

# Fimet Neo<sup>®</sup>

### Technical Manual Ver. 1.8 – 19.12.2018





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### 1 Introduction

#### 1.1 Manufacturer

This product has been manufactured by:

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Tel: +358 19 521 6600 Fax: +358 19 521 6666 fimet@fimet.fi http://www.fimet.fi

#### 1.2 Models Covered by this Manual

This manual covers the Fimet-manufactured dental treatment system models:

- Neo
- Neo Cart
- Neo City
- Neo Ceiling

#### 1.3 Directives and Standards

The product complies with the requirements of:

- IEC 60601-1:2005 Medical electrical equipment Part 1: General requirements for basic safety and essential performance
- ISO 14971:2012 Medical devices Application of risk management to medical devices
- ISO 6875:2011 Dental patient chair
- ISO 7494-1:2011 Dentistry Dental units Part1: General requirements and test methods
- ISO 7494-2:2015 Dentistry Dental units Part2: Water and air supply



This product bears the CE marking in accordance with the provisions of the Council Directive 93/42/EEC of June 14, 1993 concerning medical devices.

#### 1.3.1 Quality Standards

Fimet Oy is a responsible dental manufacturer. The company's quality management system is certified by notified body (VTT) according to the standards:

 SFS-EN ISO 13485:2012 Medical devices - Quality management system - System requirements for regulatory purposes

#### 1.4 Terms and Abbreviations

Accessible conductive part Part of the system (other than an *applied part*) that can be touched without opening an access cover.

Applied part	Part of the equipment that in normal use necessarily comes into physical contact with the patient to perform its function. Applied parts in Neo system are: seat, backrest, headrest, footrest, handles, instruments, and suction tips.
System	Dental Treatment System, consisting of <i>Dental Unit</i> , <i>Dental Chair</i> , <i>Operating Light</i> , <i>Foot Control</i> , and <i>Hand Control</i> .
Dental Unit	Part of the System consisting of Cuspidor, Instrument Bridge, Display, Suction Head, Connection Box, and Tray(s).
Dental Chair	Part of the <i>System</i> consisting of patient chair including seat, backrest, headrest, armrests, footrest, <i>display</i> and <i>joysticks</i> .
Connection Box	An enclosure consisting of power supply and connections to drainage, pressurised air, mains power, suction, and water.
Operating Light	Light source with swivel arms and optional power supply.
Display	Flat panel display with swivel arm.
Cuspidor	Main body of the unit consisting of pneumatic centre, spittoon bowl, clean water bottle, water heater, filter(s), amalgam separator, and water taps for glass filling and bowl flushing.
Instrument Bridge	Device consisting of instrument holders, hoses with whip arms or hanging hoses, swivel arms, control buttons, and display.
Suction Head	Device consisting of hanging hoses with holders, swivel arms, control buttons, and display.
Tray	Metallic or plastic tray with a supporting arm.
Foot Control	Radio operated control device with batteries or pneumatic remote control.
Hand Control	Radio operated control device with batteries.
Joystick	Four-way control device for controlling the chair
PCB	Printed Circuit Board

### 1.5 Symbols and Markings

### Follow instructions for use

The information provided is important and must be read.

# Note!

The information provided is important and should be read before use.



This symbol warns against possible operating errors or hazards to the product, user, patient or maintenance personnel.



This symbol warns against high voltage. The system has to be separated from mains voltage before maintaining. Only qualified personnel may open the enclosure provided with this symbol.



Type B classified applied part. It is a part which is in contact with the patient, and might be protectively earthed or not conductive.



Type BF classified applied part. Offers better electrical protection than type B applied part. BF applied parts are electrically separated from earth, 'floating'.



11 Manufacturing year.

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RF transmitter, a symbol for non-ionising radiation. There is a low power close-range RF transmitter in the remote foot control.

- IPX1 Ingress protection code, class 1 means that the product is protected against vertically falling water drops.
- *Italics* mean a term or abbreviation with an explanation defined in the section 1.4 Terms and Abbreviations.
- **Bold** text is a reference to another document.

#### 1.6 Referred Documents

**Registration Form** – Supplied with the device.

Service Book - Located in the pouch on the backside of the unit door

#### 1.7 General

# Warning!: If this equipment is modified, appropriate inspection and testing must be conducted to ensure continued safe use of the equipment.

Contact the manufacturer for detailed descriptions on printed circuit boards, component lists, and other information and spare parts required to repair and service the equipment.

#### 1.8 Transportation, Storage and Packaging

The patient chair and unit are delivered in separate packages.

Check the condition of the transport package before accepting the delivery. If the package is damaged, please contact the carrier and report of the transport damage.

During transportation, the chair and unit packages may be stacked in piles of two. During storage, piles of three are acceptable.

#### 1.8.1 Symbols used in packages

Symbol	Instruction		
	Fragile, handle with care		
5	Use no hand hooks		
<u>     1     1     1     1     1 </u>	This way up		
Ť	Keep away from rain		
Å⊡∎	Stacking limit, number of packages allowed to be stacked		
×∎	Do not roll		
$\rightarrow$	Beware of scrathing the contents while opening the package		
<b>CE</b> 0537	CE-mark with notified body number		

### 1.8.2 Contents of the chair package



Item	Order code	Quantity
Neo Chair		1 pc
Seat upholstery		1 pc
Backrest		1 pc
Handle, right		1 pc
Handle, left		1 pc
Headrest		1 pc
Remote foot control		1 pc
Chair seat bottom back part		1 pc
Accessory box (+ other order specific items):		1 pc
Arm rest hole cover	59201011	2 pcs
Head rest lock tightening tool	59203610	1 pc
Chair bottom foot	59203660	5 pcs
PS Wafer 18*25*1,0	97601810	2 pcs
Screw 3 X 8		2 pcs
Screw 3 X 10		2 pcs
Screw 3 X 12		2 pcs
Screw 3 X 16		2 pcs
Screw 3 X 20		2 pcs

### 1.8.3 Contents of the unit package

Item	Order code	Quantity
Neo unit		1 pc
White spittoon bowl	C20171W	1 pc
Transparent spittoon bowl	C20171	1 pc

