CA 4 amalgam separator

EN

Installation and Operating Instructions

CE

9000-606-44/30

DÜRR DENTAL

1803V002

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1 About this document

These installation and operating instructions form part of the unit.

If the instructions and information in these installation and operating instructions are not followed, Dürr Dental will not be able to offer any warranty or assume any liability for the safe operation and the safe functioning of the unit.

1.1 Warnings and symbols

Warnings

The warnings in this document are intended to draw your attention to possible injury to persons or damage to machinery.

The following warning symbols are used:


General warning symbol


Warning – dangerous high voltage


Biohazard warning

The warnings are structured as follows:

SIGNAL WORD

Description of the type and source of danger

Here you will find the possible consequences of ignoring the warning

› Follow these measures to avoid the danger.

The signal word differentiates between four levels of danger:

– **DANGER**
  Immediate danger of severe injury or death
– **WARNING**
  Possible danger of severe injury or death
– **CAUTION**
  Risk of minor injuries
– **NOTICE**
  Risk of extensive material/property damage

Other symbols

These symbols are used in the document and on or in the unit:

Note, e.g. specific instructions regarding efficient and cost-effective use of the unit.


Unit can be used with Tyscor Pulse


Comply with the Operating Instructions.


Wear hand protection.


Switch off and de-energise the unit (e.g. unplug from mains).


Do not sit on the unit


Do not climb onto the unit


Do not reuse


Monitor ambient conditions


Unit in operation


Unit operation interrupted


Audible signal/melody sounds


Mark of conformity from the Deutsches Institut für Bautechnik


CE labelling

Order number

Serial number


Manufacturer

EN

1.2 Copyright information

2 Safety

Dürr Dental has designed and constructed this device so that when used properly and for the intended purpose there is no danger to people or property. Nevertheless, residual risks can remain. You should therefore observe the following notes.

2.1 Intended purpose

The amalgam separator is designed for the separation of amalgam out of all waste water collected from dental treatment units.

2.2 Intended use

Installation in accordance with the requirements of the water authorities in the German Federal States or in accordance with local regulations. In accordance with the installation regulations of DIBT Berlin.

The CA4 amalgam separator is intended for installation downstream of an air/water separation system and its purpose is to separate amalgam out of all waste water collected from dental treatment units.

If placed downstream of a combination suction unit (suchas the VS 1200 S), a pressure equalisation tank must be installed upstream the CA 4 amalgam separator. The waste water must flow without pressure. The waste water flow rate to the unit must be at least 0.1 l/min and must not exceed 16 l/min. Here, a separation efficiency of at least 95% is maintained for amalgam.

Water ring pumps must be equipped with a downstream air release vent; air must not be permitted to enter the CA 4 amalgam separator.

Downstream of separation units (such as the Sepamatic), a positive suction head of 150 mm must be maintained in order to prevent backflow.

Installation, servicing and repairs may only be performed by qualified personnel authorized by Dürr Dental.

The disposable amalgam containers must only be used once.

2.3 Improper use

Any other usage or usage beyond this scope is deemed to be improper. The manufacturer accepts no liability for damages resulting from this. In these cases the user/operator will bear the sole risk.

The CA4 amalgam separator must only be used to process liquids from the oral cavity and not for any other substances such as dust, sludge, plaster or the like.

Only chemicals and disinfectants that will not damage the materials, e.g. Orotol Plus or equivalent, may be used.

The max. water flow rate of 16 l/min must not be exceeded.

The unit must not be installed such that the outlet is higher than the waste water fitting on the unit. Do not use any risers. All pipes must have a downward gradient.

Not suitable for wet rooms! Do not allow flammable or explosive mixtures to enter the unit. Do not use the unit in a potentially explosive environment!

2.4 Systems, connection with other devices

Additional devices connected with medical electrical devices must be proven to conform with their corresponding IEC or ISO standards. All configurations must continue to comply with the standard requirements for medical systems (see IEC 60601-1-1 or section 16 of the 3rd edition of IEC 60601-1 respectively).

Whoever connects additional devices to medical electrical devices automatically becomes the system configurator and is responsible for ensuring that the system corresponds with the standard requirements for systems. Local laws take priority over the requirements outlined above.

2.5 General safety information

- When operating this device always observe all guidelines, laws, and other rules and regulations that are applicable at the site of operation.
- Prior to each use, check condition of the device and make sure it is in perfect working order.
- Do not convert or modify the units.
- Observe the Installation and Operating Instructions.
- Make the Installation and Operating Instructions available to the person operating the device at all times.

2.6 Qualified personnel

Operation

Persons who operate the units must ensure safe and correct handling based on their training and knowledge.

- Instruct or have every user instructed in handling the unit.

Installation and repairs

- Installation, readjustments, alterations, upgrades and repairs must be carried out by Dürr Dental or by qualified personnel specifically approved and authorized by Dürr Dental.

2.7 Protection from electric shock

- When working on the units observe all the relevant electrical safety regulations.
- Never touch the patient and unshielded plug connections on the device at the same time.
- Immediately replace any damaged lines and connections.

Observe the EMC rules concerning medical devices

- The appliance is designed for the use in health care establishments (in accordance with IEC 60601-1-2). If the appliance is operated in another environment, potential effects on electromagnetic compatibility must be taken into account.
- Do not operate the unit in the vicinity of HF surgical instruments or MRT equipment.
- Maintain a minimum distance of at least 30 cm between the unit and other electronic devices.
- Keep a minimum distance of 30 cm between the unit and mobile radio devices.
- Note that cable lengths and cable extensions have effects on electromagnetic compatibility.

NOTICE
Negative effects on the EMC due to non-authorised accessories

- Use only Dürr Dental parts or accessories specifically approved by Dürr Dental.
- If other accessories are used, note any negative consequences to the function of the unit.

NOTICE
Erroneous operation mode due to use immediately adjacent to other devices or with other stacked devices

- Do not stack the unit together with other devices.
- If this is unavoidable, note any potential impacts on the operation mode.

2.8 Only use genuine parts

- Only use Dürr Dental parts or accessories and special accessories specifically approved by Dürr Dental.
- Only use only genuine working parts and spare parts.

DÜRR MEDICAL accepts no liability for damages or injury resulting from the use of non-approved accessories or special accessories, or from the use of non-genuine working parts or spare parts.

The use of non-approved accessories, special accessories or non-genuine working parts / spare parts (e.g. mains cable) can have a negative effect in terms of electrical safety and EMC.

2.9 Transport

The original packaging provides optimum protection for the device during transport.

If required, original packaging for the unit can be ordered from Dürr Dental.

Dürr Dental does not accept any responsibility or liability for damage occurring during transport due to the use of incorrect packaging, even where the unit is still under guarantee.

- Only transport the device in its original packaging.
- Keep the packing materials out of the reach of children.

2.10 Disposal

The unit may be contaminated. Instruct the company disposing of the waste to take the relevant safety precautions.

- Decontaminate potentially contaminated parts before disposing of them.
- Uncontaminated parts (e.g. electronics, plastic and metal parts etc.) should be disposed of in accordance with the local waste disposal regulations.
- If you have any questions about the correct disposal of parts, please contact your dental trade supplier.

