screws on the front frame and remove the pump motor.



Step 4:

7. Build in new pump motor paying attention to cable orientation.
8. Fix pump motor with four screws on the front frame.



Step 5:

9. Align motor axis so that the surface area points to the side.

Step 6:

10. Attach pump wheel with pump rollers to motor axis.

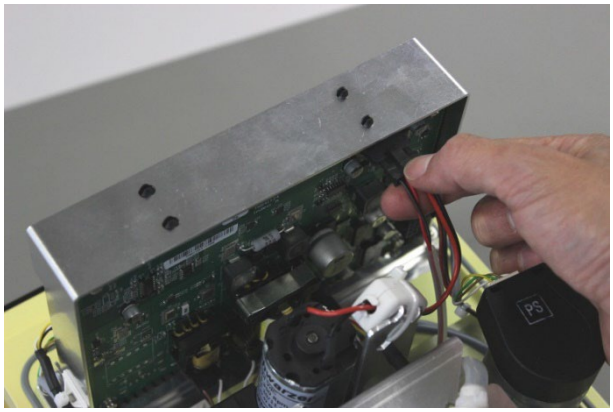
CAUTION!
Malfunction of the peristalsis.
Risk of reversible eye damage to the patient.
► The distance between the pump rollers and the front frame must be set to 0.2 mm!

11. Attach pump wheel with stud and secure with Loctite 243.

7.6 Replacement of Vit-PN module

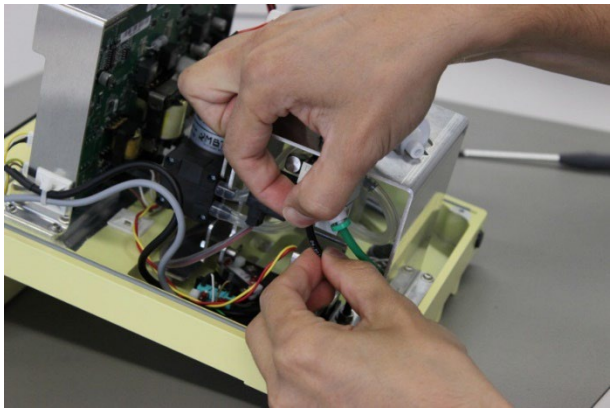
VX210143 Vit-PN module

Work steps:



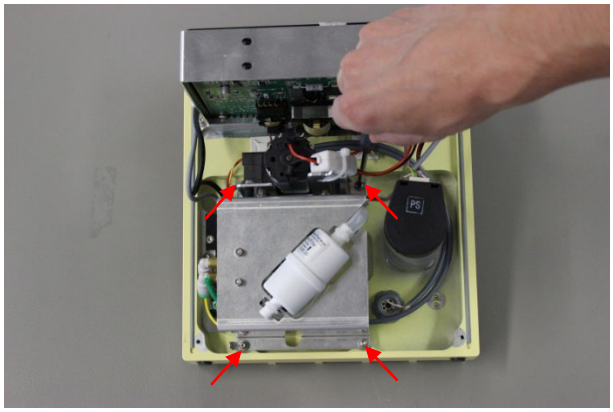
Step 1:

1. Open housing according to ♦7.3.
2. Disconnect <Vit-PN> cable from the power print.



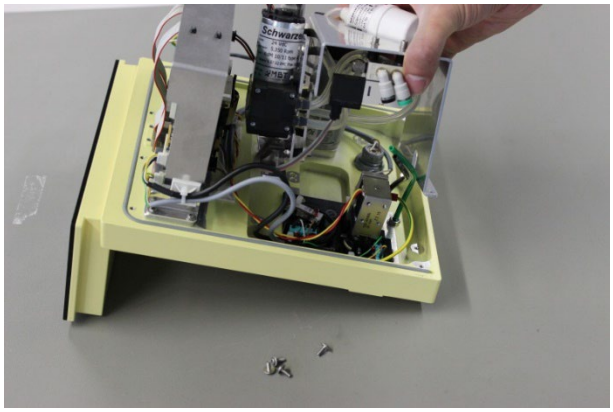
Step 2:

3. Unplug both the black and green tubes on the Vit-PN unit by pressing the colour ring towards the plug.



Step 3:

4. Undo the four screws on the Vit-PN unit.



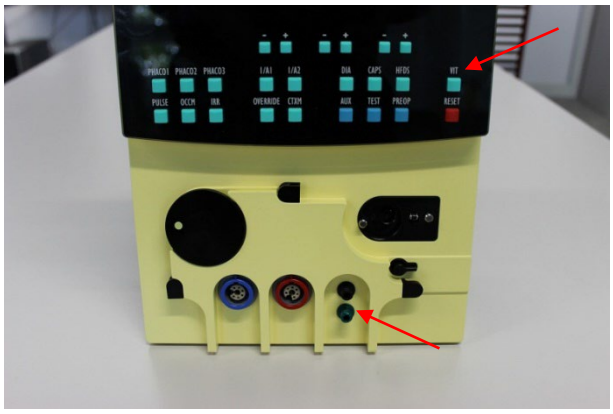
Step 4:

5. Remove the four screws from the Vit-PN unit.
6. Carry out assembly in reverse order of dismantling. Connect the black tube to the black connection (above), connect the green tube to the green connection (below).
7. Service mode: set supplied Vit-PN correction factor.

NOTE!
VIT-PN hoses can be interchanged.
VIT-PN function restricted.
► Perform a visual inspection of the VIT-PN hoses.

WARNING!
VIT-PN Adjustment values not updated.
Risk of reversible eye damage to the patient.
► Set correction factor according to ♦6.11.

7.6.1 Test Vit-PN



The function test is done without an attached instrument.

Step 1:

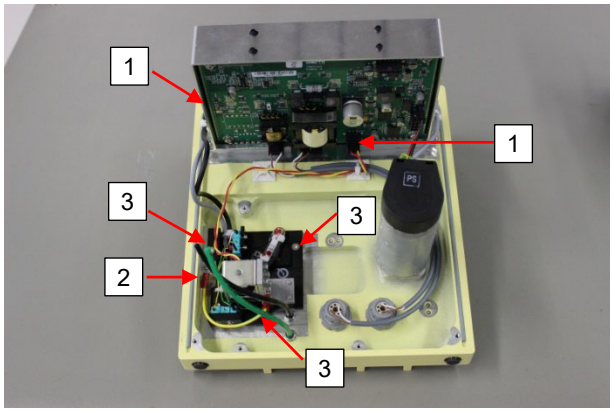
1. Select the VIT function.
2. Press the pedal briefly to switch the valves.
3. Air must flow out of the lower, green connector.

If air flows out of the black connector, the tubes were swapped between the Vit-PN module and the connectors. In that case, the stripper will not work properly. Change tubing accordingly.

7.7 Replacement of coupling plate

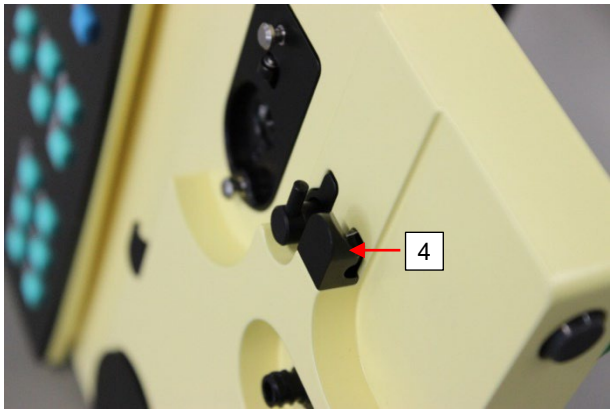
VX210115 Coupling plate with force sensor

Work steps:



Step 1:

1. Open housing according to ♦7.3.
2. Disassemble Vit-PN unit according to ♦7.6.
3. Pull off the connectors [1] for the force sensor, tube detection switches and IRR valve on the system board.
4. Remove grounding cable [2].
5. The entire coupling plate can be removed by undoing three screws [3].



DANGER!
Faulty earth connection.
Risk of death or serious injury.
► The grounding cable must be fixed with the lamellar disc and overhead screw.

Step 2:

6. When putting in the coupling plate in place, ensure that the switch lever [4] can move freely; it must not be impeded by any part of the housing.

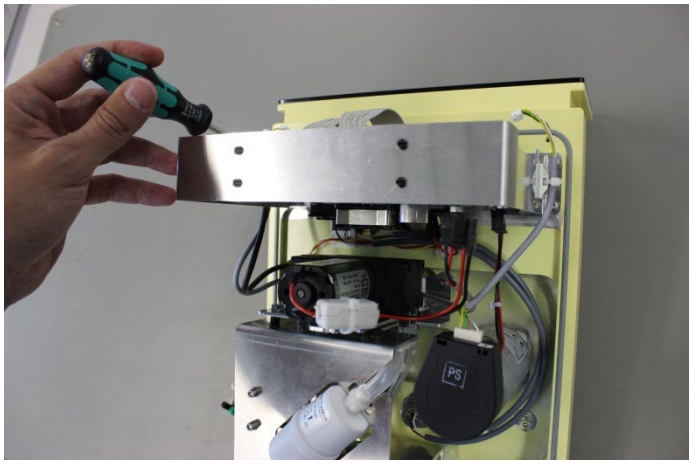
WARNING!
Adjustment values not updated.
Risk of reversible eye damage to the patient.
► Set force sensor calibration in service mode according to ♦6.6.

7.8 Replacement of system board

VX210109 System board

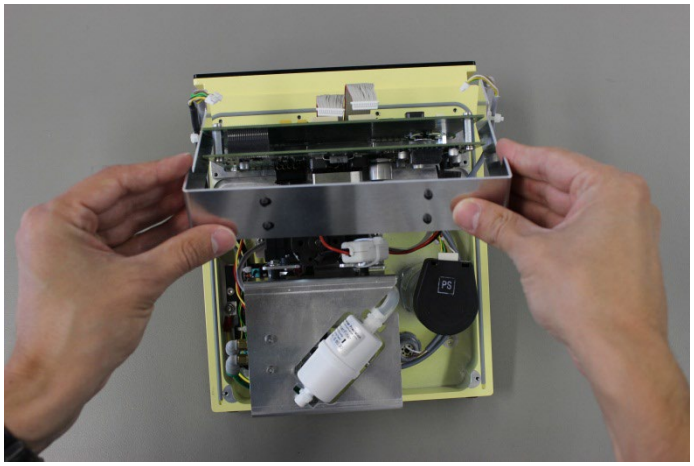
The VIT-PN correction factor must be read out and noted in the service mode before the repair. If this is no longer possible, note the correction factor, which is written on the VIT-PN unit. If no value is noted, contact V-CSS and give the unit serial number. Then the correction factor can be determined.