Item	Order code	Quantity
O-ring for spittoon bowl	OR7504	1 pc
Spittoon bowl sieve, lower	C20173	1 pc
Spittoon bowl sieve, upper	C20174	1 pc
All instrument flushing -holder	C10686	1 pc
Suction arm joint cap	C10548M	1 pc
Clean water bottle, 1I	32322301	1 pc
Unit accessory box	•	
Adapter attachment screws, hex socket, M8x40	-	6 pcs
Adapter adjustment screws, hex socket, M8x30	-	6 pcs
Allen keys, 5 mm & 3 mm	-	2 pc
Suction hose, small volume, 2.03 m	99000010	1 pc
Suction hose, high volume, 1.96 m	99000009	1 pc
Suction hand piece, small volume	DU220 / CA140 / 59205130	1 pc
Suction hand piece, high volume	DU210 / CA150 / 59205090	1 pc
Suction tips for small volume suction	DU225	3 pcs
Suction hand piece tip	CA160	1 pc
Suction reduction piece, large	59204390	1 pc
Suction reduction piece, small	CA130	1 pc
General hose connector, white	59205471W	1 pc
Suction hose end piece, small, white	59205242W	1 pc
Suction hose end piece, large, white	59205241W	1 pc
Light pole via cover ring, white	59204274	1 pc
Block adjustment key	59204204	3 рс
PVC tube, Ø25mm x 100mm	-	2 pc
PVC connector 90° 32mm	PV03290	2 pc
Metal clamp for tube, 30mm	3333660	2 pcs
Compression fitting nut	3333190	2 pcs
Compression fitting ring	3333200	2 pcs
Lubricant for tube fittings	-	1 pc
Operating light pole cap	C10617	1 pc
Spring adjustment key	590208030	1 pc
Suction head attachment screw M8x18	-	1 pc
O-ring	OR156178	2 pcs
O-ring	OR12015	2 pcs
Tray arm stopper, white(*) (w. double tray)	59205200W	1 pc
Documents		
Fimet Neo User Guide		1 pc
Instrument instruction manuals		n pc(s)
Neo Quick Guide		1 pc

Item	Order code	Quantity
Neo Registration card		1 pc
Neo Service book		1 pc
Neo monitor and camera power cable connections(*)		1 pc

\* optional

#### 1.9 Environmental Specifications

Variable	Min	Мах		
During storage and transport				
Humidity	10%	95%		
Temperature	-40°C	70°C		
Temperatures for display	-20°C	60°C		
Air pressure	50 kPa (0.5 bar)	106 kPa (1.06 bar)		
During use				
Humidity	30%	75%		
Temperature	10°C	35°C		
Air pressure	80 kPa (0.8 bar, ca. 2000 m above sea level)	102 kPa (1.02 bar, ca. 60 m below sea level)		

Using the product in a moving vehicle is not allowed.

#### 1.10 Maximum lifting capacity

The chair is designed to lift patients weighting 135 kg maximum. The total lifting capacity (including the chair, patient, and other parts of the system) is 250 kg. Maximum weight of the Display is 8 kg.

### 1.11 Movement Ranges





### 2 Installation

### 2.1 Space Requirements







### 2.2 Unpacking

2.2.1 Unpacking the chair



After cutting the bands, lift the cardboard hood away.

Lift both of the trays away. Then lift the cardboard collar away. Unscrew the fixing screws. The chair is now ready to be positioned to the final location. The side of cardboard box can be used as a slide to ease up the positioning of the chair.

#### 2.2.2 Unpacking the unit

Cut the bands and open the cardboard box. Remove the cardboard box. Detach the wooden frames around the unit. The unit is now ready to be attached to the chair.

#### 2.3 Attaching Backrest

Slide the backrest in its place. Make sure the locking mechanism locks the backrest.



#### 2.4 Attachment to floor



Remove screws A from both sides of the base.



Then detach the back cover. Now two out of five attachment screws are accessible.



Then push joystick inwards to uncover the screw hole. Then unscrew joystick attachment screw and detach the joystick by lifting it carefully.



The C attachment screws are now accessible (4/5 in total).



The last attachment screw (3) is under a cover which can be detached using a suitable tool, for example a coin.



Figure 1: Attachment bolts

The five attachment screws are located as shown in picture above.

#### 2.5 Floor materials

The Fimet Neo can be attached to different kinds of floors; for example floors made of concrete, wood, or gypsum. Table 2: Examples of attachments lists examples which are acceptable. The following table (Table 1: Minimum withdrawal strengths) shows the required pulling strengths the attachment bolts have to withstand (withdrawal strengths).

Table 1: Minimum withdrawal strengths

Number of attachment bolts	Attachment bolt places (see Figure 1: Attachment bolts)	Minimum withdrawal strength / bolt
1	[3]	2700 N
3	[1],[3],[5]	800 N
5	[1],[2],[3],[4],[5]	700 N

Material of floor	Number of attachment bolts	Attachment type	Attachment hole diameter and depth	Withdrawal strength / bolt
Concrete, K25	1	Würth Wümax 8x50	8 mm x 60 mm	3600 N
Concrete, K25	3,5	Würth Wümax Dome 6x40	6 mm x 45 mm	1200 N
Wood, 28 mm solid wood floor	3,5	Hex Head Wood Screw 6x40	6 mm x 45 mm	2000 N
Gypsum, 25 mm	5	Toggler Alligator – anchor + WÜPO General Screw 6x40	8 mm x 50 mm	775 N

Table 2: Examples of attachments

#### 2.6 Attaching unit to the chair

Slide the unit pallet next to the chair. Connect power cords from the unit to the chair temporarily to position the chair. Connect the connection box to the mains temporarily. Power up the chair and position the height of the adapter (raise the chair) so that the unit can be placed on it easily by sliding the pallet closer.

Attach the adapter. See chapter Adapter adjustments.

#### 2.7 Adapter adjustments



Figure 2: Adapter with bolts

Attach the black hex screws. Adjust the cuspidor horizontally and vertically straight by loosening the corresponding attachment screws. Ensure that at least 8 mm of the threaded part of the bolt is inside the hole of the patient chair body plate. When the cuspidor is in the correct position attach and tighten the bright securing hex screws.

The black attachment hex socket (Allen) screws are of type M8 \* 40, hardness 12.9, non-galvanized. 6 pcs.

The bright securing hex socket (Allen) screws are of type M8 \* 30, hardness 8.8, galvanized. 6 pcs.

#### 2.8 Connecting the cables

Connect the cables



Figure 3: Chair connector PCB (CNA)

#### 2.9 Removing transport screw



Figure 4: Electronics protection cover

Unscrew the attachment screw and remove electronics protection cover.



Figure 5: Transportation locking screw

Loosen the transportation locking screw. This screw prevents the rotation of the cuspidor during transportation.

#### 2.10 Adjusting the instrument arm spring



Figure 6: Instrument Arm spring adjustment

Remove the spring adjustment opening cover before adjusting the tension of the spring. This adjusts the balance and displacement force of the instrument arm.



#### 2.11 Adjusting the stiffness of tray rotation

#### Tray Arm

The stiffness of the rotation of the tray arm is adjusted with the adjustment screw (shown on the picture). Use 3 mm hex key for the adjustment. The adjustment screw is locked with the locking screw to prevent loosening. Use 4 mm hex key for the locking.

#### 2.12 Headrest lock tightness adjustment

The movements of the headrest are double articulated. The headrest can be adjusted around the two axels when the locking lever is in open position. The tightness of the locking system is adjusted with a plastic tool delivered with the system.



Figure 7: Headrest lock tightening tool

Remove the plastic plug on the vertical bar carefully with the chisel end of the tool. Then adjust the tightness of the nut with the key and replace the plug. The plug locks the tightening nut in its place.