3 Overview

CA 4 amalgam separator

Model with 230 V / 1~, 50 Hz 7805-100-50
Model with 230 V / 1~, 50 Hz,
for installation in a PTS 7805-200-50
Model with 230 V / 1~, 60 Hz 7805-200-60

3.1 Scope of delivery

The following items are included in the scope of delivery (possible variations due to country-specific requirements and/or import regulations):

CA 4 amalgam separator . . . . . 7805-..

– amalgam separator
– Set of connection fittings
– Hose ø 20 mm
– Display panel
– Cable for display panel, 1 m
– Cable for display panel, 5 m
– Amalgam collecting container
– Tyscor Pulse software (CD)
– Installation and operating instructions
– Operating Handbook

3.2 Special accessories

The following optional items can be used with the device:

Noise reduction hood 7122200000
Rinsing unit II 7100-250-50
Cable for display panel, 3 m 9000-119-042
OroCup care system 0780-350-00
Adapter PCB for remote display . . 7805-993-00
Surge tank 7130-991-51
Wall bracket 7130-190-00
Console for floor-mounted
installation. 7130-191-00
Test set. 7805-064-00

3.3 Disposable materials

The following materials are consumed during operation of the device and must be ordered separately:

Disposable amalgam container . . . 7805-033-00
Orotol plus (2.5 litre bottle) CDS110P6150
MD 550 spittoon bowl cleaner
(750 ml bottle). CCS550C4500
MD 555 cleaner (2.5 litre bottle). CCS555C6150

3.4 Wear parts and spare parts

The following working parts need to be changed at regular intervals (refer to the "Maintenance" section):

Pump propeller 7805-100-20
Fluid sensor 7805-104-00E
Centrifugal drum 7805-100-10E
Nonreturn valve (pack of 3) 7128-100-03E

Information on spare parts can be found on the website portal for authorised specialist dealers under: www.duerrdental.net.

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4 Technical data

Electrical data		7805-100-50	7805-200-60
Voltage	V	230	230
Mains frequency	Hz	50	60
Rated power	W	210	260
Nominal current	A	1.0	1.2
Start-up current; approx.	A	4.5	5
Mains fuses *	A	16	
Type of protection		IP 21	
Protection class		I	
Over-voltage category		II	

* Line circuit breaker 16 A, characteristic B in accordance with EN 60898

Electrical data – electronics		
Switching performance signal output		
Max. voltage	V	24 AC/DC
Max. nominal current	mA	120
Signal input from the hose manifold	V	24 AC/DC

Media and connections		
Fluid volume		
min.	l/min	0.1
max.	l/min	16
Usable volume, disposable amalgam container	ccm	approx. 600
Replacement interval	Months	9 - 12
Dürr Connect inlet and outlet connection		Hose, 20 mm (inside)

General data			
Speed	rpm	2900	3470
Duty cycle	%	95 (S 5 min)	
Dimensions (H x W x D)	cm	41 x 25 x 30	
Weight	kg	10	
Noise level*			
without housing; approx.	dB(A)	55	66
with housing; approx.	dB(A)	46	57
Separation rate	%	≥ 95	99 **

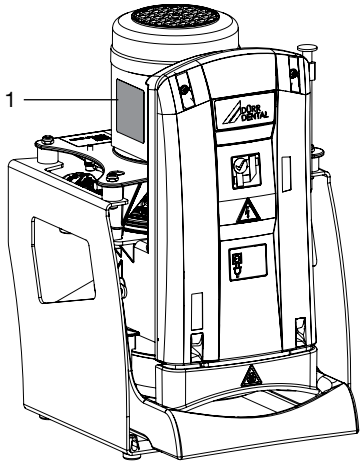
* Noise levels in acc. with EN ISO 1680 "airborne noise emissions"; measured in a sound-proofed room. Higher values may be obtained in rooms with reverberating sound characteristics.

** according to ISO 11143

Network connection		
LAN technology		Ethernet
Default		IEEE 802.3u
Data rate	Mbit/s	100
Connector		RJ45
Type of connection		Auto MDI-X
Cable type		≥ CAT5
Ambient conditions during storage and transport		
Temperature	°C	-10 to +60
Relative humidity	%	< 95
Ambient conditions during operation		
Temperature	°C	+10 to +40
Relative humidity	%	< 70
Classification		
Medical Devices Directive (93/42/EU)		Class I
Electromagnetic compatibility (EMC) Interference emission measurements		
High-frequency emissions in accordance with CISPR 11		Group 1 Class B
Harmonics in acc. with IEC 61000-3-2		Fulfilled
Voltage fluctuations/flickers in acc. with IEC 61000-3-3		Fulfilled
Electromagnetic compatibility (EMC) Interference immunity tests		
Static electricity discharge in accordance with IEC 61000-4-2		Fulfilled
Electrical fast transient/burst immunity test in accordance with IEC 61000-4-4		Fulfilled
Voltage surge in accordance with IEC 61000-4-5		Fulfilled
Voltage dips, short interruptions and voltage variations in accordance with IEC 61000-4-11		Fulfilled
Magnetic field for a supply frequency (50/60 Hz) in accordance with IEC 61000-4-8		Fulfilled
Conducted HF disturbance variables in accordance with IEC 61000-4-6		Fulfilled
Emitted HF disturbance variables in accordance with IEC 61000-4-3		Fulfilled

4.1 Type plate

The type plate can be found on the side of the amalgam separator motor.



1 Type plate

4.2 Conformity assessment

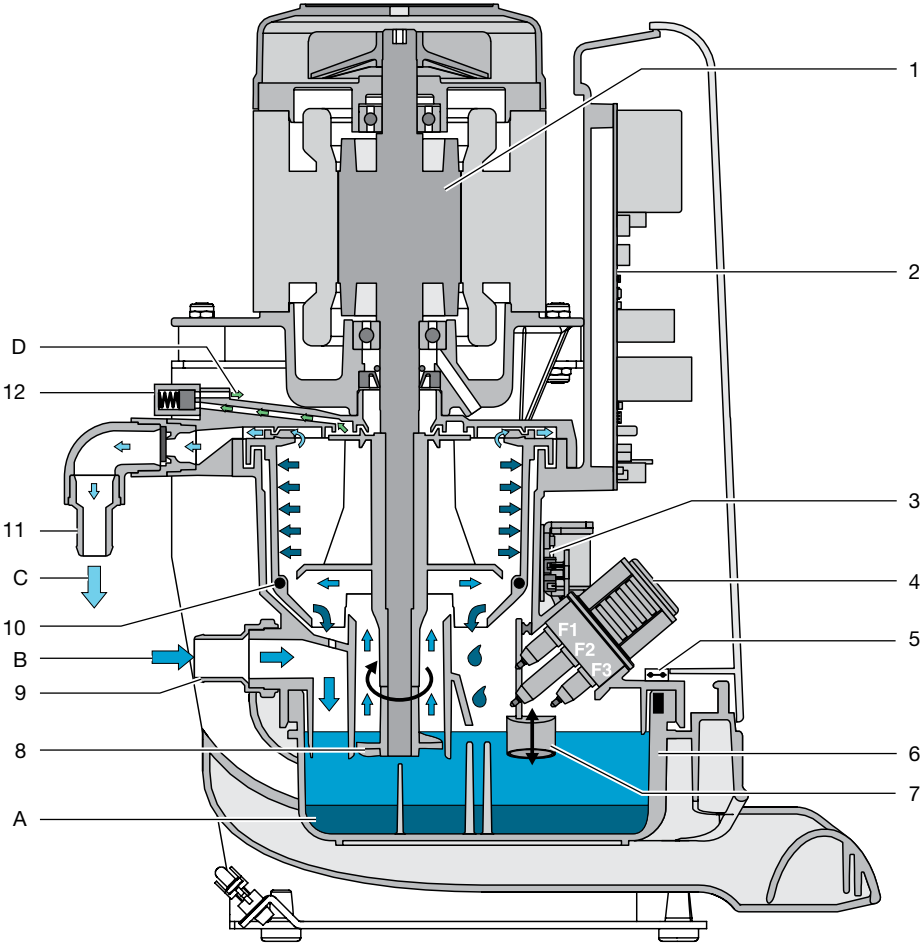
This device has been subjected to conformity acceptance testing in accordance with the current relevant European Union guidelines. This equipment conforms to all relevant requirements.