Work steps:



Step 1:

1. Open housing according to ♦7.3.
2. Unplug all cables on the logic PCB according to ♦5.2 for an overview of the interfaces.
3. Unplug all cables on the power PCB according to ♦5.3 for an overview of the interfaces.
4. Undo the four screws of the holding sheet.



Step 2:

5. Take off the holding sheet.
6. Take out the system board.
7. Carry out assembly in reverse order of dismantling. Make sure the printed circuit boards are correctly slotted in the circuit board guide.

No system unit can be installed which has already been used with another control unit.

WARNING!
Adjustment values not updated.
Risk of reversible eye damage to the patient.

► Set force sensor calibration according to ♦6.6.
► Set correction factor according to ♦6.11.

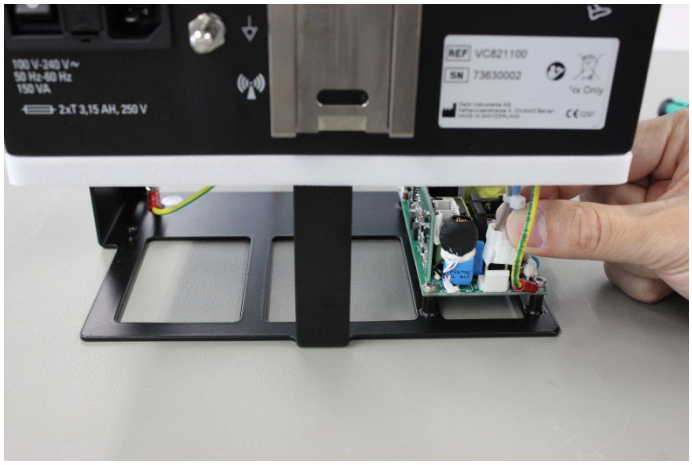
NOTE!
Error, Serial Nummber does not match.
Restricted device operation.

► Follow the instructions below: The VX210109 system board may only be operated on the final device. When the device is switched on for the first time, the device serial number is loaded into the system board and stored. This can only be deleted at the Oertli factory. If this instruction is not followed, the error message <Serial number does not match> appears on the device.

7.9 Replacement of power supply unit

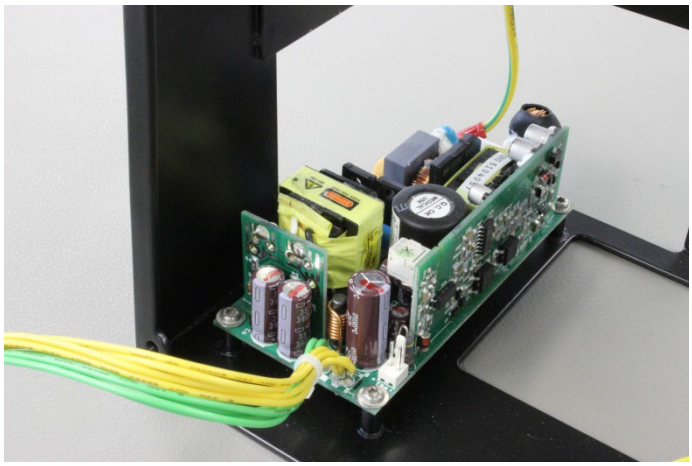
VX310073 Power supply unit

Work steps:



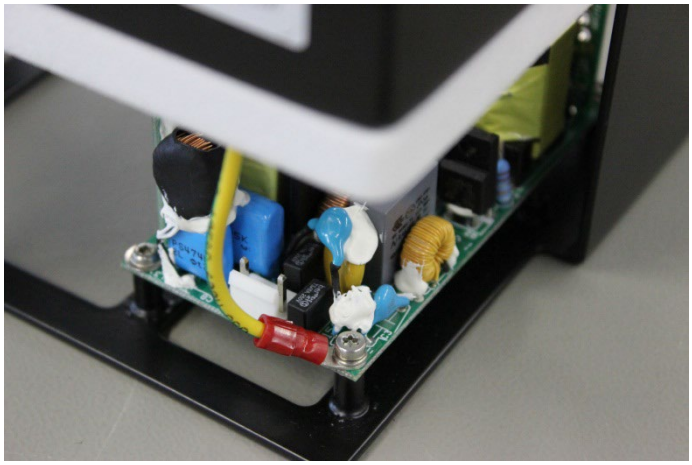
Step 1:

7. Open housing according to ♦7.3.
8. Disconnect mains switch cable from power supply.



Step 2:

9. Undo the four screws on the power supply unit and take out the power supply unit.



Step 3:

10. The assembly of the components is done in the reverse order of disassembly.

DANGER!
Faulty earth connection.
Risk of death or serious injury.

► When assembling the front frame with the support structure, insure that the grounding wire is fixed to the front frame.

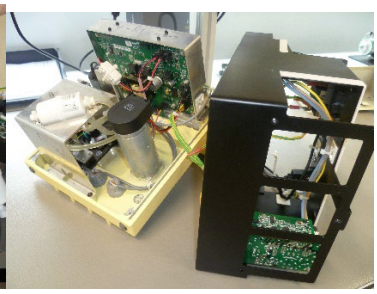
7.10 Replacement of clamp for I/V pole

VX210111 Clamp for I/V pole

7.11 Replacement of Dia and Phaco connector

VX400267
VX400268

Work steps:

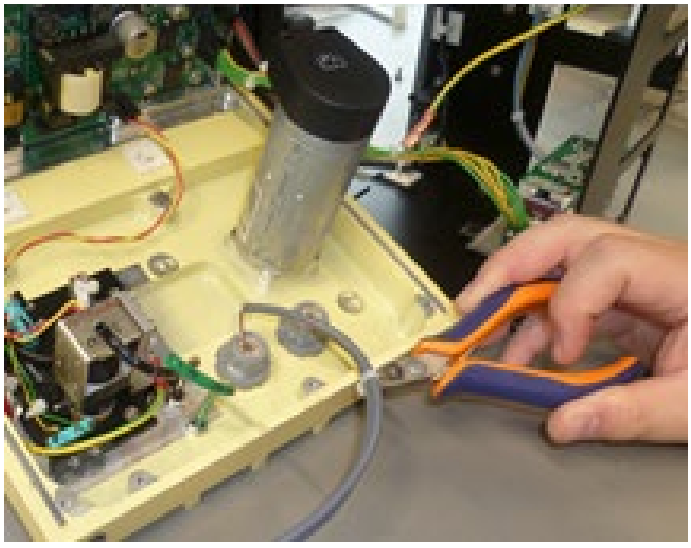


Step 1:

1. Open housing according to ♦7.3.
2. Remove the supporting structure.
3. Disconnect the VIT-PN Module according to chapter ♦7.6.

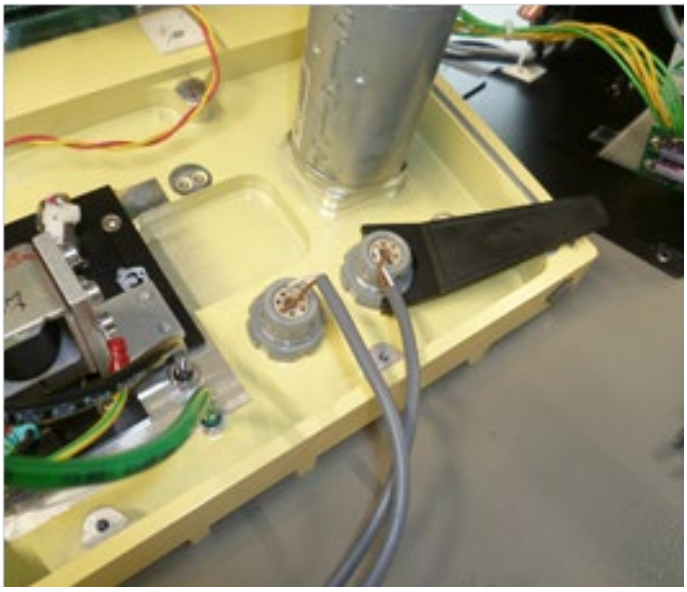
Step 2:

4. Disconnect the cable of the Dia or Phaco connector form the print.



Step 3:

5. Remove the cable tie, which holds the cable in place.



Step 4:

6. Loosen the connector and remove it.
7. Install the new connector in reverts order.

7.12 Replacement of front plate

VX102116

Work steps:

Step 1:

1. Carefully push a trimming knife between the frame and the front plate.

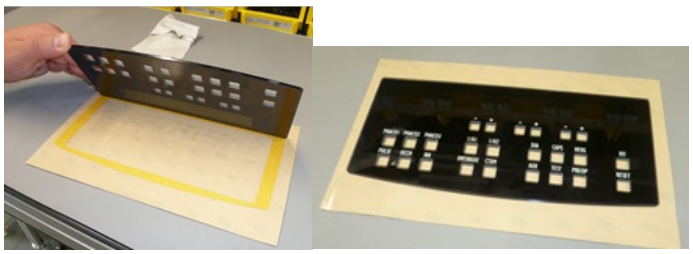
Step 2:

2. Carefully increase the gab with a small slotted screwdriver (00).
3. Increase the gab again with a bigger slotted screwdriver.

If the front plate is already broken, stabilize it with 2 or 3 adhesive strips, this way it does not completely shatter while removing.

Step 3:

4. Repeat this steps until the front plate can be removed from the frame by hand.
5. Completely remove any adhesive residue form the frame.



Step 4:

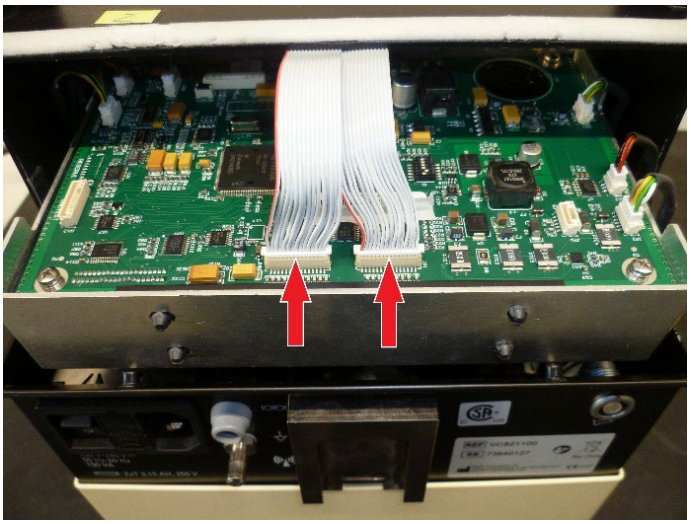
6. Apply the adhesive foil to the new front plate.