#### 2.13 Setting Air and Water Pressures

The pressure regulators inside the connection box control the pressures in the system. The pressures must be set correctly. The pressure increases by rotating the level control clockwise and decreases counter clockwise.

The symbols for the gauges are: W-water and A-air.

The recommended pressures are:



Figure 8: Water pressure regulators



Figure 9: Air pressure regulators

#### 2.14 Connection to Mains

*Warning!* To avoid the risk of electric shock, this equipment must only be connected to supply mains with protective earth.

### 3 Annual service

#### 3.1 Service steps

- Visual Inspection General
  - o Check that safety related markings and labels are legible and complete
  - Check the condition of mechanical parts
  - Check that there are no odours or visual impurities in the tubes and no stains on the surfaces
  - $\circ$  Check the condition of the power supply cord, air and water tubes
  - Check that user guide is accessible and is of correct version
- Chair general
  - Check the chair rotation system
  - o Check the functions of the chair leg rest
  - o Check the functions of the seat angle
  - o Check the functions of the head rest
  - o Check the safety switch functionally
  - Check the function of the joystick(s)
- Chair lift motor
  - Check the condition of the lift motor assembly
  - Lubricate the screw spindle, see 3.2 Greasing the Lift Motor Screw Spindle
  - Lubricate the gear wheels of the lift motor (White Molycote)
  - o Oil the brake of the tilt motor (general lubricant oil)
  - o Lubricate the axles of the leg rest fixing (general lubricant oil)
- Chair tilt motor
  - o Lubricate the gear wheels of the tilt motor (White Molycote)
  - Oil the brake of the lift motor (general lubricant oil)
  - Check the upper and lower limits
  - Check the condition of the tilt motor assembly
  - Lubricate the spindle of the tilt motor (White Molycote)
- Foot control
  - Check the functions of the foot control
  - o Replace the rechargeable batteries every two years
  - Check the foot control charging cable
- Instrument Delivery System
  - o Check operation of the delivery arm
  - o Check operation of instrument selection and condition of instrument hoses
  - o Check condition of Doriot arms
  - o Check main air, spray air, water and exhaust air pressure of turbine hose(s)
  - o Check that there are no water leaks inside the instrument bridge
  - o Check operation of instrument light
  - Check operation of micro motors; rotation to both directions, speed range settings, etc.
  - Check operation of electric scaler; power adjustment, paro / endo -functions, etc.
  - o Check operation of curing light
  - Check operation of syringe
  - Check operation of cup filling and bowl rinsing
  - Check operation of the chair control buttons
  - o Check magnetic valves
  - Check the exhaust air oil collector bottle
  - o Check the condition of silicon cover
  - Replace instrument block's membrane every five years
- Suction System

- Check operation of the chair control buttons
- o Check operation of suction high, low and both together
- o Check condition of suction hoses
- Check the selective valves
- o Check the F1-filter
- o Check the suction arm
- o Check the bowl valve sensor
- o Check the bowl valve
- o Check the condition of silicon cover
- Other
  - o Check the operation light
  - o Replace the air and water filter cartridge in the connection box
  - o Check water and air pressure in the connection box
  - o Check condition of movement limiter -micros
- Third party devices (Suction system, separators, etc.)
  - o Check third party devices according their instructions

#### 3.2 Greasing the Lift Motor Screw Spindle

- 1. Drive the patient chair to its upper limit.
- 2. Inject ~ 2 ml grease using the medical syringe through the hole at the side of the tube.
- 3. Repeat to the other side.



Figure 10: Lift motor screw spindle

The type of the red grease to use is:

Fimet Spindle Grease. Available from Fimet Oy.

#### 3.3 Safety measurements

These measurements must be done according to the standard IEC 62353:2007 Medical electrical equipment. Recurrent test and test after repair of medical electrical equipment.

These measurements must be done during installation and after that annually. The results have to be written to the service book (located inside the cuspidor door).

#### 3.3.1 Protective Earth Resistance Measurement

Measure the resistance between earth connector and accessible conductive part. The test device must be able to supply minimum 200 mA current to 500 m $\Omega$  resistance. The measured resistance must be under **300 m\Omega**. This measurement ensures that the protective earth line is capable to carry all possible current away from the equipment in case of a malfunction.



Figure 11: Measuring arrangement for protective earth resistance measurement

#### 3.3.2 Leakage Current Measurement

This measurement is not required, if the power network meets the standard IEC 60364-7-710 and the network is regularly inspected. This measurement ensures that there are no harmful leakage current in the equipment which could harm the patients.

The leakage current is measured between (Figure 12):

- mains lines (connected together) and protective earth
- mains lines (connected together) and patient connections

mains lines (connected together) and F-type applied part (if any)

The maximum allowed currents are:

Equipment Leakage Currents					
Applied Part     Applied     Accessible Part       Type B     Part Type       BF					
Leakage currents	1 mA	5 mA	1 mA		



Figure 12: Measuring arrangement for equipment leakage current

#### 3.3.3 Measurement of insulation resistance

Insulation resistance measurements are performed with 500 Vdc and the equipment is disconnected from supply mains during the measurement. The power switch is on-position.

The insulation resistance is measured between:

- mains lines (connected together) and protective earth (Figure 13)
- protective earth and F-type applied part (if any) (Figure 14)

The measured resistance is typically  $\infty$  and must be more than **7** M $\Omega$ . Any big changes from previous measurements may indicate problems.



Figure 13: Measuring arrangement for insulation resistance between mains lines and protective earth



Figure 14: Measuring arrangement for insulation resistance between applied parts and protective earth

### 4 Repairs and adjustments

### 4.1 Replacing Fuses

Warning! Use only fuses with specified and marked characteristics. Replacing with an incorrect type may cause a fire in case of a short circuit.



Figure 15: Connection box fuses

### 4.2 Replacing Electric Circuit Boards

Warning: Do not replace the lithium battery on the master card but change the whole electric circuit board. Do not place the master card to a hot environment because of the danger of explosion of the battery.

#### 4.3 Replacing rechargeable batteries of remote foot control



Figure 16: Remote foot control batteries

Detached the 4 attachment screws and open the cover of the foot control. Replace the rechargeable batteries with the type:

#### 1.2 V, NiMH, AA, Rechargeable

#### 4.4 Error, warning and info messages

Error messages need to be acknowledged by clicking the hutton on the instrument bridge.

Warnings and information messages are automatically acknowledged after 5 seconds.