4.3 Approvals

Centre of Competence in Civil Engineering, Berlin	
Test number	Z-64.1-22

Separation method compliant with standard	
ISO 11143	Type 1

5 Operation



1 Motor
2 Electronics
3 Sediment PCB with sediment sensor and light barriers
4 Sensor block
F1 Emergency start sensor
F2 Reference sensor
F3 Water start sensor
5 Safety end switch on sediment PCB
6 Collecting container
7 Sediment sensor
8 Levelling pump
9 Inlet connecting piece
10 Magnets for RPM monitoring
11 Waste water outlet
12 Relief valve

A Amalgam sludge
B Fluid with amalgam
C Waste water, cleaned
D Vent

The amalgam separator works according to the centrifugal principle and is driven by an electromotor.

Each time the unit is supplied with power, the amalgam separator performs level measuring using the sediment sensor. The level detected then appears on the display panel. Where the power supply to the amalgam separator is not switched off (e.g. in hospitals), an integrated timer ensures that a sedimentation scan is carried out every 24 hours.

If the water sensor (conductivity sensor) is immersed in fluid when the amalgam separator is activated, the drive motor will start up first and the sedimentation scan will take place during the next idle phase.

If the fluids in the collecting container are not recognised by the sensors, the sensitivity of the sensors can be increased via the electronics.

Fluid from the treatment unit flow through directly into the amalgam collecting container via the water inflow. A coarse filter with a mesh of max. 3 mm must be fitted upstream of the amalgam separator (e.g. in the treatment unit). Coarse particles are immediately separated out in the amalgam collecting container. When the water start sensors are bridged by fluid, the drive motor, after an initial delay, starts the centrifugal drum and the levelling pump, which is also situated on the drive shaft. The level pump pumps the fluid from the amalgam collecting container to the centrifuge drum. The amalgam floating in the fluid will then be separated using centrifugal force.

If the water start sensor is unable to detect any fluids for approx. 30 seconds, the drive motor is switched off and the brake is applied. The gravity-induced rotation of the water ring rinses the particles separated from the centrifuge drum downwards towards the amalgam collecting container. After extremely short working phases, it is not necessary to brake the centrifugal drum. To ensure this, after the last braking phase a timer is set which prevents the braking stage from being carried out during the next few minutes.

Where there is a steady flow of fluids to the amalgam separator (e.g. if it is installed downstream of VS suction units or water ring pumps), a timer is used to briefly switch off, brake and then restart the drive motor every 15 minutes. This braking moment rinses the centrifuge drum clear. The separation rate is maintained here up to the max. nominal flow rate of 16 l/min.

If the amalgam separator is installed downstream of a VS suction unit, it can be started simultaneously with the suction unit using external start signal input.

The cover of the centrifuge housing is equipped with a solenoid valve. It remains open as long as the amalgam separator is ready for operation but closes in the event of a fault. This ensures sufficient air intake and venting of the amalgam separator during operation.If the water start sensor is defective, the amalgam separator will be monitored by another sensor (the emergency start sensor) and started. If the emergency start sensor is not pumped free within a set period of time, an LED will flash on the display panel and an audible signal will sound. This signal can be cancelled by pressing the service key. The amalgam separator is still operational. The flashing LED will switch off when the emergency start sensor is free again.

The amalgam separator is constantly monitored using the emergency start-up sensor and emits both an audible and an optical signal in the event of a motor breakdown, fault or blockage of the drainage outlet. The drive motor is switched off. It is possible to start the motor three more times using the service key. After that the motor will no longer be operational.

To restart it, the service key must be pressed for more than 2 seconds.

A hose empties the amalgam separator in the case of a fault, so that no water can escape when opening the amalgam collecting container.

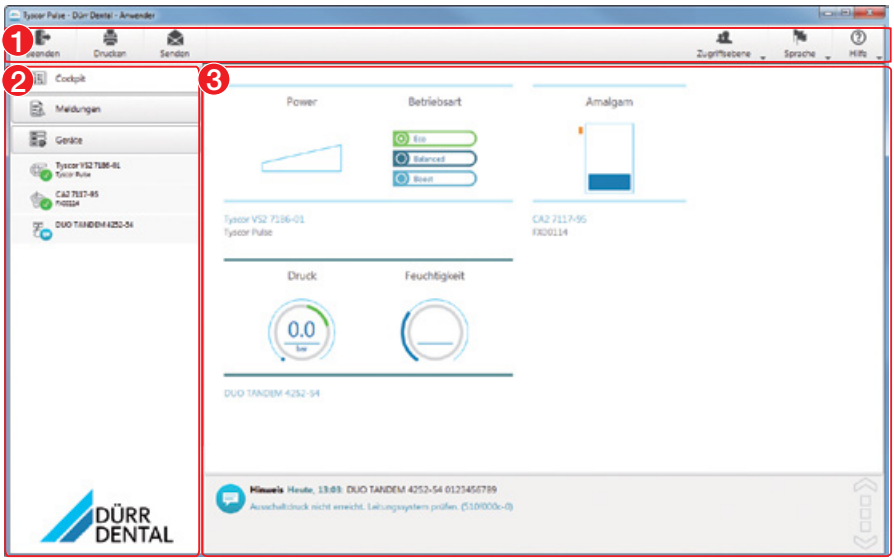
5.1 Tyscor Pulse (optional)

The software is connected via the network to the devices from Dürr Dental and displays the current status as well as messages and errors.

All messages are logged and can be printed or sent.

The ***cockpit*** shows the devices with the current characteristic data and provides a quick overview of the functional status of the devices.

The software interface consists of the menu bar, the side bar and the contents area.



1 Menu bar
2 Side bar
3 Contents area

The contents area depends on the tab selected on the side bar. The current messages are always displayed in the lower part of the contents area.

If there are several current messages, then the mouse wheel or the  or  buttons can be used to scroll through the messages.

The views and rights depend on the selected access level (Operator, Administrator or Service Technician).

While the software is running (even if the software window is closed), the access level is visible in the task bar (or Mac OS menu bar). The symbol shows the current status of the devices (see "13 Monitoring the device with Tyscor Pulse"). If a new message appears, a speech bubble tip also appears.

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6 Requirements

6.1 Installation/setup room

The room chosen for set up must fulfil the following requirements:

– Closed, dry, well-ventilated room.
– Installation in purpose built rooms, e.g. in boiler rooms, must be checked with local building regulations first.
– Ambient temperatures are compliant with "4 Technical data".

Ambient and environmental conditions must be taken into account. Do not operate the unit in damp or wet conditions.