Step 5:

7. Carefully centre the front panel and press it against the frame.

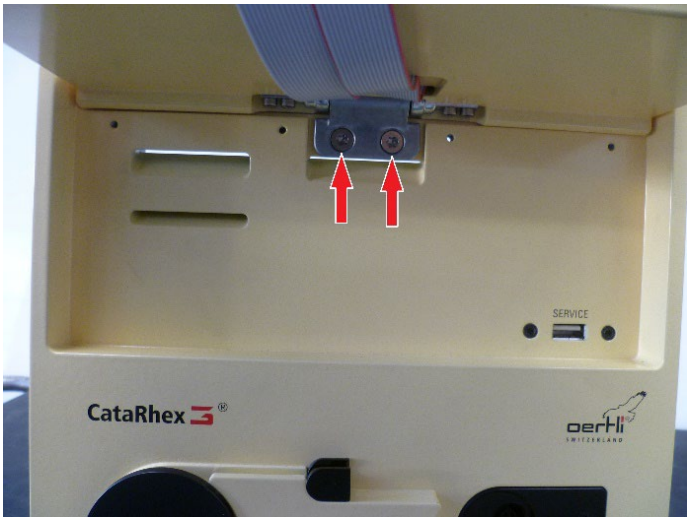
7.13 Display cable

VX400206



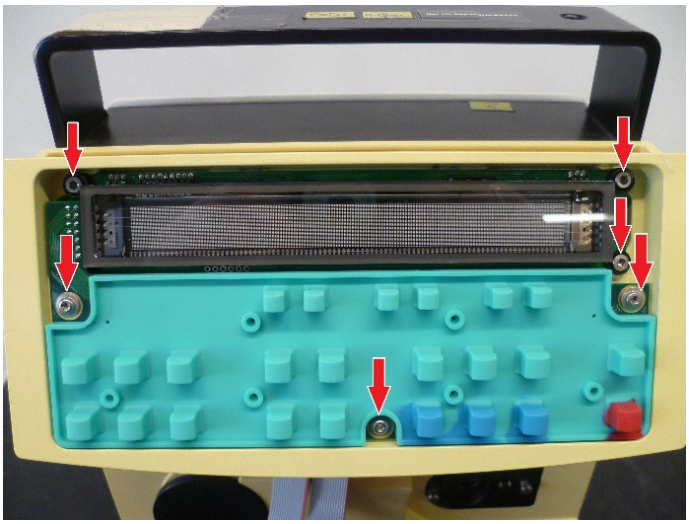
Step 1:

1. Remove housing according to ♦7.3.
2. Remove the front plate according to ♦7.12.
3. Unplug the display cable from the system unit.



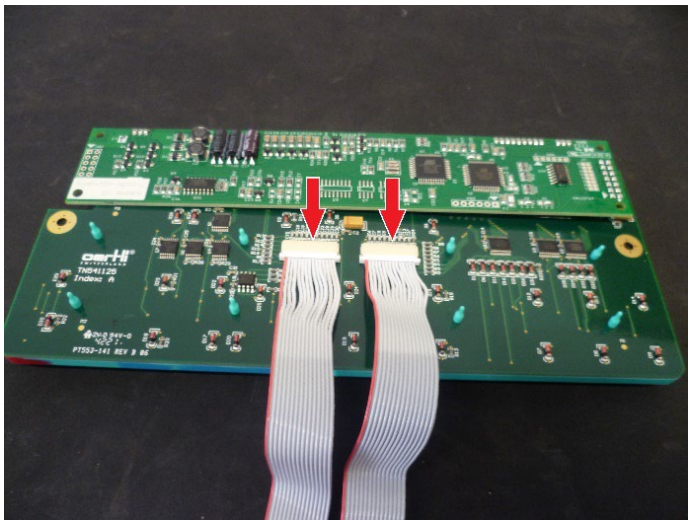
Step 2:

4. Loosen the fastening screws on the display.



Step 3:

5. Loosen the operating print and display with 3 screws each.

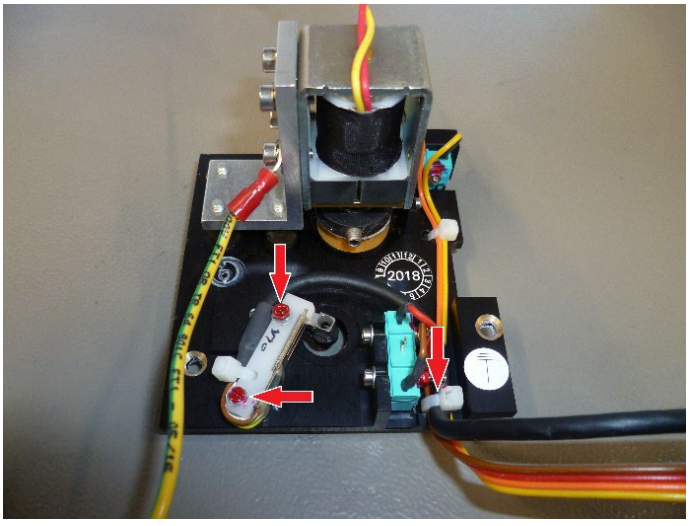


Step 4:

6. Unplug the display cable.
7. Reinstall in reverse order.

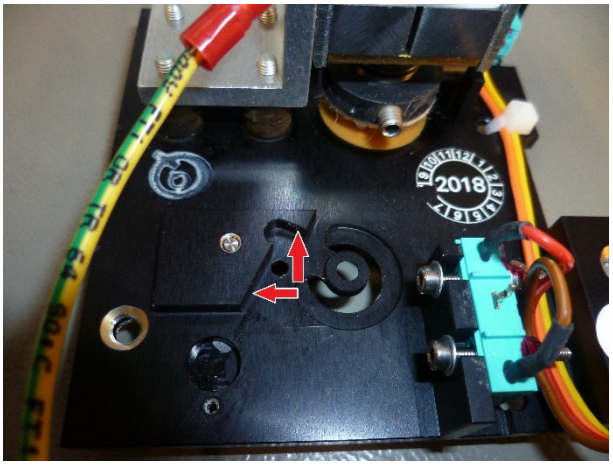
7.14 Force sensor

VX400275



Step 1:

1. Remove housing according to ♦7.3.
2. Remove supporting structure according to ♦7.3.
3. Remove VIT-PN module according to ♦7.6.
4. Remove coupling plate according to ♦7.7.
5. Remove force sensor. Loosen 2 screws and cut off the cable tie, then the force sensor can be removed.



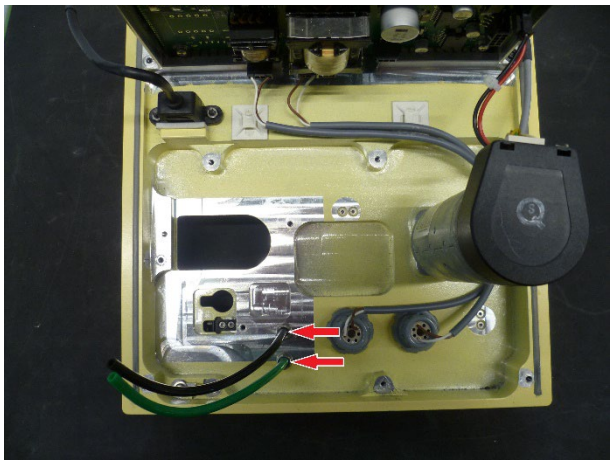
Step 2:

6. Install the force sensor. The force sensor must be pressed to the stop and mounted.
7. Reinstall in reverse order.

WARNING!
Adjustment values not updated.
Risk of reversible eye damage to the patient.

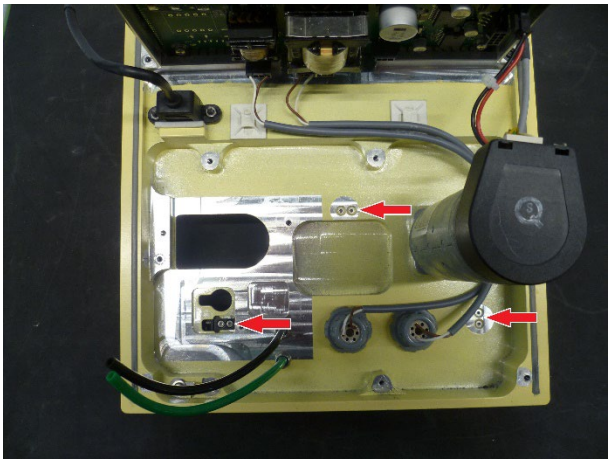
► Set force sensor calibration in service mode according to ♦6.6.

7.15 Front



Step 1:

1. Remove housing according to ♦7.3.
2. Remove control panel according to ♦7.2.
3. Remove peristaltic pump according to ♦7.4.
4. Remove VIT-PN unit according to ♦7.6.
5. Remove coupling plate according to ♦7.7.
6. Remove system board according to ♦7.8.
7. Remove phaco and DIA connector according to ♦7.11.
8. Hoses must be cut off. Then the nut can be loosened to remove the VIT-PN connectors (black and green).



Step 2:

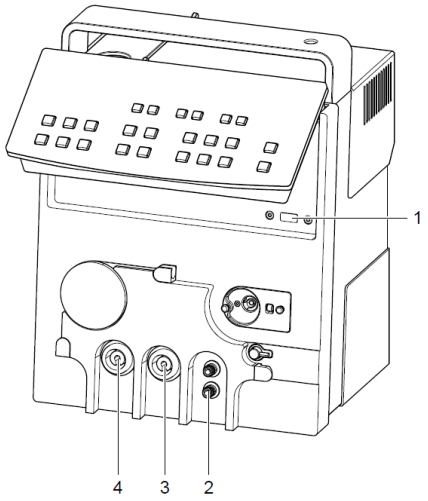
9. 2 screws must be loosened for each hose stopper.
10. Reinstall in reverse order.