Code	ode Description		Display text
Errors			
10	Chair Move Alarm Switch - Lift	MDR1	ALARM,CHAIR,LIFT MOVE
11	Chair Move Alarm Switch – Back	MDR2	
12	Chair Move Alarm Switch - Unit	UNT	
20	Under Voltage	MDR1	MDR1,POWER,LOST
21	Under Voltage	MDR2	
22	Under Voltage	RLY	
23	Under Voltage	UNT	
24	Under Voltage	BVD	
25	Under Voltage	RXC	
26	Under Voltage	UMB	
27	Under Voltage	UMF	
28	Under Voltage	BRI	
40	FCC message lost	RXC	
41	FCC battery empty	RXC	FCC,BATTERY,EMPTY
50	Over TEMPERA- TURE heat sink	MDR1	
51	Over CURRENT hw meas	MDR1	MDR1,MOTOR.OVER LOAD
52	Over CURRENT sw meas	MDR1	
53	Softdog timeout	MDR1	
54	No chair MOVE on potentiometer	MDR1	MDR1,SENSOR,NO MOVE
60	Over TEMPERA- TURE heat sink	MDR2	
61	Over CURRENT hw meas	MDR2	
62	Over CURRENT sw meas	MDR2	
63	Softdog timeout	MDR2	
64	No chair MOVE on potentiometer	MDR2	
90	Device status request lost	MST	
Warnings			
100	Tool Selected at Boot	BRI	
101	Tool Selected at Boot	SUI	
105	Button Down at Boot	BRI	
106	Button Down at Boot	SUI	
107	Button Down at Boot	CUI	
108	Button Down at Boot	JOY1	

109	Button Down at Boot	JOY2	
110	Button Down at Boot	RXC	
120	Multiple Tool Selec- tion	BRI	
121	Dutycycle limitter	MST	
140	FCC battery low	RXC	
150	Chair move limit	MST	
<b>Information</b>			
200	FCC charger con- nected	RXC	
201	FCC charger discon- nected	RXC	
202	FCC battery full	RXC	
210	Timer Elapsed	MST	
211	Flush Done	MST	
212	Cattani Draining	MST	
240	Net Traffic Failure	CUI	
<u>System</u>			
254	Unknown Message	MST	
255	Factory testing	MST	

#### 4.5 Setting the chair movement soft limits

Lift the chair until the lift tube is positioned as shown in Figure 17: Lift tube. Open the service menu, described in chapter 5 User interface - service menu. Select Chair / Lift Lim / Set Max. Set the value to the same value as displayed in the title (Lift=XX).

Exit the menu with button. Lower the chair until the seat's lowest position nearly touches the base.

Repeat the procedure for lower limit (Chair / Lift Lim / Set Min).



Figure 17: Lift tube

#### 4.6 Remote foot control settings

Open the "SERVICE" menu, described in chapter 5 User interface - service menu. Select "CONFIG" and "RFC MODE". If the "DEF" is active, the foot controls settings are in the default mode. The function of the foot control joystick and buttons can be altered by changing the "RFC CONF MODE" from "DEF" to "CFG" and clicking the "OK" -button on the correspondent row.



Control	Controlled device	Function	
	MDR1, lift motor	A=Chair up, C=Chair down	
	MDR2, tilt motor	A=Backrest up, C=Backrest down	
	MDR3, cart motor	A=Cart up, C=Cart down	
D1 = Joystick A<->C	MDR4, Trendelenburg motor	A=Seat tilt, C=Seat horizontal	
(Default = MDR1)	MDR1–, lift motor	A=Chair down, C=Chair up	
	MDR2–, tilt motor	A=Backrest down, C=Backrest up	
	MDR3–, cart motor	A=Cart down, C=Cart up	
	MDR4–, Trendelenburg motor	A=Seat horizontal, C=Seat tilt	
	MDR1, lift motor	B=Chair up, D=Chair down	
	MDR2, tilt motor	B=Backrest up, D=Backrest down	
	MDR3, cart motor	B=Cart up, D=Cart down	
D2 = Joystick B<->D	MDR4, Trendelenburg motor	B=Seat tilt, D=Seat horizontal	
(Default = MDR2)	MDR1–, lift motor	B=Chair down, D=Chair up	
	MDR2–, tilt motor	B=Backrest down, D=Backrest up	
	MDR3–, cart motor	B=Cart down, D=Cart up	
	MDR4–, Trendelenburg motor	B=Seat horizontal, D=Seat tilt	

	MDR1, lift motor	E=Chair up, F=Chair down	
	MDR2, tilt motor	E=Backrest up, F=Backrest down	
D2 Duttone F and	MDR3, cart motor	E=Cart up, F=Cart down	
D3 = Buttons E and F	MDR4, Trendelenburg motor	E=Seat tilt, F=Seat horizontal	
(Default =)	MDR1–, lift motor	E=Chair down, F=Chair up	
	MDR2–, tilt motor	E=Backrest down, F=Backrest up	
	MDR3–, cart motor	E=Cart down, F=Cart up	
	MDR4–, Trendelenburg motor	E=Seat horizontal, F=Seat tilt	
	MDR1, lift motor	H=Chair up, I=Chair down	
	MDR2, tilt motor	H=Backrest up, I=Backrest down	
	MDR3, cart motor	H=Cart up, I=Cart down	
D4 = Lever H<->I	MDR4, Trendelenburg motor	H=Seat tilt, I=Seat horizontal	
(Default =)	MDR1–, lift motor	H=Chair down, I=Chair up	
	MDR2–, tilt motor	H=Backrest down, I=Backrest up	
	MDR3-, cart motor	H=Cart down, I=Cart up	
	MDR4–, Trendelenburg motor	H=Seat horizontal, I=Seat tilt	

#### 4.7 Remote foot control lever calibration

Pull foot controls joystick towards yourself [C=chair down] while lifting the handle (=switching the foot controls power on). Turn the lever to extreme position on both directions while keeping the joystick in C-direction. After releasing the joystick, the lever movement is calibrated.



#### 4.8 Pairing the transmitter and the receiver

Connect charging cable while the foot control is powered on (handle lifted). If both LEDs blink few times, devices are paired. If only one LED blinks, disconnect and reconnect again.

#### 4.9 Unpairing the transmitter and the receiver

Push the foot controls joystick away from you [A=chair up] and the lever button [G] pressed while powering up (lifting the handle). Release the buttons after lifting the handle. If both LEDs blink, the devices are unpaired.

#### 4.10 Setting the parameters of joysticks



Side parameter defines the joysticks placement, either doctors or assistants side.

Press and hold any two of the joystick's micro switches simultaneously and plug in the joystick's connector. If both LEDs are blinking, push the joystick towards the foot rest [B=raise the backrest]. Release the micro switches. Set the side parameter of the other joystick on the same way. Reboot (or reset) the system. Please notice, if the parameter of either one of the joysticks is incorrectly set, the joysticks will not function correctly.

The chair lift / chair down- function can be reversed separately in the "SERVICE" -menu. Opening the "SERVICE" -menu is described in chapter 5 User interface - service menu. Select "CONFIG" and then "JOY MODE". The value can be toggled with the "OK" -button on the correspondent line.