NOTICE
Risk of overheating due to insufficient ventilation

The units generates heat. Possibility of heat damage and/or reduced service life of the unit.

› Do not cover the unit.
› Install a fan for auxiliary ventilation in rooms where ambient temperatures exceed ≥40 °C while the unit is in operation.

6.2 Setup options

The following options for setting up the unit are available:

– In a side room, in conjunction with a combination suction unit or in conjunction with a suction unit in a wet suction system with downstream separation.
– As a central amalgam separator in a dry suction system.
– In a ventilated cabinet (e.g. Power Tower) or noise reduction hood.
– Upright on a level surface.
– Mounted upright on a Dürr wall holder.
– Mounted upright on a Dürr console for floor-mounted installation.

6.3 Pipe materials

Only use vacuum-sealed HT-waste pipes manufactured from the following materials:

– Polypropylene (PP),
– Chlorinated polyvinyl chloride (PVC-C),
– Unplasticized polyvinyl chloride (PVC-U),
– Polyethylene (PE).

The following materials must not be used:

– Acrylonitrile-butadiene-styrene (ABS),
– Styrene copolymer blends (e.g. SAN + PVC).

6.4 Hose materials

For waste connections and suction lines only use the following hose types:

– Flexible spiral hoses made of PVC with integrated spiral or equivalent hoses
– Hoses that are resistant to dental disinfectants and chemicals

Plastic hoses will display signs of ageing over time. Therefore, they should be inspected regularly and replaced as necessary.

The following types of hoses must not be used:

– Rubber hoses
– Completely PVC hoses
– Hoses that are not sufficiently flexible

6.5 Pipe/hose installation

› Execute the on-site pipe installation in accordance with the applicable local regulations and standards.
› Lay the hose installation of the drains to or from the unit at a sufficient incline.

If incorrectly laid, the hoses can become blocked with sedimentation.

6.6 Information about electrical connections

› Ensure that electrical connections to the mains power supply are carried out in accordance with current valid national and local regulations and standards governing the installation of low voltage units in medical facilities.
› Install an all-pole disconnect switch with a contact opening width of at least 3 mm in the electrical connection to the mains power supply.
› Observe the current consumption of the devices that are to be connected.

The diameter of the connections depends on the current consumption, length of line and the ambient temperature of the unit. Information concerning the current consumption can be found in the Technical Data supplied with the particular unit to be connected.

The following table lists the minimum diameters of the connections in relation to the current consumption:

Current consumption of unit [A]	Cross-section [mm²]
> 10 and < 16	1.5
> 16 and < 25	2.5
> 25 and < 32	4
> 32 and < 40	6
> 40 and < 50	10
> 50 and < 63	16

6.7 Information about connecting cables

Mains supply cable

Installation type	Line layout (minimum requirements)
Fixed installation	– Plastic sheathed cable (e.g. type NYM-J)
Flexible	– PVC flexible line (e.g. H05 VV-F) or – Rubber connection (e.g. H05 RN-F or H05 RR-F)

Display panel

Installation type	Line layout (minimum requirements)
Fixed installation	– CAT5.e network cable
Flexible	– ISDN standard cable with connectors or – Network patch cable

Control cable

Installation type	Line layout (minimum requirements)
Fixed installation	– Shielded sheathed cable (e.g. (N)YM (St)-J)
Flexible	– PVC data cable with shielded cable sheathing, as used for telecommunications and IT processing systems (e.g. type LiYCY) or – Lightweight PVC control cable with shielded cable sheathing

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7 System components

7.1 Rinsing unit

For surgical procedures and for procedures using powder jet devices, a rinsing unit must in all cases be installed in the treatment unit. The rinsing unit provides a small amount of water during aspiration. This dilutes the aspirated fluids (blood, saliva, rinsing water, etc.), which can then be transported more effectively.

For further information, refer to the rinsing unit installation and operating instructions

7.2 Surge tank

If the suction unit is combined with an amalgam separator, this requires the installation of a surge tank. The surge tank reduces pressure peaks caused by the waste water pump of the suction unit and acts as a buffer against temporary rises in the volume of water.

The surge tank can also be used if the waste water is fed directly into the building waste water system. this case the waste water from the suction unit is diverted to the building drainage system under zero pressure.

8 Installation

WARNING
Infection due to contaminated unit
- Clean and disinfect the suction before working on the unit.
- Wear protective equipment when working (e. g. impermeable gloves, protective goggles and mouth and nose protection).

Prior to working on the device or in case of danger, disconnect it from the mains (e. g. pull the mains plug).

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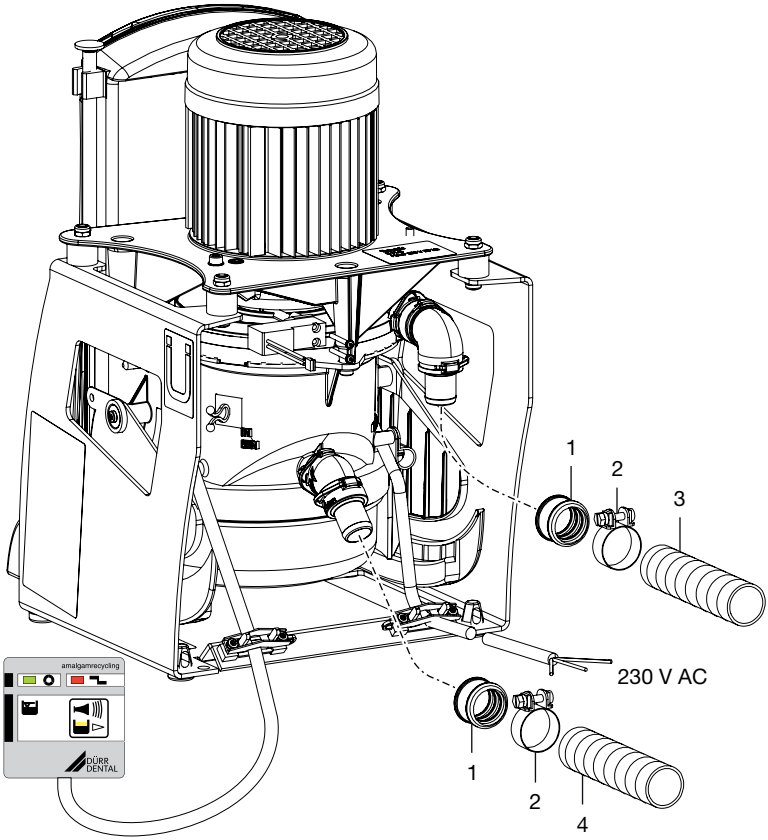
8.1 Connect the hoses and lay correctly

Install the hoses so they are as short as possible and with sufficient incline.
Downstream of separation units, a positive suction head of 150 mm must be maintained in order to prevent backflow.

- Cut the hoses to the required length.
- Screw hose sleeves onto the hose ends.
- Connect the hoses to the DürrConnect connections and secure them with hose clips.
- Connect the hoses on the inlet and outlet sides.