8 Software update

8.1 Device

VX541996

The service interface is located below the display.



1 Service interface
2 Connections for vitrectomy handpiece
3 Connection for diathermy handpiece
4 Connection for phaco handpiece

New software can be loaded onto the device using the Oertli USB memory stick.

The USB port with the name <Service> is to be used as the interface. This is a standard USB interface.

WARNING!
Non-approved devices connected to the USB port.
Can endanger the safety of staff and patients.
► Only connect devices approved by Oertli.

Only use an Oertli service USB flash drive in conjunction with the CataRhex 3

The software (CR3AS_xxxx.BIN) can be copied to the USB memory stick using a standard Explorer window. Care should be taken that all of the older software on the memory stick is deleted in advance and that the software is copied to the main directory.

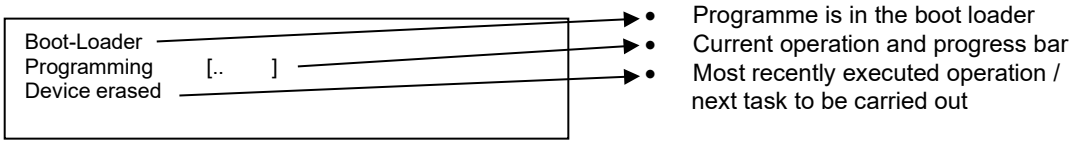
Procedure:

1. Insert the USB stick into the <Service> connector. Ensure that it is the right way round.
2. When starting up, hold the <Reset> key depressed until the programme opens the boot loader (approx. 4 sec).

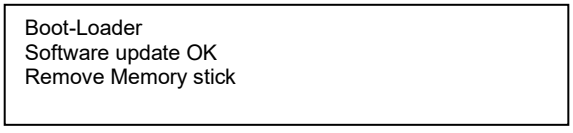
The update procedure will then start automatically. It is important not to interrupt this process (by pulling out the memory stick)!

A new programme will be installed during the update. It is subsequently tested for proper execution. If, for some reason, the procedure cannot be completed successfully, the partially programmed firmware on the device will be deleted. In this situation, the device cannot be operated until new software has been installed.

Function display during the update:



Following a successful software update:



Following an unsuccessful software update:

Boot-Loader
WARNING: DEVICE IS NOW WITHOUT FIRMWARE
Remove Memory stick

or

Boot-Loader
WARNING: FIRMWARE UPDATE NOT COMPLETED.
PLEASE REPEAT FIRMWARE UPDATE!

8.2 Pedal

New software is installed by the manufacturer.

9 Installation and uninstallation of pedal components

WARNING!
Adjustment values not updated.
Risk of reversible eye damage to the patient.
► Calibrate pedal after each repair according to ♦6.5.

WARNING!
Repair not carried out correctly.
Risk of reversible eye damage to the patient.
► A function test must be performed after each repair according to ♦14 to end.

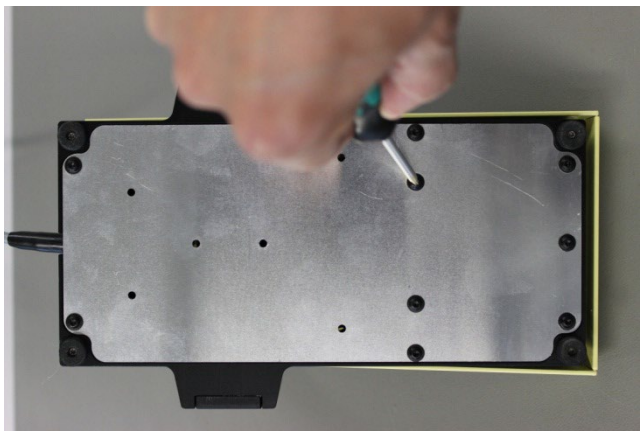
Confirm activities performed on the pedal on the report sheet according to ♦14 to end.

CAUTION!
Improper sealing of the pedal.
Risk of reversible eye damage to the patient.
► Seal pedal after repair according to ♦9.3.

9.1 Replacement of cover plate

VX102281 Cover plate for pedal

Work steps:



Step 1:

1. Unscrew the 9 oval head screws and remove the cover plate.
2. Mount the new cover plate.

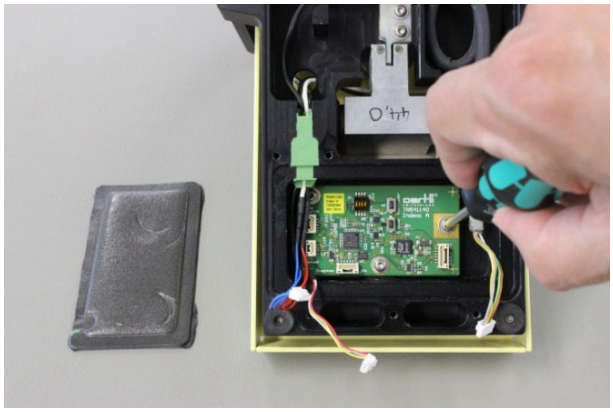
9.2 Replacement of pedal electronics board

VX541140 Pedal PCB

Work steps:

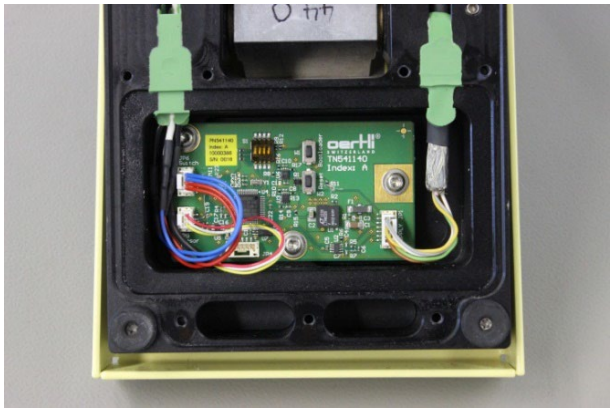
Step 1:

1. Unscrew and remove the cover plate according to ♦9.1.
2. Remove seal.



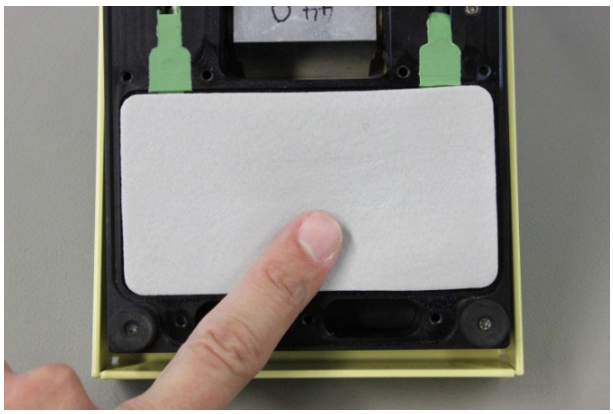
Step 2:

3. Unplug all cables.
4. Remove the old print.



Step 3:

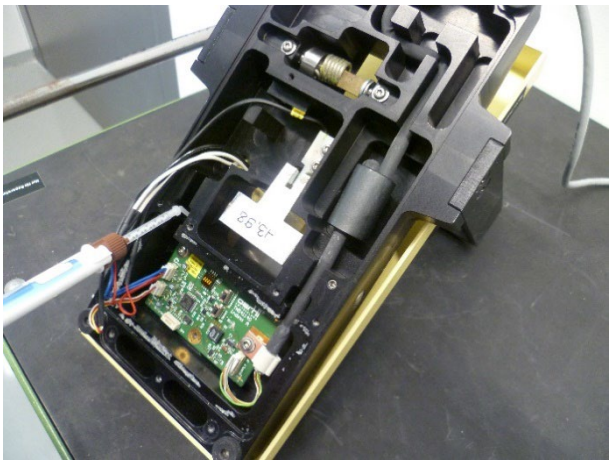
5. Install the new print.
6. Plug all cables back in.



Step 4:

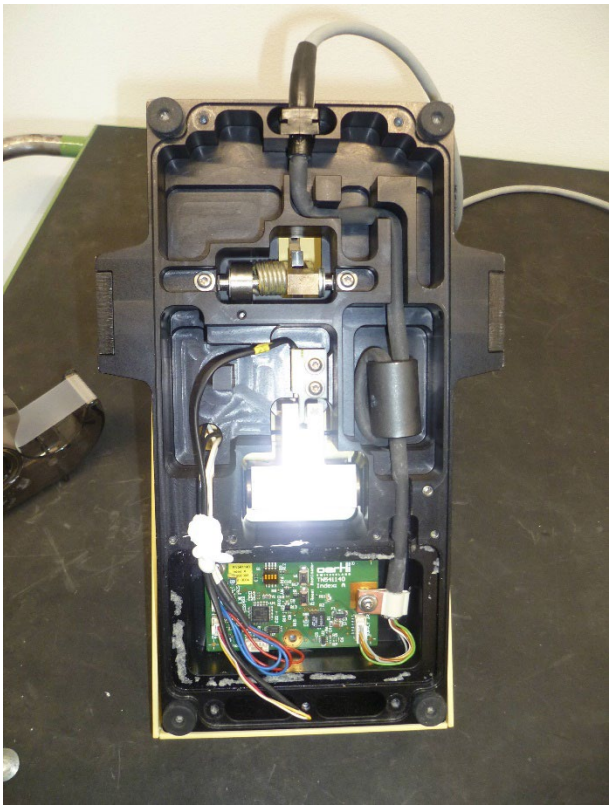
7. Apply the new seal.
8. Mount the cover plate.