Joystick	Value	Function	
JOY1 (doctors side)	00	A=Chair up, C=Chair down (default)	
JOY1	01	A=Chair down, C=Chair up	
JOY2 (assistants side)	00	A=Chair up, C=Chair down (default)	
JOY2	01	A=Chair down, C=Chair up	

#### 4.11 Replacing the MST

Connect the second MST to the communication bus. Press and hold the "reset"-button in the MST. Power up the system. After a few seconds, the display in MST should display "C0". This means that the parameters have been copied from the existing to the second. The other MST in the system should display "P", which means it is inactive (paused). Switch the power off from the system and remove the old MST. Power up the system and check the tool positions, pneumatic block channel selection for each instrument and suction system selection setting, see *"5 User interface - service menu"*.



Figure 18: MST displaying "C0"

#### 4.12 Faro Alya operating light On/Off mode change

Faro Alya operates in two different modes. In mode 1 the light isn't automatically switched on when the power is fed to the lamp. This mode allows the lamp to be controlled from the lamp's own power switch. Mode 2 switches the light on automatically when power is fed to the lamp (preferable mode). This mode allows the lamp to be controlled from the unit (or from the remote foot control). To change operating mode, first open the lamp electronics cover, see Figure 19: Opening Faro Alya electronics cover.



Figure 19: Opening Faro Alya electronics cover

There are two different kinds of electronics used. The older one is used up to serial number 10LD010815:

Disconnect the JP4 jumper to disable automatically ON / OFF function.



Figure 20: Faro Alya older electronics mode change

The newer electronics, starting from serial number 10LD010816, has different procedure. To switch mode:

- Put in the jumper J2
- Power on the board
- Pull out jumper J2



Figure 21: Faro Alya newer electronics mode change

### 5 User interface - service menu

To enter service menu, click and hold -button (about 2 secs.) until the following display appears:



Then click within 3 seconds the  $\bigcirc$ -button.

Menu item	Submenu 1	Submenu 2	Submenu 3	Description
+SYS INFO				
	MESSAGES			Error, info, and warn- ing message log
	MASTER			System info, fw- version, dev. count, start times, up-time hours
	DEV INFO			PCB's, software ver- sions, serial numbers
+SERVICE				
	CHAIR			
		LIFT LIM		
			SET MIN	Sets seat lifting mini- mum height(*)
			SET MAX	Sets seat lifting max- imum height(*)
			MMM-NNN	Current values
			RESET MIN	Resets the min value
			RESET MAX	Resets the max value
		BACK LIM		
			SET MIN	Sets backrest tilting minimum(*)
			SET MAX	Sets backrest tilting maximum(*)
			MMM-NNN	Current values
			RESET MIN	Resets the min value
			RESET MAX	Resets the max value
		TREN LIM		
			SET MIN	Sets Trendelenburg tilting minimum(*)
			SET MAX	Sets Trendelenburg tilting maximum(*)
			MMM-NNN	Current values
			RESET MIN	Resets the min value
		RESET MAX	Resets the max value	
---------	---------------------------------------	---	---	
	SET MEM		Factory use only	
	TESTER		Factory use only	
BRIDGE				
	TOOL POS	SYRINGE / TURBIN1 / TURBIN2 / TURBIN3/ TURBIN4/ MOTORF1 / MOTORF2 / MOTORF2 / MOTORB1 / MOTORB2 / SCALER / CURING / SUCT1/ SUCT2	Sets the instrument type for each instru- ment module. =-sign marks the selected instrument type.	
	BLOCK SEL	T1/T2/T3/T4 /T5	Pneumatic block channel (, B1, B2, B3, B4) selection for each instrument	
	UMF VOLT	UMF BOARD / ENA POS	UMF BOARD (micro motor driver) common minimum and maxi- mum voltage settings. ENA POS individual micro motor voltage settings	
	UMB MODEL	BA BASIC / BA STD / NSK NLX	Micro motor driver card type selection	
	BRI FUNC		Bridge PCB valve controls???	
	VALVE TYP		Valve selection	
	SCALER CF		Ultrasonic scaler drive through relay or semiconductor	
	TESTER		Tool position tester – tool	
SUCTION				
	SUCT1/ SUCT2/ SYRINGE/ VIDEO		Suction head tool setting	
UNIT				
	CUP FILL		Cup filling time	
 	RINSE		Bowl flushing time	
	W SENSOR		Water sensor sensi- tivity settings, high=start level, low=stop level	
	SUC SYST	METASYS / CATTANI /	Suction system selec- tion setting. Metasys, Cattani, Cattani with	

		CAT-PMP/ WETLINE	pump, wet line
	SUC TIMES		
		SUC MOTOR	Suction motor time
		CAT FLUSH	Cattani flushing time
		CAT PUMP	Cattani pump time
		EVASEPT	Evasept time
	CONFIG	RFC MODE/ LAMP MODE/ JOY MODE	Remote foot control settings, operating light control, joystick settings

\* Note, beep-signal confirms that the set value is stored

To enter debug menu, click and hold -button (about 2 secs.) ,then click within 3 seconds the - and - buttons simultaneously.

Menu item	Submenu 1	Submenu 2	Submenu 3	<b>Description</b>
++DEBUG				
	STREQ=0/1			Factory use only
	DEV INFO			Device listing with version numbers

## 6 Electronics

## 6.1 General Description

Neo dental treatment system consists of a few obligatory PCBs, several optional PCBs and third party devices. The system parameters are configurable using the service menu. The modularity of the system allows easy setup of additional devices and functions after instalment.

Communication between the PCBs is realised with a data bus. This bus is used with all Neo PCBs. Bus data transfer is controlled by MST-card. There is no direct data transfer between two separate PCBs; the communication is always between the master and a slave. Specific information about each PCB can be found in section 7.

### 6.2 System overview

The system electronics overview with wiring information is described in the next figure.



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#### 6.3 Data communication

All the PCBs have the same communication electronics. It consists of a microcontroller, RS485 transceiver and two Molex 4-pin Spox connectors. The software of the microcontroller utilizes dedicated UART registers to receive from and transmit data to the communication bus. The transceiver converts the microcontroller logic level signals to half duplex differential signals for the bus cable. The data transmission rate is 19200 bauds. Two connectors for bus cable are used to allow the cable to be easily continued. Supply voltage of +7 VDC is used to power up all the microprocessors. This logic voltage is regulated to a suitable level in each card. PCB supply voltage is protected with a 1.2 A PTC resistor located in the PWRB. An indication LED in the PWRB shows when the supply voltage is short circuited or overloaded. Protection is automatically reset after overload condition has been fixed. In normal idle condition, all the PCBs together should consume about 400 mA.

#### 6.4 Status LEDs

The green status LED (STA) indicates the status of received traffic. There are five different blinking modes:

STA LED on time	Network status
No light	Data traffic missing
1/16 slow blinking	Data traffic detected (address not match)
1/2 fast blinking	CRC error
14/16 slow blinking	Package received (address match)
Light on	No data traffic detected for the last second

The red LED (PWR) indicates power status. It also indicates about error or malfunction of the board. There are five different blinking modes:

PWR LED on time	Power status
No light	35V power and logic power missing
1/16 slow blinking	Power failure. Logic power only
1/2 fast blinking	Alarm (overheating, safety limit etc.)
14/16 slow blinking	Self-diagnostic failure
Light on	Power OK

The Yellow LED (ACT) indicates specific state of the card; it is not used with all the cards.