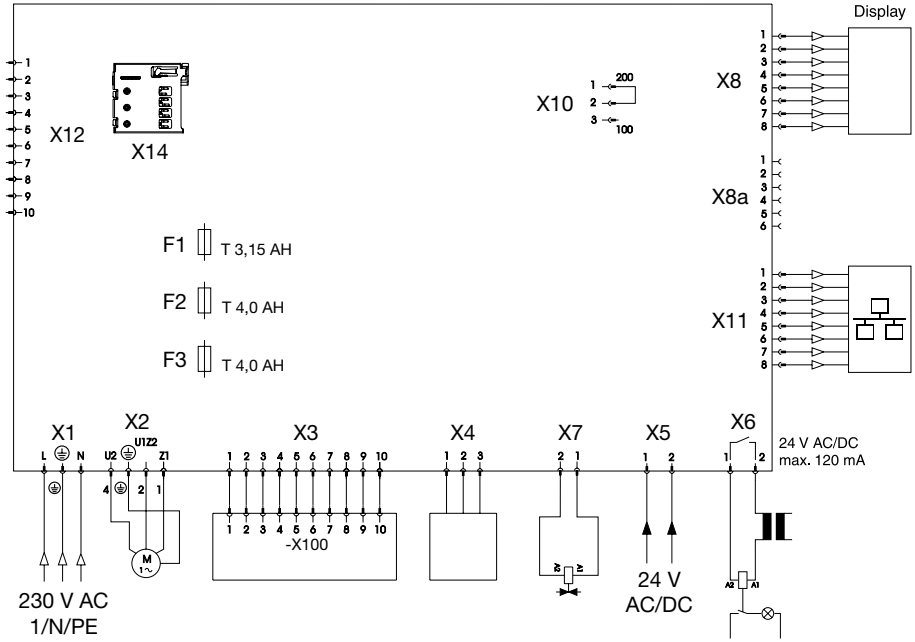
1 Hose sleeve

2 Hose clamp
3 Outlet hose ø 20 mm
4 Inlet hose ø 20 mm

8.2 Electrical connections

WARNING
Electric shock
› The device may only be connected to a supply system with a earthed power outlet.

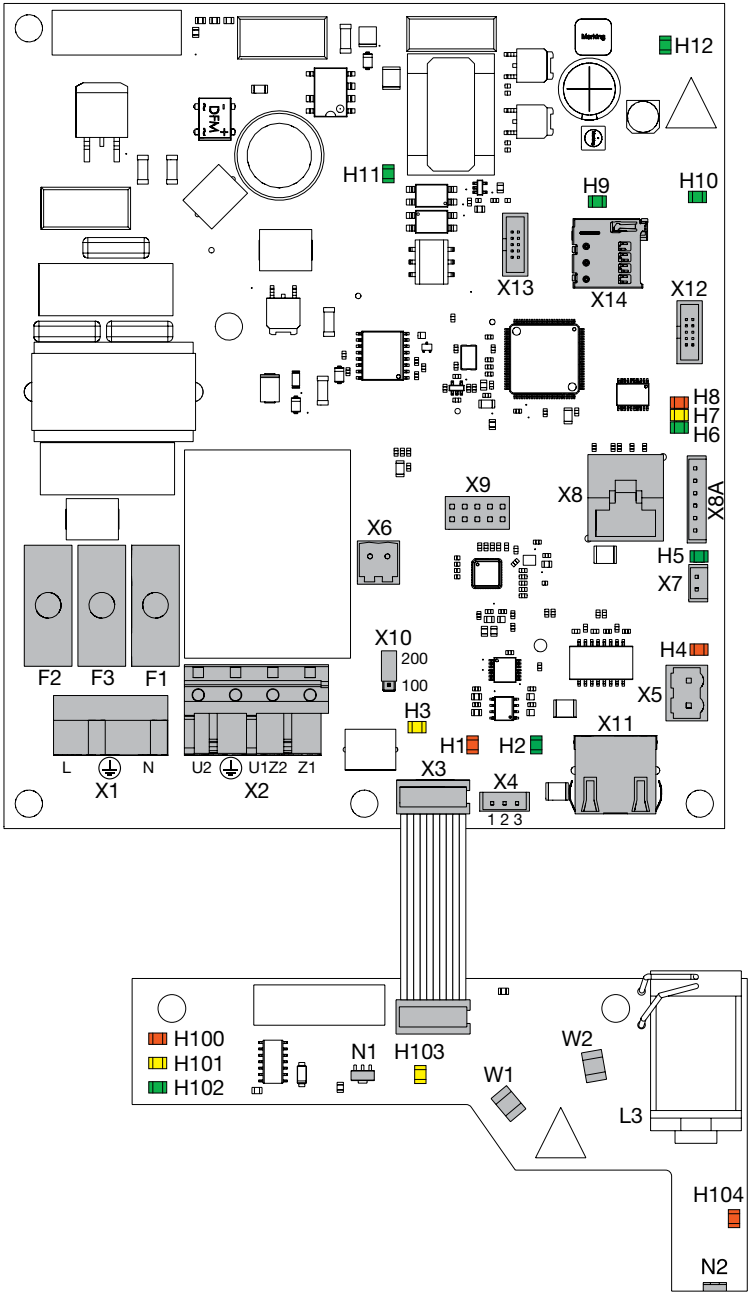
› Establish the electrical connection to the supply network (230 V).
– To a Dürr control box.
– Connected to a power outlet via the surgery's main power switch.
› Connection the display panel.
› Connect external start (optional).
› Connect external alarm (optional).
› Connect network (when using Tyscor Pulse).



X1 230 V AC power supply
X2 Motor connection
X3 Sensor system connection
X4.1 Emergency start sensor
X4.2 Reference sensor
X4.3 Water start sensor
X5 External start (optional input, protective low voltage 24V, AC/DC)
X6 External alarm (switching capacity max. 24V, 120mA, AC/DC)
X7 Relief valve connection
X8 Display panel connection (RJ45 connector)
X8a Display panel connection (6-pin connector)
X10 Sensitivity of the sensor conductance 100/200 µS
X11 100 Mbit network connection
X12 Diagnostic connector
X14 Micro SD card holder

F1 Fuse, brake, T 3.15 AH (IEC 60127-2)
F2 Fuse, T 4.0 AH (IEC 60127-2)
F3 Fuse, T 4.0 AH (IEC 60127-2)

8.3 Connections and displays of the control



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X1 230 V AC power supply
X2 Motor connection
X3 Sensor system connection
X4.1 Emergency start sensor
X4.2 Reference sensor
X4.3 Water start sensor
X5 External start (optional input, protective low voltage 24V, AC/DC)
X6 External alarm (switching capacity max. 24V, 120mA, AC/DC)
X7 Relief valve connection
X8 Display panel connection (RJ45 connector)
X8a Display panel connection (6-pin connector)
X9 Bus module
X10 Sensitivity of the sensor conductance 100/200 µS
X11 100 Mbit network connection (when using Tyscor Pulse)
X12 Diagnostic connector
X13 Programming connector (J link)
X14 Micro SD card holder for datalogger and update
F1 Fuse, brake, T 3.15 AH (IEC 60127-2)
F2 Fuse, T 4.0 AH (IEC 60127-2)
F3 Fuse, T 4.0 AH (IEC 60127-2)
H1 Emergency water start (red)
H2 Normal water start (green)
H3 Sediment coil (yellow)
H4 External start (red)
H5 Relief valve (green)
H6 Display panel (green)
H7 Display panel (yellow)
H8 Display panel (red)
H9-H12 Internal power supplies (green)
W1+2 Light barriers, sediment scan
N1 Hall sensor, RPM monitoring
N2 Hall sensor, collector monitoring
H100 100% fill level, W1+2 interrupted
H101 95% fill level, W1 interrupted
H102 Ready for operation, W1+2 free
H103 Indicator, motor rotation frequency
H104 Indicator, container monitoring

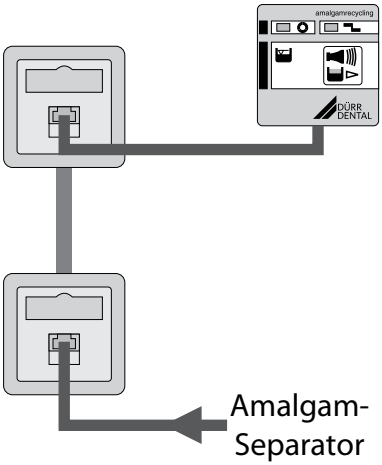
8.4 Display panel connection

New installation with network sockets

There must be a direct line connecting the RJ-45 socket on the unit and the RJ-45 socket on the display panel. Do not toggle network units (e. g. switch or router).