9.3 Pedal sealing



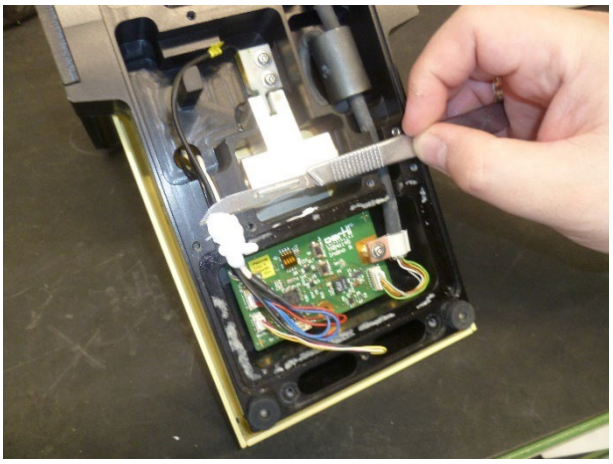
Step 1:

1. Put the cable on the side and fill the empty space a little with Tempo Sil2.



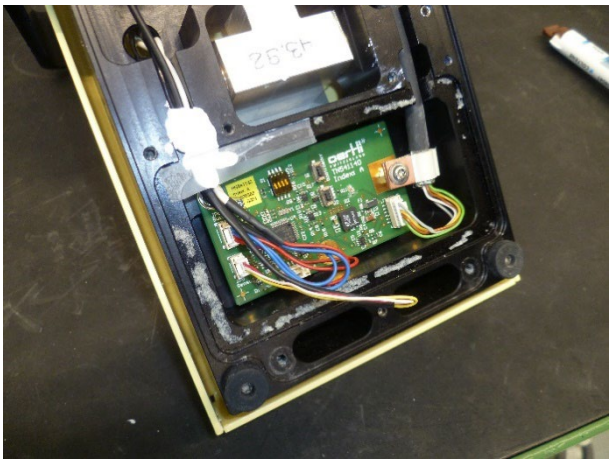
Step 2:

2. Then press all the cables into the Tempo Sil2 filled space and on top of that fill in Tempo Sil2 again until it comes over the edge.



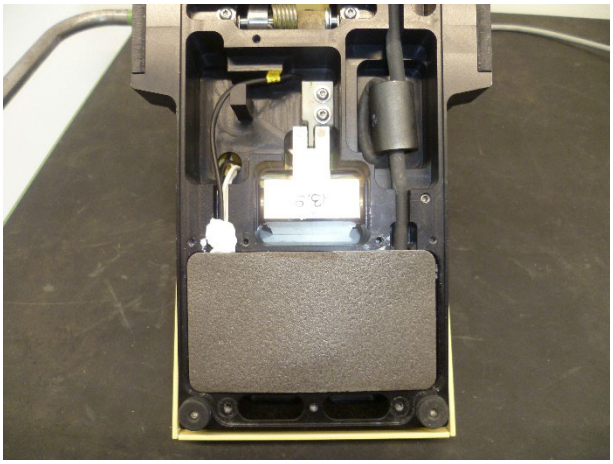
Step 3:

3. Adjust the Tempo Sil2 Paste overhanging the edge with a knife so that it is flush with the edge.



Step 4:

4. Tape Tempo Sil2 Paste so that it can dry out flush.



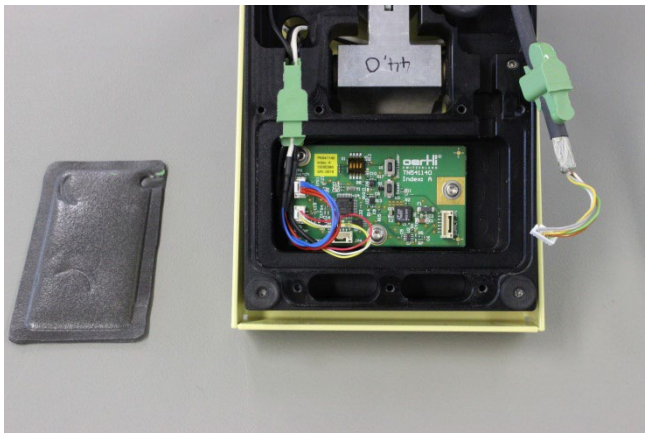
Step 5:

5. After drying out, the seal can be applied.

9.4 Replacement of pedal cable

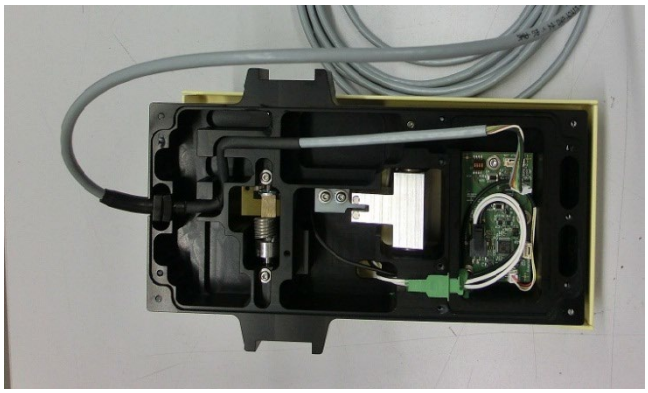
VX400277 Cable for Pedal

Work steps:



Step 1:

1. Unscrew and remove the cover plate according to ♦9.1.
2. Remove the seal.
3. Unplug the CAN cable, and remove the green rubber seal.



Step 2:

4. Insert the new CAN cable.
5. Pre-fill the pouch with TEMPO SIL2.
6. Press the CAN cable into the channel and fill the pouch to above the rim with TEMPO SIL2.
7. Place adhesive tape on the sealing surface and wait until TEMPO SIL2 has cured (approx. 2 minutes).

Step 3:

8. Remove adhesive tape and use a sharp razor blade to remove excess TEMPO SIL2.
9. Reconnect the CAN cable.
10. Apply the new seal and mount the cover plate.

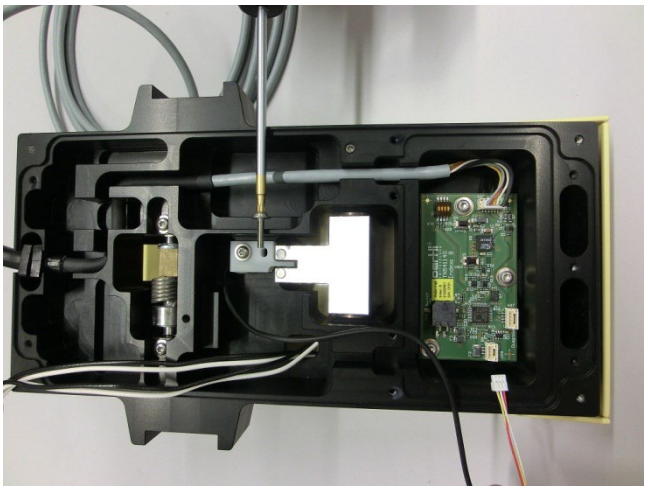
CAUTION!
Incorrect pedal signals transmitted to the device.
Risk of reversible eye damage to the patient.

► Perform a visual inspection:. Relieve the tension on the sensor cable. The screws on the sensor are tightened.

9.5 Replacement of pedal sensor

VX310076 Pedal sensor

Work steps:



Step 1:

1. Unscrew and remove the cover plate according to ♦9.1.
2. Remove the seal.
3. Unplug the defective hall effect sensor and horizontal switch, and remove the green rubber seal.
4. Remove the defective hall effect sensor.
5. Mount the new hall effect sensor.
6. Pre-fill the pouch with TEMPO SIL 2.
7. Press the hall effect sensor cable and horizontal switch cable into the sealing compound.
8. Fill the pouch to above the rim with TEMPO SIL 2.
9. Place the adhesive tape on the sealing surface and wait until TEMPO SIL 2 has cured (approx. 2 minutes).
10. Remove adhesive and use a sharp razor blade to remove excess TEMPO SIL 2.
11. Plug in the hall effect sensor and horizontal switch to pedal print.
12. Apply the new seal and mount the cover plate.
13. Perform pedal check according to ♦6.5.

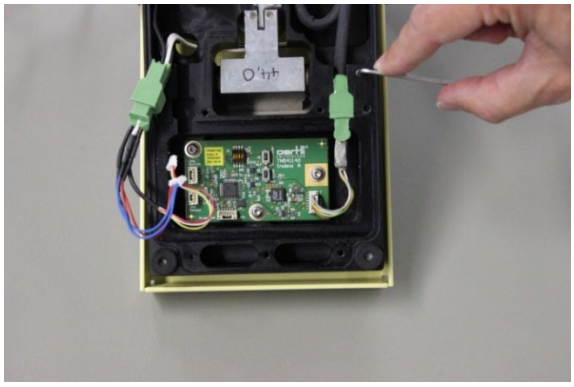
CAUTION!
Incorrectly mounted screws.
Risk of reversible eye damage to the patient.

► Perform a visual inspection of the splitter with the following points: Axle must be greased. Tighten the central screw.

9.6 Replacement of rocker

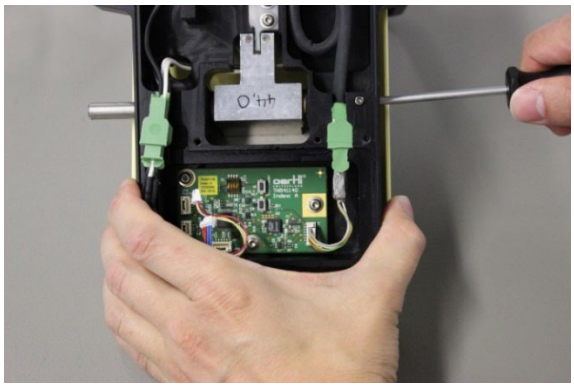
VX102277 Pedal rocker

Work steps:



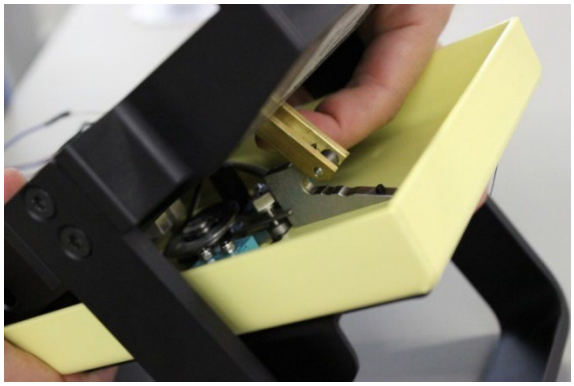
Step 1:

1. Unscrew and remove the cover plate according to ♦9.1.
2. Remove the seal.
3. Unplug the hall effect sensor and horizontal switch, and remove the green rubber seal.
4. Undo the grub screw.



Step 2:

5. Push out the wave vertical deflection component from the base body.



Step 3:

6. Raise the slotted lever and carefully position the rocker.
7. Take out the horizontal switch cable through the opening in the base body and remove the old rocker.