Yellow LED is also used to indicate Valves supply voltage and generally operative conditions.

#### 6.5 Connection Box

- Power source and fuses.
- Relay card for external connections
- PWRA, PWRB, PWRC, RLY, pressure relief

#### 6.5.1 Power supply

- +7 VDC / 1 A for node, 24 VDC / 15 A for chair, 32 VDC / 5 A and 24 VAC / 5 A for unit
- Isolates the system from mains voltage
- Power Factor Correction (PFC)

 Separate multimedia power supply 28 VDC / 1A & 12 VDC / 4A for multimedia devices, isolated from main power supply

#### 6.6 Unit/Cuspidor

- Unit main PCB
- Valve control for cuspidor functions (tap(s), suction controls, etc.)
- Power source for operating light
- Place for external cards controlling devices placed in suction head or on display arm
- Control for waste handling devices and sensors (separators, etc.)
- UNT, MST, LMP, UNV

#### 6.6.1 Master

- Controls data communication
- Holds configuration data
- Is replaceable for updating

#### 6.6.2 Valve driver cards

- Used mainly to handle Water and Air
- Can include different types of sensors, I/O connectors
- Two basic places, Cuspidor and Instrument head, different purposes

#### 6.7 Chair

- Motor control electronics
- User interface (joysticks, display)
- Safety devices related to chair positioning
- Radio transceiver
- Charging of remote foot controller
- MDR x2, CAN, RXC, JOY, CUI

#### 6.7.1 Motor controllers

- Drives lift and tilt motors
- Has current, temperature, and different types of limits

#### 6.8 Instrument Bridge

- Control for instrument water & air
- Instrument control PCBs
- Instrument selection detectors
- User interface, keypad and display
- BRI, BVD, BVA, BVB, UMF, UMB, GUI, BUI

#### 6.8.1 Instrument related cards

- Mainly for different types of instruments manufactured by external company
- Can alter voltages, currents, or even serial data

#### 6.9 Suction Head

- User interface, keypad and display
- Controls for Instruments
- SUI, GUI

## 6.10 User interference devices

- Includes keyboards, joysticks and displays, few different types
- Takes user inputs to control the device
- Gives information about the device status, from date/time to Alarm signals

#### 6.10.1 Remote foot control

- Rechargeable batteries x4
- Radio transceiver
- RFT, RFB, RFC

#### 6.11 Radio devices

- Mainly user interference devices
- Can be used to data transfer

### 6.12 I/O cards

Control for external devices, inputs & outputs

## 7 PCB descriptions

## 7.1 ALA - Unit bottom safety switch

## 7.1.1 General description

The safety switch opens when the unit is lowered against an obstacle.



## 7.1.2 Connectors

Connector	Purposed use
ALARM	UNT-card

## 7.1.3 Indicators

N/A

## 7.2 ALB - Suction arm safety switch

### 7.2.1 General description

The safety switch opens when the suction arm is lowered against an obstacle.



#### 7.2.2 Connectors

Connector	Purposed use
ALARM	ALC-PCB

### 7.2.3 Indicators

N/A

### 7.3 ALC - Chair lift safety switch

7.3.1 General description

The safety switch opens when the chair is lowered against an obstacle.



#### 7.3.2 Connectors

Connector	Purposed use
ALARM1	MDR-PCB, lift
ARM	ALB-PCB, jumper if no suction arm (=no ALB)

### 7.3.3 Indicators

N/A

## 7.4 ALD - Chair back safety switch

## 7.4.1 General description

The safety switch opens when the chair back rest is lowered against an obstacle.



### 7.4.2 Connectors

Connector	Purposed use
ALARM	MDR-card, tilt

## 7.4.3 Indicators

N/A

## 7.5 ALE – Chair movement limiter switch, lift

7.5.1 General description

The movement limit switch gets closed on the mechanical limits of the seat lifting.



### 7.5.2 Connectors

Connector	Purposed use
LIMITS	MDR-card, lift

## 7.5.3 Indicators

N/A

## 7.6 ALF - Chair movement limiter switch, tilt

### 7.6.1 General description

The movement limit switch gets closed on the mechanical limits of the back rest tilting.



#### 7.6.2 Connectors

Connector	Purposed use
LIMIT	MDR-card, tilt

#### 7.6.3 Indicators

N/A

## 7.7 BRI – Instrument bridge main board

7.7.1 General description

Provides connection for BRIDGE BUS.

Power source for instrument lights.

Instrument selection acknowledgement with a chain of detectors (HSWs & DSWs).



### 7.7.2 Connectors

Connector	Purposed use
СОМ	Reserved
AUX	Reserved
DSW	Tool selection switches, DSWs, HSWs
LM1	Instrument light #1
LM2	Instrument light #2
LM3	Instrument light #3
LM4	Instrument light #4
LM5	Instrument light #5
NET1	Communication bus #1
NET2	Communication bus #2
PWR1	Power #1
PWR2	Power #2
INTERCON	Bridge bus

#### 7.7.3 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power

## 7.8 BUI – Instrument bridge user interface

## 7.8.1 General description

Keyboard with 13 push buttons.

5 button status LEDs beside corresponding buttons.

Links the display controller (GUI) to communication bus.

Keyboard PCB is used on the instrument head and it provides controls for the system.



### 7.8.2 Connectors

Connector	Purposed use
CON	Display (GUI)
NET1	Communication bus #1
NET2	Communication bus #2

## 7.8.3 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power
L1A	Yellow	Button status
L3A	Yellow	Button status
L3B	Yellow	Button status
L1C	Yellow	Button status
L4B	Yellow	Button status

## 7.9 BVA - Instrument bridge valve board A

## 7.9.1 General description

4 instrument line pilot valves for pneumatic block.



#### 7.9.2 Connectors

Connector	Purposed use
X1	BVD-PCB

## 7.9.3 Indicators

LED	Colour	Purposed use
L1	Yellow	Valve status, open when lit
L2	Yellow	Valve status, open when lit
L3	Yellow	Valve status, open when lit
L4	Yellow	Valve status, open when lit

## 7.10 BVB - Instrument bridge valve board B

## 7.10.1 General description

Water, main air and cooling air valves for pneumatic block.



### 7.10.2 Connectors

Connector	Purposed use
X1	BVD-PCB

## 7.10.3 Indicators

LED	Colour	Purposed use
L1	Yellow	Valve status, open when lit
L2	Yellow	Valve status, open when lit

L3 Yellow Valve status, open when lit
---------------------------------------

## 7.11 BVD - Instrument bridge valve board

- 7.11.1 General description
  - Controls 7 valves

Relay output for scaler

Optional relay output

Bridge bus provides logic and supply voltage (32 VDC) to the board.