Pay attention to the resistance of the network cable between the RJ-45 sockets. The maximum length should not exceed 50 m.

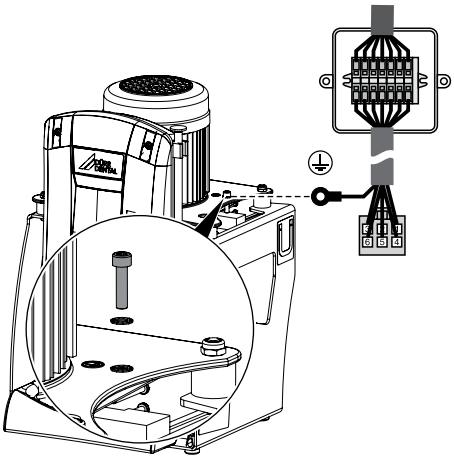
› Remove the cover from the electronics.
› Connect cable with RJ-45 socket to electronics (X8) and in RJ-45 socket.
› Fix the cable to the unit.
› Connect display panel and RJ-45 socket using the ISDN cable supplied.



Replacement of an existing amalgam separator

Where a model 7801 amalgam separator is being replaced by a CA 4 unit, the display panel can be connected using the adapter cable provided. The shielding of the existing display panel cable MUST always be reconnected.

› Connect the yellow adapter cable to X8a on the electronics.
› Connect the yellow adapter cable to the existing display cable.
› Connect the shielding of the display cable to the ground point on the motor carrier.
› Fasten the cable to the strain relief on the floor plate of the amalgam separator.



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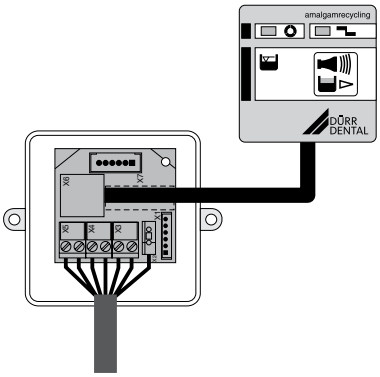
Replacement of large display panel with the new, smaller display panel

Where a model 7801 amalgam separator is being replaced by a CA 4 unit and the smaller display panel supplied is to be used, this can be connected with the help of an adapter PCB (7805-993-00).

› Disconnect the wiring of the large display panel in the terminal box and remove the terminal strip (note colour coding).
› Connect the existing display cable to the terminals of the adapter PCB.
  – Ground terminal X2
  – Screw terminals X3, X4, X5 (WH = white, YE = yellow, BU = blue, BN = brown, PK = pink, GY = grey)
› Insert the ISDN connecting cable of the display panel into connector X6 on the adapter PCB.
› Mount the display panel in a suitable position.



8.5 Network connection

All connected IT units must correspond to the currently-valid edition of IEC 60950.

Purpose of the network connection

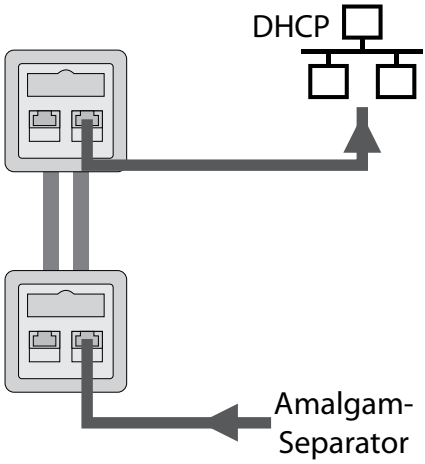
The network connection is used to exchange information or control signals between the unit and a software installed on a computer, in order to, e. g.:

– Display parameters
– Select operating modes
– Indicate messages and error situations
– Change unit settings
– Activate test functions
– Transmit data for archiving
– Provide documents concerning the units

Connecting the unit to the network

During initial installation, a router or server with DHCP is recommended so the unit is detected in the network.

› Remove the cover from the electronics.
› Plug the network cable into the electronics and into a network socket.
› Attach the network cable to the device.
› Create a connection to the network in the surgery with the network cable.



9 Commissioning and first start-up

In many countries technical medical products and electrical devices are subject to regular checks at set intervals. The owner must be instructed accordingly.

› Turn on the unit power switch or the main surgery switch.
› Carry out an electrical safety check in accordance with applicable local regulations (e.g. the German Ordinance on the Installation, Operation and Use of Medical Devices / Medizinprodukte-Betreiberverordnung) and record the results as appropriate, e.g. in the technical log book.
› Check that coarse filters are installed in the units upstream of the amalgam separator.
› Carry out a functional test.
› Check the unit and connections for leak tightness.
› Fill out the Operating Handbook.

In some countries the owner is required to keep an operating handbook. This operating handbook must document all maintenance work, service work, checks and amalgam disposal.

9.1 Monitoring the device with Tyscor Pulse

Combining devices safely

› Safety and essential performance features are independent of the network. The device is designed for operation independent of a network. However, some of the functions are not available in this case.
› Incorrect manual configuration can lead to significant network problems. The expert knowledge of a network administrator is required for configuration.
› The data connection utilizes part of the bandwidth of the network. Interactions with other medical devices cannot be completely excluded. Apply the IEC 80001-1 standard for risk assessment.
› The device is not suitable for direct connection to the public internet.

Network configuration

Various options are available for network configuration:

– Automatic configuration via DHCP (recommended).
– Automatic configuration via Auto-IP for direct connection of unit and computer.
– Manual configuration.

› Configure the network settings of the unit using the software or, if available, the touch screen.
› Check the firewall and release the ports, if applicable.

Further information on Tyscor Pulse can be found in the software help and in the Tyscor Pulse manual, order number 0949100001.

Network protocols and ports

Port	Purpose	Service
45123 UDP, 45124 UDP	Unit recognition and configuration	
1900 UDP	Service indicator	SSDP / UPnP
502 TCP, 8080[1)] TCP, 2005 TCP	Unit data	
514[1)] UDP	Event protocol data	Syslog
22 TCP, 23 TCP	Diagnosis	SSH, Telnet
123 UDP	Time	NTP
2006	Diagnosis	

[1)] The port can vary depending on the configuration.