Step 4:

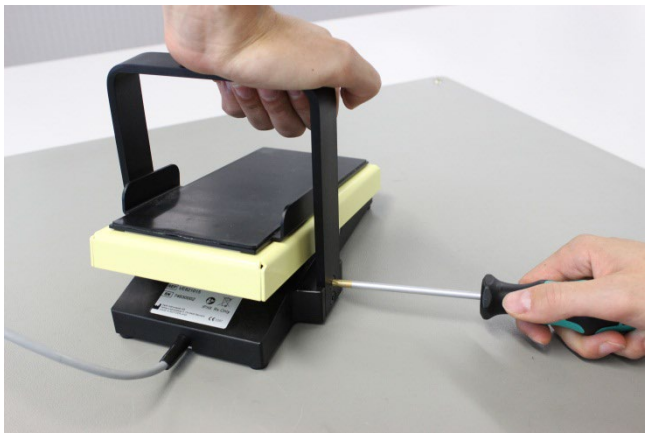
8. Assemble the new rocker in reverse order.

Make sure the cables are not kinked!

9.7 Replacement of pedal handle

VX102276 Pedal handle

Work steps:



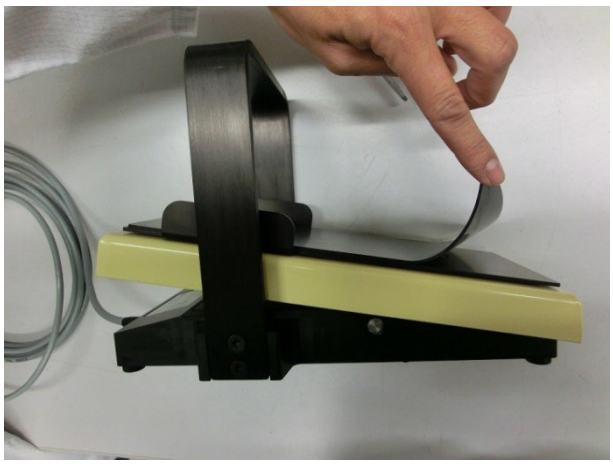
Step 1:

1. Undo the 4 countersunk head screws and remove the old pedal grip.
2. Insert the new pedal grip and fasten it with the 4 new countersunk head screws.

9.8 Replacement of rubber mat

VX102363 Rubber mat for pedal

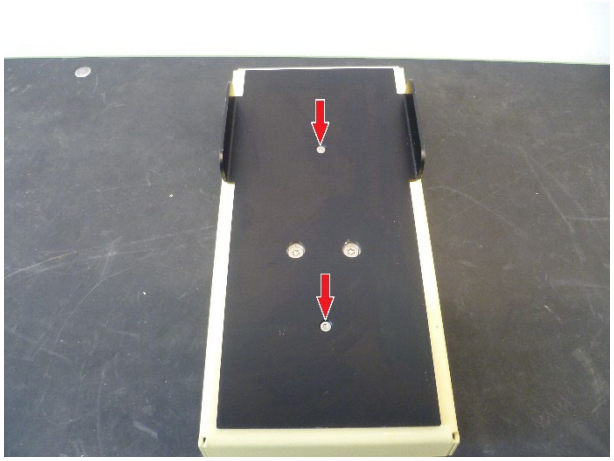
Work steps:



Step 1:

1. Remove the old or defective rubber mat.
2. Thoroughly clean the rocker attachment with medical benzene.
3. Apply the new rubber mat to the rocker attachment.

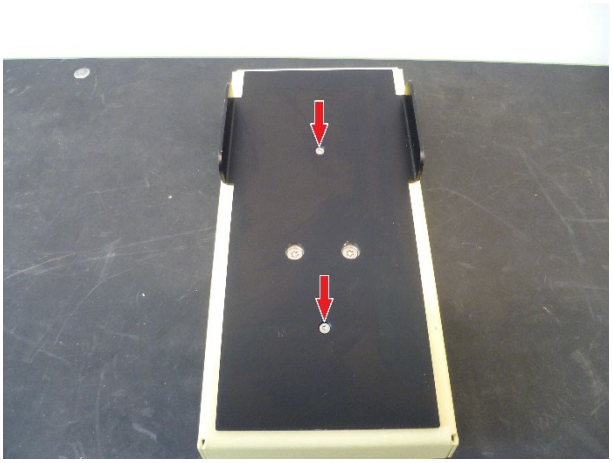
9.9 Splitter



Step 1:

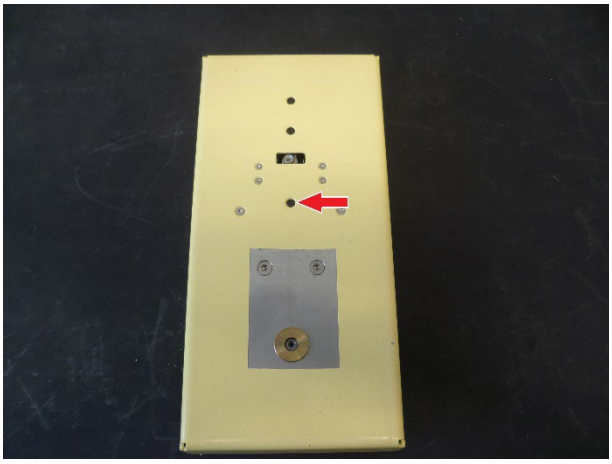
1. Remove the cover plate according to ♦9.1.
2. Remove rocker according to ♦9.6.
3. Remove rubber mat according to ♦9.8.
4. Remove the rocker attachment. 2 screws must be loosened for this.
5. 2 screws must be loosened. Then the splitter can be removed.
6. Reinstall in reverse order.

9.10 Horizontal spring



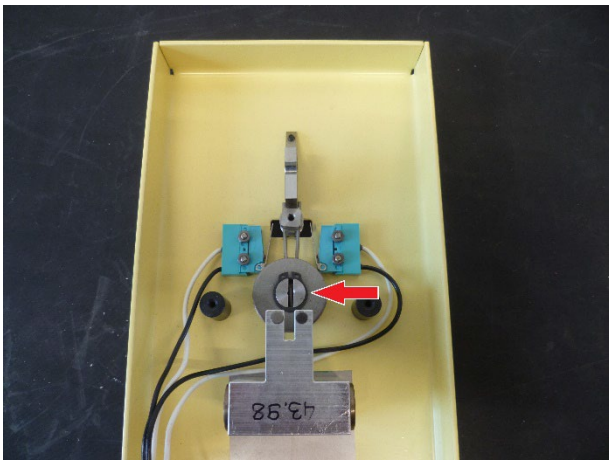
Step 1:

1. Remove the cover plate according to ♦9.1.
2. Remove rocker according to ♦9.6.
3. Remove rubber mat according to ♦9.8.
4. Remove the rocker attachment. 2 screws must be loosened for this.



Step 2:

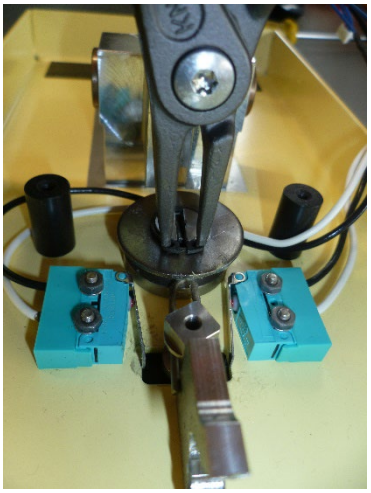
5. The screw shown must be loosened. Then the spring can be removed 2 times.
6. Reinstall in reverse order.



9.11 Spring for vertical deflection

Step 1:

1. Remove Rocker according to ♦9.6.



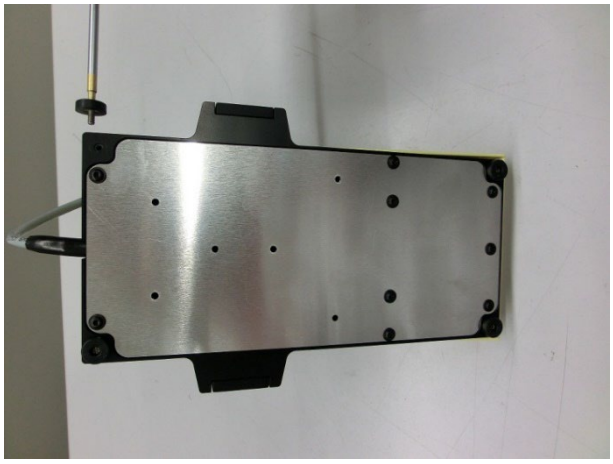
Step 2:

2. Remove the circlip and body washer and replace the spring.
3. Assemble the pedal in reverse order. Apply a new sealing mat and seal the pedal with TEMPO SIL2.

9.12 Replacement of rubber buffer

VX102310 Rubber buffer for pedal

Work steps:

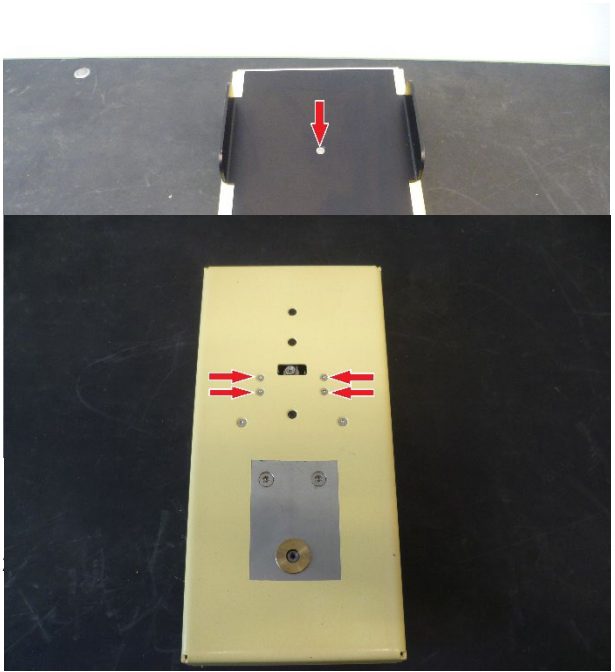


Step 1:

1. Remove the old or defective rubber buffers.
2. Adhere the new rubber buffers on the base body.

9.13 Horizontal switch

VX310033



Step 1:

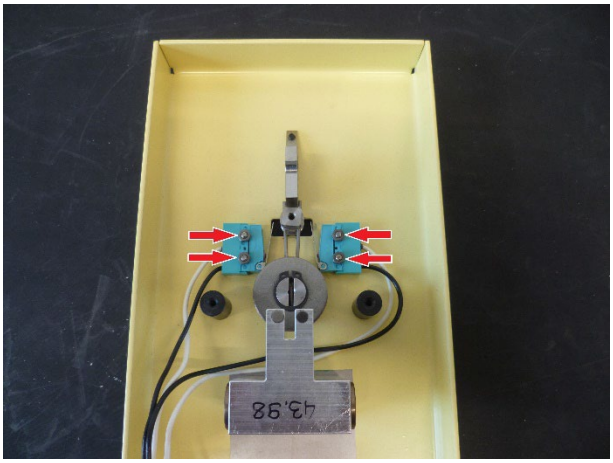
1. Remove the cover plate according to ♦9.1.
2. Remove rocker according to ♦9.6.
3. Remove rubber mat according to ♦9.8.
4. Remove the rocker attachment. 2 screws must be loosened for this.