### 7.11.2 Connectors

Connector	Purposed use
01	Scaler relay
02	Optional relay output
BVA	BVA-PCB
BVB	BVB-PCB
INTERCON	Bridge bus

### 7.12 CNA - Connector card

#### 7.12.1 General description

Distribution PCB for power connections and communication bus. Shuts the power down from lift and tilt motors, when emergency stopping device has been activated.



#### 7.12.2 Indicators

LED	Colour	Purposed use
NET	Yellow	Communication bus power present
PWR	Red	24 VDC present

### 7.12.3 Connectors

Connector	Purposed use
UNIT	UNT-PCB
PWR3	MDR-PCB
PWR4	MDR-PCB
PWR7	Power 24 VDC
PWR8	Power 24 VDC
SW1	Emergency stopping device
SW2	Emergency stopping device
NET1	Communication bus
NET2	Communication bus
NET3	Communication bus
NET4	Communication bus
NET5	Communication bus

## 7.13 CUI – Chair user interface

### 7.13.1 General description

User interface with 3 push buttons.

Controls OLED graphic display.

The OLED display shows information about battery state and radio transmission quality. Error messages are also shown in the display. Push buttons are used to change user pre-set settings, surf through menus and setup the Chair.



## 7.13.2 Connectors

Connector	Purposed use
DISP1	OLED Display
NET	Communication bus

## 7.13.3 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power

## 7.14 DSW – Doriot tool switch



### 7.14.1 General description

The DSW card detects the doriot-arm position with optical port. The card passes the instrument selection information to the BRI-card. The doriot tools switch includes microcontroller, IR-emitter diode, phototransistor, two indication LEDs, extend- and select connectors.

## 7.14.2 Connectors

Connector	Purposed use
EXTEND	Next DSW card (SELECT connector), chaining
SELECT	BRI card / previous DSW card (EXTEND connector)

### 7.15 GUI – Graphical user interface

## 7.15.1 General description

The Graphical User Interface (GUI) -card controls the OLED display. GUI is connected to BUI/ SUI -card and to OLED-display.



### 7.15.2 Connectors

Connector	Purposed use
OLED DISP	OLED-display
CON	BUI/SUI card

## 7.16 HSW - Hanging hose switch



### 7.16.1 General description

The HSW card detects the hanging hoses position with optical port. The card passes the instrument selection information to the BRI-card. The tools switch includes microcontroller, IR-emitter diode, phototransistor, two indication LEDs and extend- and select connectors.

## 7.16.2 Connectors

Connector	Purposed use
EXTEND	Next HSW card (SELECT connector), chaining
SELECT	BRI card / previous HSW card (EXTEND connector)
LED	IR-LED (transmitter), welded
T1	IR-transistor (receiver), welded

## 7.17 JOY - Joystick

### 7.17.1 General description

Joystick has switches for 4 directions and a communication bus connection. The joystick sends information to the MST-card, which decides the correct action to be done.



## 7.17.2 Connectors

Connector	Purposed use
NET1	Communication bus
NET2	Communication bus

## 7.17.3 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power

## 7.18 MDR - DC motor driver

### 7.18.1 General description

The MDR drives the lift and backrests motors. Two models are available, one for backrest and one for lift. The models have different current limits and addresses.

Potentiometer, safety- and limit -switches are connected directly to PCB.

CHAIR -model has hardware current limit of 15 A.

BACKREST -model has hardware current limit of 8 A.



## 7.18.2 Connectors

Connector	Purposed use	
MOTOR	Motor connector	
MANUAL	Manual driving of motor, connect 1&2 forward and 2&3 reverse	
LIMIT	Limit switch, ALE / ALF -PCBs	
ALARM	Safety switch, ALC / ALD -PCBs	
POS	Position sensor potentiometer	
NET1	Communication bus	
NET2	Communication bus	
P1	Power 1, power in, 4 pins	
P2	Power 2, power out, 2 pins	



## 7.19 MST – Master device controller

## 7.19.1 General description

MST controls the communication bus and stores system configuration. The MST has a battery-protected clock, two buttons and a two digit 7-segment display. When pressing the upper button (COUNT) the amount of detected devices is shown. The lower button (RESET) rescans the devices in the system. When powering up the system, the MST shows the amount of recognized devices in the system.

The lithium battery in MST is of type CR2430 (diameter 24.5 mm, height 3.0 mm, capacity 290 mAh). Order code 76502430.

### 7.19.2 Connectors

Connector	Purposed use
NET1	Communication bus
NET2	Communication bus

## 7.20 PWRA - Power Supply - Mains

#### 7.20.1 General description

System power switch Main fuse Mains connection



#### 7.20.2 Connectors

Connector	Purposed use
X1	PWRB-PCB
X2	Main supply

## 7.21 PWRB Power Supply - Secondary

## 7.21.1 General description

Generates voltages: 7 VDC 1A, 24VDC 15A, 32VDC 10A, 24VAC 5A, 12 VDC 2A.



## 7.21.2 Connectors

Connector	Purposed use
TRANS-1	Transformer
UNIT-1, UNIT-2	UNT-PCB, miscellaneous
CHAIR-1, CHAIR-2	CNA-PCB
XTRA-1, XTRA-2	RLY-PCB, Pressure relief
LIGHT-1, LIGHT-2	N/A
DATA1-3	Power supply for communication bus
LED	Power switch LED

## 7.21.3 Indicators

LED	Colour	Purposed use
LED1	Red	Communication bus over current protection (lit when over-
LED2	Red	24 VDC fuse condition indicator (lit when blown)
LED3	Red	12 VDC fuse condition indicator (lit when blown)
LED4	Red	32 VDC fuse condition indicator (lit when blown)
LED5	Red	24 VAC fuse condition indicator (lit when blown)

## 7.22 PWRC Power Supply - Multimedia

### 7.22.1 General description

Isolated power supply for multimedia devices; monitor, camera, etc.



### 7.22.2 Connectors

Connector	Purposed use
TRANSFORMER	Transformer
MULTIMEDIA-1 & 2	12 VDC & 28 VDC

## 7.23 RFB – Remote foot control battery PCB

### 7.23.1 General description

The RFB-PCB supplies power to the RFC-PCB, contains four rechargeable batteries, potentiometer for lever position detection, a micro switch for detecting lever actuation and a second for power switch.



### 7.23.2 Connectors

Connector	Purposed use
TSW1	RFT-PCB
CON2	RFC-PCB

## 7.24 RFC – Radio foot controller

#### 7.24.1 General description

The RFC-PCB has a radio transceiver for wireless communication to the system. It has a 4direction joystick, 2 buttons and 1 lever for instrument operation. Two LEDs show the radio status; LED1 indicates radio transmission, LED2 indicates radio reception.