The following requirements must be met in order to monitor the unit with the software on the computer:

– Unit connected to the network
– Software Tyscor Pulse (version 3.2 or higher) installed on computer

As the monitoring system of the device, the software must deliver acoustic signals. Audio output on the computer must be activated.

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Add device

Requirements:

– Unit switched on and connected to the network
– Administrator or service technician access level selected in the software

› Working in the menu bar, click on *Device Manager*.

The list of units appears. A symbol displays the connection status to the software:

The device is present in the network and connected to the software.

The device is present in the network but not connected to the software.

The network connection between the software and the device is interrupted, e.g. the device is switched off.

The new unit that is not yet connected, is displayed with the connection status .

› Select the unit and click on .

The unit appears in the side bar.

Adding the device in the cockpit

All devices that are connected to the software can be added to the cockpit. When the unit is first connected to the software, the unit is automatically added to the cockpit.

Requirements:

– Administrator or Service Technician access level selected.

› Click on the device in the device list with the left mouse button and keep the mouse button pressed.

› With the mouse key pressed, drag the unit onto the cockpit.

› Release the mouse key.

The block with the current characteristic data and the name of the device appear in the cockpit.

› To change the position of the device block, click on the block and, with the mouse key pressed, drag it to the required location.

Manually starting the device

Manually starting the device for testing.

Requirements:

– Service technician access level selected.

› Select the device in the device list.

› Click on the Start button with the left mouse key; on some devices you will need to keep it pressed.

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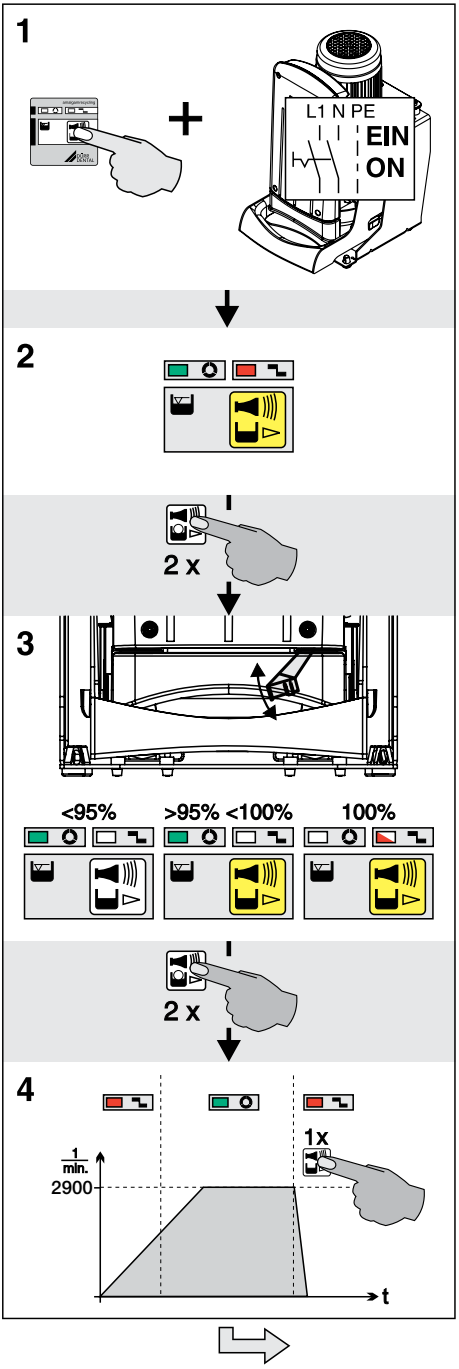
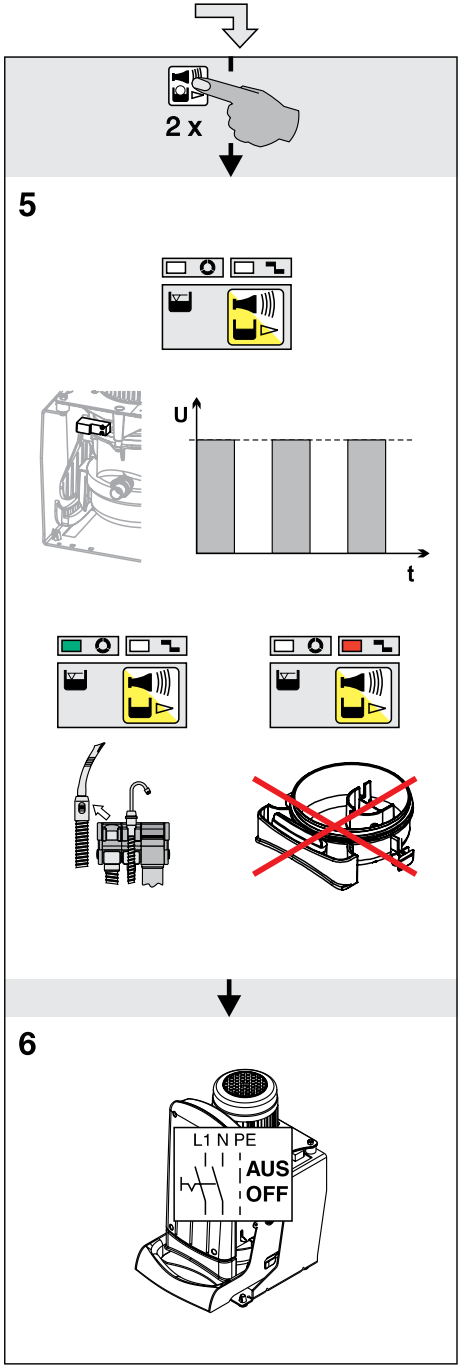
10 Service program





11 Description of the service program

Wear protective equipment to avoid any risk of infection (e.g. liquid-tight protective gloves, protective goggles, face mask).

The various unit functions can be checked with the aid of the service program.

The individual program steps are:

– Display test
– Sediment level measurement
– Motor start and motor braking with rpm check
– Input and output signals

Function of the service key:

– By pressing the service key twice the next individual program step is called up.
– By pressing the service key once that program step is repeated.

A press of the service key is confirmed by an audible signal.

11.1 Service program ON/OFF

On

– Press the service key and switch on the voltage supply to the unit.
– As soon as a signal melody can be heard, release the service key.
  The green, yellow and orange LEDs on the display panel light up (display test) and the service program is activated.

Off

Switch off the main supply to the unit.

11.2 Display test

The display test is activated as soon as the service program is started.
The LEDs on the display panel are checked. All three LEDs must come on. There is also an audible signal, which can be switched off by pressing the service button.

11.3 Sediment level measurement

While the service program is activated, the safety check for the collector vessel is deactivated.

The sediment level measurement can be used to check the function of the sediment sensor and the function of the LEDs.

Every time the service key is pressed, the sediment level is checked. Lifting the sediment level check wire strip allows the simulation of various sediment levels. The various fill levels are shown by LEDs H100 - H102 on the sediment measuring PCB (main board):

H100 = 100% fill level

H101 = >95% fill level

H102 = <95% fill level

Check:

– Lift the wire strap on the sediment scanner until H100 illuminates (red LED = 100% fill level). Hold onto the wire strap.
– Press the service key on the display panel.
– Wait briefly until the appropriate LED illuminates on the display panel.
– Repeat procedure with H101 and H102.

11.4 Motor start - motor braking

The drive motor starts and is then braked approx. 30 seconds. If the service key is pressed within this time period, the motor will be braked immediately.