Step 2:

5. Remove the switch. 4 screws must be loosened for this.
6. Reinstall in reverse order.

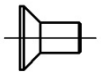
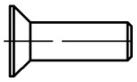
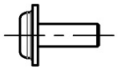
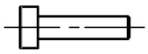
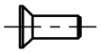
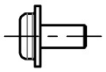
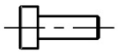
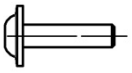
CAUTION!
Incorrect pedal signals transmitted to the device.
Risk of reversible eye damage to the patient.

► Perform a visual inspection of pedal switch: The screws on the sensor are tightened.



9.14 Set of replacement screws

VX950045 Set of replacement screws

Quantity	Description	Picture
10	M4x8 countersunk bolt Torx	
20	M5x16 countersunk bolt Torx	
50	M3x8 eco-fix Torx	
10	M3x12 cylinder bolt Torx	
10	M3x6 grub screw I-6kt	
10	M3x8 countersunk bolt Torx	
10	M3 lamellar disc	
10	M3x6 eco-fix Torx	
10	M3x8 cylinder bolt Torx	
10	M3 spring ring	
10	M3x12 eco-fix Torx	

9.15 Set of small replacement parts

VX950044 Set of small replacement parts

Quantity	Description
5m	Rubber sponge sealing ring d=3mm
5m	Sealing strip
20	Cable strap
10	Cable strap holder
10	Rubber buffer 12.7 x 3.5mm black

9.16 Thread locking

With the exception of the screws used to secure the electronic print, Loctite must be applied to all screws in order to guarantee long-term stability. The following Loctite thread lockers are recommended:

- Loctite 221
- Loctite 222
- Loctite 241
- Loctite 242
- Loctite 243
- Loctite 245

10 Order number for replacement parts

10.1 Control unit

Article No.	Descripton	Packaging Unit
VX102116	Front plate incl. printing, spare part for CataRhex 3	1
VX210106	Control panel, spare part for CataRhex 3	1
VX210109	System board, spare part for CataRhex 3	1
VX210111	Clamp for infusion pole, spare part for CataRhex 3	1
VX210115	Coupling plate with force sensor, spare part for CataRhex 3	1
VX210138	Upper cover plate incl. bag/bottle holder, spare part for CataRhex 3	1
VX210139	Lower covering plate, spare part for CataRhex 3	1
VX210143	VIT-PN module, spare part for CataRhex 3	1
VX210046	Pump wheel, spare part for CataRhex 3	1
VX310073	Power supply unit, spare part for CataRhex 3	1
VX310075	Pump motor, spare part for CataRhex 3	1
VX400206	Cable catalog operating print, spare part for CataRhex 3	1
VX400209	Cable encoder pump motor, spare part for CataRhex 3	1
VX400266	Cable logic-USB, spare part for CataRhex 3	1
VX400267	Dia connector, spare part for CataRhex 3	1
VX400268	Phaco connector, spare part for CataRhex 3	1
VX400269	Cable catalog-CAN (Pedal socket), spare part for CataRhex 3	1
VX400275	Force sensor JST, spare part for CataRhex 3	1
VX520010	Replacement fuses 3.15AT, high breaking capacity, box of 10	10
VX541996	Software update CataRhex 3 SW version: 1.2.0	1
VX950044	Set of incidentals, spare part for CataRhex 3	1
VX102130	Front frame complete, spare part for CataRhex 3	1
VX102291	Spring for horizontal deflection, spare part for CataRhex 3	1
VX950000	Incidentals	1
VX400388	Mains socket with mains switch & fuse holder, spare part for CataRhex 3	1
VX102131	Bottle holder with fastening screw, spare part for CataRhex 3	1
VX102110	Vit connection Luer black and green, spare part	1

10.2 Pedal

Article No.	Descripton	Packaging Unit
VX102276	Pedal grip, spare part for CataRhex 3	1
VX102277	Pedal rocker, spare part for CataRhex 3	1
VX102281	Covering plate for Pedal, spare part for CataRhex 3	1
VX102310	Rubber buffer for pedal, spare part forCataRhex 3, box of 4	4
VX102363	Rubber mat for pedal, spare part for CataRhex 3	1
VX310076	Pedal sensor, spare part for CataRhex 3	1
VX310077	Switch (horizontal deflection pedal), spare part for CataRhex 3	1
VX400277	Cable for pedal, spare part for CataRhex 3	1
VX541140	Pedal PCB, spare part for CataRhex 3	1
VX950045	Set of spare screws, spare part for pedal CataRhex 3	1

11 Messages, warnings and error messages / fault correction

Message	Explanation
SYSTEM READY	Successful completion of the system check when starting up the system.
SELECT SURGEON	Asks you to select the appropriate surgeon memory.
CONNECT PEDAL	The pedal is not connected correctly or not at all.
INSERT TUBE	The tubing system is not inserted correctly or not at all (2 recognition switches).
PREOP FILL RINSE 100%	PREOP is running, progress displayed as a percentage.
PREOP DISCONTINUED!	PREOP has been interrupted.
PHACO TEST DISCONTINUED!	The phaco test has been interrupted.
PHACO TEST ACTIVE	The phaco test is running, nothing else can be activated.
PHACO TEST O.K.	The phaco test has been successfully completed.
PLEASE REPEAT PHACO TEST	The phaco test could not be carried out due to activated pedal. The phaco test must be restarted.
TEST HANDPIECE!	The handpiece shows low performance.
HANDPIECE DEFECTIVE!	The handpiece can’t be operated.
CHECK TIP!	The tip has not been screwed on properly.
STORING VALUES	Values are being stored (operator has to keep the key pressed).
VALUES STORED	Values have been stored (operator can let go of the key).
NOT STORED	Values have not been stored (operator did not hold the key down long enough).
TEMPERATURE TOO HIGH!	The temperature in the device is too high. Wait until the device has cooled down, the message will disappear.
NOT AVAILABLE	HFDS function not available.
SERIAL NUMBER IS MISSING	Serial number not programmed in the device.
SERIAL NUMBER DOES NOT MATCH	Invalid serial number programmed in the device.

Error Message	Cause	Corrective actions
ERROR 1 CALL SERVICE	Internal operating values (+3.3V, +5V, +12V, -12V, +24V) not within tolerance range	– Check the operating voltages in service mode. – Remove the cable between the power supply and the system board: check the voltage on the power supply. – Replace the system board or the power supply.
ERROR 2 ADJUST DIA	DIA adjustment has not been adjusted correctly or not at all	Replace the system board and notify the manufacturer.
ERROR 3 ADJUST PEDAL	Pedal is not adjusted correctly or not at all (impossible reference values for pedal positions)	The pedal has to be readjusted as described in the Section <Service mode operation / pedal calibration>.
ERROR 4 GRAPHIC DISPLAY	Graphic display is not ready or does not respond	– Check the cable from the system board to the control panel. – Replace the control panel.
ERROR 8 PROGRAM FAILURE	Undefined state	– Check for the presence of extreme electromagnetic radiation from a nearby non-Oertli appliance. – Please notify the manufacturer if the message is displayed again. In addition to the error message, a number is issued in hex format, e.g. (0X0001). – If this value corresponds to 0x1000 when the error message occurs, the service technician needs to check the connection of the pedal for loose contact – For all other values, the system unit must be replaced.
ERROR 9 NV-RAM FAILURE	NV-RAM defective or missing	Replace the system board and notify the manufacturer.
ERROR 10 PERISTALTIC PUMP FAILURE	Pump does not react, pump does not rotate (interruption in the pump control circuit)	Check the encoder cable and the motor cable to the pump motor.
ERROR 11 OVERLOAD	U_{pow} too low (PTC2 has responded)	– Remove the continued short circuit in the PHACO, DIA or CAPS instruments. – Wait until the affected circuit has cooled down, the message will disappear.
ERROR 13 CHECK PUMP	The pump does not react nor rotate (interruption in the pump control circuit or resistance at the edge of the pump too strong)	– Check tubing system. The message will disappear after approx. 10 seconds. – Check pump rollers for free rotation. – To exchange the pump wheel see chapter ♦7.4
ERROR 15 FORCE SENSOR	Force sensor has not been plugged in or is defective	– Check the force-sensor cable from the system board to the coupling plate. – Replace the coupling plate with the force sensor.
ERROR 17 ADJUST FORCE SENSOR	Sensor has been adjusted incorrectly or not at all	The force sensor has to be readjusted as described in the section <Service mode operation / sensor calibration>.
ERROR 29 EEPROM FAILURE	Memory module defective. Cable to the operating unit defective.	Contact authorized service.
Display remains dark	No supply voltage	– Check the fuses at the mains power socket. – Check the voltage on the power supply.
	Display defective	– Check the cable from system board to the control panel. – Replace the control panel.
CONNECT PEDAL message remains, even when the pedal is connected	Pedal defective or another type of pedal is connected	– Check / replace the pedal cable. – Replace the pedal. – Use only CataRhex 3 or SwissTech pedals.
The PED sign will be displayed even if the pedal is not operated	Pedal is misadjusted	The pedal has to be readjusted as described in the Section <Service mode operation / pedal calibration>.
Limit value cannot be reached by moving the pedal outwards	Pedal is misadjusted	The pedal has to be readjusted as described in the Section <Service mode operation / pedal calibration>.

12 Authorized service points

Oertli Instrumente AG
Customer Service and Support
Hafnerwisenstrasse 4
CH – 9442 Berneck, Switzerland
Tel: +41 (0)71 747 42 00
Fax: +41 (0)71 747 42 90
E-mail: css@oertli-instruments.com
Website: www.oertli-instruments.com

Contact Oertli Instrumente AG for information on authorized service points in your country.