#### 7.24.2 Connectors

Connector	Purposed use
CON	Communication bus
CHARGER	Charging connector

## 7.24.3 Indicators

LED	Colour	Purposed use
LED1	Yellow	Transmission
LED2	Yellow	Reception

## 7.25 RFT - Foot control lever switch

#### 7.25.1 General description

RFT-PCB is used in the lever of the Remote Foot Control.



#### 7.25.2 Connectors

Connector	Purposed use
TSW2	RFB-PCB, welded

## 7.26 RLY – Relay card for external connections

## 7.26.1 General description

The RLY-PCB controls external devices, for example suction motor, doorbell and lamp.



#### 7.26.2 Connectors

Connector	Purposed use
PWR1	Power connector
PWR2	Power connector
NET1	Communication bus
NET2	Communication bus
RL1	Relay output 1 (NC)
RL2	Relay output 2 (NC)
RL3	Relay output 3 (NC)

### 7.26.3 Indicators

LED	Colour	Purposed use
K1L	Yellow	Relay 1 status (closed when lit)
K2L	Yellow	Relay 2 status (closed when lit)
K3L	Yellow	Relay 3 status (closed when lit)

## 7.27 RXC - Radio receiver

7.27.1 General description

RXC-PCB communicates with remote foot control (RFC), charges remote foot controller batteries and reports battery status to Master Device Controller (MST). When charging cable is plugged in, the communication is done radiolessly via charging cable. The radio communication uses 2.4 GHz frequency band.



### 7.27.2 Connectors

Connector	Purposed use
NET1	Communication bus
NET2	Communication bus
PWR1	Power
PWR2	Power
FCC	Remote foot controller recharging connector

## 7.27.3 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power
ACT	Yellow	Activity

## 7.28 SUI – Suction head user interface

#### 7.28.1 General description

Keyboard with 11 push buttons. 3 button status LEDs beside corresponding buttons. Links the display controller (GUI) to communication bus. Suction tool selection acknowledgement with a chain of detectors (HSWs).



## 7.28.2 Connectors

Connector	Purposed use
CON	GUI connector
NET1	Communication bus
NET2	Communication bus
HSW	Suction tool selection switches, HSWs

### 7.28.3 Indicators

LED	Colour	Purposed use
L1A	Yellow	Button status
L3B	Yellow	Button status
L4B	Yellow	Button status
STA	Green	Status
PWR	Red	Power

## 7.29 UMB – Bien Air micromotor adapter

## 7.29.1 General description

UMB-PCB has a serial data adapter for Bien Air 3-phase micromotor controller and a relay multiplexer for two micromotors.

The hardware supports also other than Bien Air micromotor controllers.



#### 7.29.2 Connectors

Connector	Purposed use
OUTPUT-1	Micromotor 1
OUTPUT-2	Micromotor 2
MOTOR INPUT	Bien Air micromotor controller
INTERCON	Bridge bus
PWR-OUT	Bien Air micromotor controller (power)
UMOTOR	Bien Air micromotor controller (serial data)
UMOTOR2	Reserved for other micromotor controllers

#### 7.29.3 Indicators

LED	Colour	Purposed use
STAT	Green	Status
PWR	Red	Power
ACT	Yellow	Activity

#### 7.30 UMF – Micromotor driver

## 7.30.1 General description

The UMF-PCB is a DC-micromotor controller. It adjusts the speed and direction of micromotors. It has multiplexer for three motors. The UMF can control different types of DCmicromotors.



Connector	Purposed use
INTERCON	Bridge bus
MOTOR1	Micromotor 1
MOTOR2	Micromotor 2
MOTOR3	Micromotor 3

## 7.30.2 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power
ACT	Yellow	Activity

### 7.31 UNT – Unit main module

7.31.1 General description

The UNT-PCB controls valves on UNV-PCB. It controls also auxiliary devices.



## 7.31.2 Connectors

Connector	Purposed use
VAL-A	UNV-PCB
VAL-B	UNV-PCB
BTL-IO	Clean water bottle switch and LED
SEN1	Water level sensor 1
SEN2	Water level sensor 2
META-RUN	Metasys relay output
ALARM	ALA-PCB
GEN-OUT	General output (eg. Faro Alya control)
VIDEO-CTR	Video camera control
AC-1	Power output, 24 VAC
AC-2	Power output, 24 VAC
PWR-1	Power output #1, 32 VDC
PWR-2	Power output #2, 32 VDC
BRIDGE	BRI-PCB
POWER-IN1	PWRB-PCB, power input 32 VDC, 24 VDC, 24 VAC
NET1	Communication bus
NET2	Communication bus
NET3	Communication bus
NET4	Communication bus
NET5	Communication bus
NET6	Communication bus

## 7.31.3 Indicators

LED	Colour	Purposed use
STA	Green	Status
PWR	Red	Power
WLS	Yellow	Water level sensor indicator (maximum water level detected when lit)

## 7.32 UNV - Unit valves

## 7.32.1 General description

UNV-PCB controls the water- and air supply to the devices located in the cuspidor.



### 7.32.2 Connectors

Connector	Purposed use
А	UNT
В	UNT

## 7.32.3 Indicators

LED	Colour	Purposed use
LED1-9	Yellow	Valve status, open when lit

## 7.33 X1N10A - Pressure relief

## 7.33.1 General description

Relieves air and water pressures when the system is powered down.



## 7.33.2 Connectors

Connector	Purposed use
CONNECTOR	PWRB-PCB

## 8 Pneumatics



## FINET THE ART OF MEDICAL DESIGN





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#### 9 Materials used in maintenance

Material	Where used	Volume	Order code
Orapi CT 609 Grease	Head rest lock mecha- nism	20 ml	3232135
Fimet Spindle Grease (Red)	Lift and tilt motor spin- dles and gear wheels	20 ml	REDGREASE3751P
Rechargeable batteries	Remote foot control	4 pcs	76502100X4
Rubber button set	Remote foot control	5 pcs	800200
Air & Water filter cartridge	Air & water filter	2 pcs	3333273
Clean water bottle	Unit water system	1 pc	32322301
PUR-tube, clear 6/9	Clean water bottle, in- ner tube	1 pc	3333943
Exhaust oil bottle	Instrument return air	1 pc	PULLO002K
Plastic angle joint outside thread	Angled connection nip- ple	1 pc	AP1110
Plastic joint male with plastic lock nut	Extension nipple, male	1 pc	AP1185
Plastic joint female	Extension nipple, fe- male	1 pc	AP1220
O-ring	Spittoon bowl	1 pc	OR7504
O-ring	Suction system	2 pcs	OR12015
O-ring	Suction system	2 pcs	OR15015
O-ring	Suction system	2 pcs	OR1602
Lock square bolt	Head rest locking mechanism	1 pc	F38020
Lock square bolt nut, left handed thread	Head rest locking mechanism	1 pc	97500103
Lock square bolt nut, right handed thread	Head rest locking mechanism	1 pc	97500100
Double pivoting lock tighten- ing plates	Head rest locking mechanism	2 pcs	59202422-3
Maintenance kit	All the above materials		NEOSERVICESET