12.1 Sending defective device, instrument or part to Oertli Instrumente AG

1. Clean and sterilize instruments before returning them to the service point.
2. Fill out the QMF 17.09E and QMF 17.15E
3. Send device, instrument or part to the service point.

13 Appendix A) Safety check

Please see form on next page.

Safety Check
CataRhex 3

Customer	
Address:	
Contact person:	

CR 3 device	
Article no.:	
Serial no.:	
Software version:	

Test device			
Brand / Model:		Serial no.:	

Perform safety check

		not OK	OK
1. Check protective earth connections.	according to IEC 60601-1	❑	❑
2. Check leakage currents.	according to IEC 60601-1	❑	❑

Work completed:	❑ yes	❑ no	Installation accepted:	❑ yes
Needs follow up:	❑ yes	❑ no	Service accepted:	❑ yes

Field engineer:		**Customer:**	
Name:		Name:	
Date:		Date:	
Signature:		Signature:	
Comments:			

Oertli Instrumente AG CH-9442 Berneck Switzerland Phone +41 (0)71747 42 00
Fax +41 (0)71 747 42 90 www.oertli-instruments.com info@oertli-instruments.com

14 Appendix B) Functional test

Please see form on next page.

Customer

Address:	

Contact person:	

Data of CR 3 device

Article no.:		
Serial no. CR 3 device:		
Software version CR 3 device:		
Serial no. CR 3 pedal:		
Software version CR 3 pedal:	SW:	HW:

Functional test

1. User data and log files

		OK
1.1	Save user data on a USB flash drive according to the chapter ♦6.4. Notice: _____	☐
1.2	Save log files on a USB flash drive according to the chapter ♦6.4. Notice: _____	☐

2. Software

		OK
2.1	Latest software version installed? Notice: _____	☐

3. Settings in service mode

Pedal OK

3.1 Neutral position: no deflection is displayed. ☐
Notice:
_____

3.2 Vertical Pos. 1, Pos. 2, Pos. 3 and Pos. 4: sectors from 0 to 100 % are correctly displayed and correspond to the mechanical transition. ☐
Notice:
_____

3.3 Horizontal left and right switch are correctly displayed. ☐
Notice:
_____

Sensors

Without tubing system! OK

3.4 Force sensor 0 ±10 mmHg Current value: _____ mmHg New value: _____ mmHg ☐
Notice: _____

Buttons OK

3.5 Check the buttons on the control panel. ☐
Notice: _____

4. Visual and mechanical inspection

OK

4.1 Pump wheel: check pump reels. ☐
Notice: _____

4.2 Check infusion hooks and holder for drainage bag for a tight fit. ☐
Notice: _____

4.3 Check castor wheels for smooth running. ☐
Notice: _____

4.4 Pedal mechanical OK (rubber buffer, switch, rubber mat, etc.) ☐
Notice: _____

4.5 Check mains cables and power socket with fuses for mechanical damages. ☐
Notice: _____

4.8 Check the connection between the device equipotential bonding and the device power plug. ☐
Notice: _____

4.9 Check the connection between the device equipotential bonding and the device frame. ☐
Notice: _____

6. Peristaltic and SPEEP® pump system

	Insert tubing system, connect I/A tubes, connect infusion tube to filled infusion bottle or immerse in liquid.		OK
6.1	Select I/A function, peristaltic pump system. Notice: _____		☐
6.2	Generate occlusion with I/A values from surgeons‘ memory. Notice: _____	Reaches set values	☐
6.3	Generate occlusion with a maximum of 50 ml / min flow and 600 mmHg vacuum. Notice: _____	Reaches maximum values in approx.< 2.5 s	☐
6.4	Hold occlusion and get pedal to neutral position. Notice: _____	Peristaltic pump is lowering pressure	☐

Open I/A tubings and hold them into an empty vessel.

			OK
6.5	Activate reflux. Notice: _____	Aspiration flows back	☐
6.6	Activate reflux and generate occlusion. Notice: _____	Pump stops (audibly)	☐
6.7	Press <IRR> key and release pedal. Notice: _____	Irrigation is retained (liquid is flowing from irrigation tube)	☐
6.8	Activate reflux. Notice: _____	Irrigation stops	☐

7. Phaco

	Assemble phaco handpiece with phaco tip and test chamber and install tubing system!		OK
7.1	Select phaco, press <TEST> key. Notice: _____	Phaco test is performed	☐
7.2	After completion of the phaco test, the notice <Test OK> appears. Notice: _____		☐
7.3	Activate maximum phaco power output. Notice: _____	Reaches 100 %, hisses	☐
7.4	Activate pulse, burst and CMP. Notice: _____	Function OK, hisses	☐

			OK
7.5	Generate occlusion with surgeons‘ values and undo occlusion.	Test chamber remains stable	☐
	Notice: _____		

8. HF: DIA, CAPS, HFDS

Connect HF instrument and immerse any HF tip in liquid! OK

8.1	Activate DIA	Function OK, sound correct	☐
	Notice: _____		
8.2	Activate CAPS	Function OK, sound correct	☐
	Notice: _____		
8.3	Activate HFDS (if installed only)	Function OK, sound correct	☐
	Notice: _____		

9. VIT

Connect cutter! OK

9.1	Activate VIT with Instrument	☐
	Notice: _____	

11. Measurements conducted with pressure gauge (without any liquid)

11.1 Check the following pressure values:

Function	Setting value	Tolerance	Measured value
Peristaltic and Speep® pump system (set maximum flow)	Reflux +150 mmHg (Activate reflux several times)	± 30 mmHg	_____ mmHg
	- 150 mmHg	± 30 mmHg	_____ mmHg
	- 300 mmHg	± 60 mmHg	_____ mmHg
	- 450 mmHg	± 90 mmHg	_____ mmHg
	- 600 mmHg	± 120 mmHg	_____ mmHg

Used replacement parts

Description	Article no.	Serial no. / version	Quantity	Remark

Work completed:	❑ yes	❑ no	Service accepted:	❑ yes
Adjustments completed:	❑ yes	❑ no		
Needs follow up:	❑ yes	❑ no		
Needs estimate of costs:	❑ yes	❑ no	Send to:	
Functional test performed:	❑ yes	❑ no		
Pedal has been sealed:	❑ yes	❑ no		
ESD protection was ensured:	❑ yes	❑ no		

Field engineer:		**Customer:**	
Name:		Name:	
Date:		Date:	
Signature:		Signature:	

Comments / recommendations:

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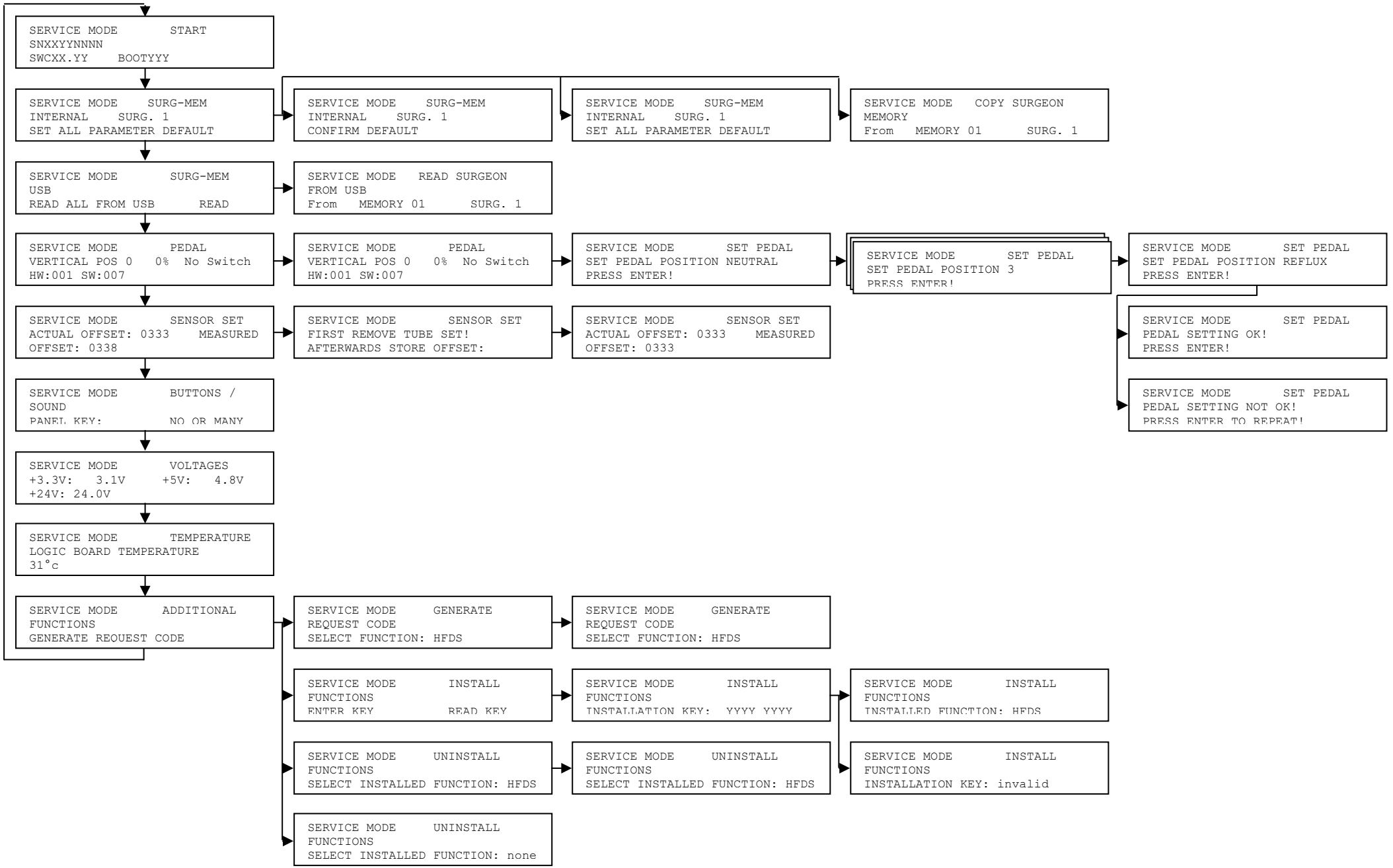
SERVICE MENU OVERVIEW



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