This procedure can be repeated by pressing the service key 1x again.

The drive motor starts up.

As a result of the rpm monitoring, the LED will change from orange to green upon start-up and from green to orange upon braking.

11.5 Input and output signals

– After activating the program point, the yellow LED on the display panel flashes. In addition, H5 and H7 will flash on the main PCB.
– A cycled DC voltage (approx. 22-30 V) can be measured on the ventilation solenoid valve connection (X7).
– If the collecting container is opened, the red LED on the display panel lights up, as do H8 on the main board and H104 on the sedimentation scan PCB.
– If voltage is applied to connector X5 (external start), the green LED on the display panel lights up together with H4 and H6 on the main PCB.

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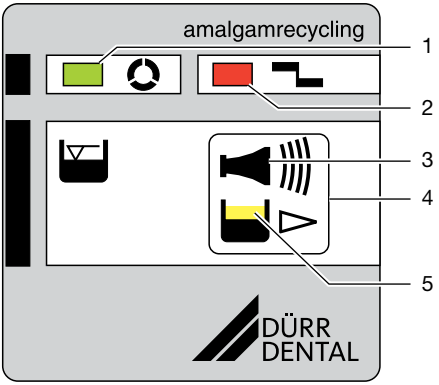
12 Display/handling



1 GREEN LED
2 RED display
3 Audible signal/melody
4 Reset/service key
5 YELLOW LED

12.1 Ready for operation

GREEN LED illuminates

12.2 Amalgam collector vessel is 95% full

Yellow LED is on

GREEN LED illuminates

Audible signal melody sounds

– At a fill level of 95%, the signal melody can be switched off by pressing the reset button. The device is then ready for operation again.
– The yellow LED comes on as a reminder that the amalgam collector vessel is due to be changed. The level display is repeated every time the unit is switched on at the main power switch.

We recommend changing the amalgam collector vessel when it reaches 95% full.

12.3 Amalgam collector vessel is 100% full

Yellow LED is on

Red display flashes

Audible signal melody sounds

– At a fill level of 100% the signal melody can no longer be switched off by pressing the reset button.
– The collector vessel needs to be replaced.

Wear protective equipment to avoid any risk of infection (e.g. liquid-tight protective gloves, protective goggles, face mask).

– The separator will not be ready for operation again until the amalgam collector vessel has been replaced

12.4 Amalgam collector vessel not in position

Red display flashes

Audible signal

– Press the reset button briefly to switch off the audible signal.
– Switch off the device.
– Insert the collector vessel.
– Switch on the unit.
– Green LED lights up – "Ready for operation“

If this error message occurs when the collector vessel is correctly inserted, this indicates that there is a technical defect – inform your Service Technician.

12.5 Motor fault

Red display and

green LED flash alternately

Audible signal

Occurs during the start-up of the amalgam separator.

– Press the reset button briefly to switch off the audible signal.
– If the reset button is pressed for longer than 2 seconds the unit can be restarted.

If this problem happens again on the same day, the amalgam separator will no longer be operational - notify the service technician.

12.6 Brake monitoring

Red display and

green LED flash alternately

Occurs upon braking action of amalgam separator.

– The amalgam separator is still operational.

If this problem occurs on several consecutive days, the braking must be checked by a service technician.

12.7 Emergency start sensor in overfill position

Yellow LED flashes

GREEN LED illuminates

– The yellow LED extinguishes when the emergency start sensor is free again.

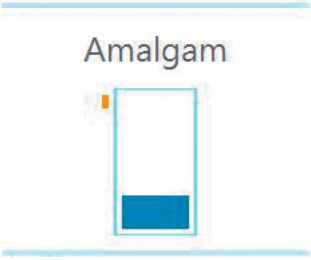
If the yellow LED flashes for a prolonged period, check whether any foam is present in the collecting container.

13 Monitoring the device with Tyscor Pulse

As the monitoring system of the device, the software must deliver acoustic signals. Audio output on the computer must be activated.

13.1 Monitoring operation

The device must have been added to the cockpit for the graphical device block to be shown in the cockpit.



The following is shown in the appliance block of the amalgam separator:
– Fill levels in the collector vessel

13.2 Querying messages

Trouble-free operation

Fault
Operation of the device interrupted

Warning
Operation of the device restricted

Note
Important information about the device

Information

Establishing a connection to the device

Connection to the device interrupted

If a message occurs for an device, the symbol next to the device in the side bar changes. The message appears in the cockpit and in the device details.

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If several messages occur, the symbol of the highest message level in each case is displayed.

As soon as a message concerning a device occurs, the symbol in the task bar (or Mac OS menu bar) also changes to the relevant message symbol. If required by the message an acoustic signal also sounds.

› To query the message details, switch to the cockpit or to the device.

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13.3 Creating a report

You can print out a current report or sent it via e-mail.
The report contains all messages and a screenshot of the view that is displayed when the report is created.

14 Disinfection and cleaning

NOTICE
Device malfunctions or damage due to use of incorrect media
Guarantee claims may become invalid as a result.
› Do not use any foaming agents, e.g. household cleaning agents or instrument disinfection agents.
› Do not use abrasive cleaners.
› Do not use agents containing chlorine.
› Do not use any solvents like acetone.

14.1 After every treatment

› Aspirate a glass of cold water through the large and the small suction hoses. Do this even if only the small suction hose was actually used during treatment.

Suction through the large suction hose causes a large amount of air to be drawn up, thereby considerably increasing the cleaning effect.

14.2 Daily after the end of treatment

After higher workloads before the midday break and in the evening

The following are required for disinfection/cleaning:
– Material-compatible, non-foaming disinfection/cleaning agents with Dürr Dental approval, e. g. Orotol plus.
– Unit care system, e.g. OroCup
› To pre-clean, suck up 2 litres of water with the care system.
› Aspirate the disinfection/cleaning agent with the care system.

14.3 Once or twice a week before the midday break

Under harsher conditions (e.g. hard water or frequent use of prophylaxis powders) 1x daily before the midday break

The following are required for cleaning:

– Material-compatible, non-foaming special cleaning agents that have been approved by Dürr Dental, e.g. MD 555 Cleaner
– Unit care system, e.g. OroCup

› To pre-clean, suck up 2 litres of water with the care system.
› Aspirate the cleaning agent with the care system.
› Rinse with ca. 2 l water after the application time.

15 Replace the amalgam collector vessel

WARNING
Risk of contamination if the amalgam collector vessel is reused since the collector vessel is not water-tight.
› Do not use the collector vessel more than once (disposable item).

Wear protective equipment to avoid any risk of infection (e.g. liquid-tight protective gloves, protective goggles, face mask).

We strongly recommend that the amalgam collector vessel should only be changed in the morning before the start of work. This will prevent fluid from dripping out of the drum while it is being changed.

› Disconnect all power from the device.
› Remove the full amalgam collecting container and from the device.
› Pour disinfectant for suction units (e.g. Orotol plus, 30 ml) into the full amalgam collector vessel.
› Close and secure the full amalgam collector vessel using the cap. Observe the markings on the cap and on the collector vessel.
› Place the securely closed amalgam collector vessel into its original packaging and seal.
› Insert a new amalgam collector vessel in the unit and clamp it in position. Only use original amalgam collector vessels.
› Switch on the power supply. The device is ready for operation again.

15.1 Disposal of amalgam collecting container

The contents of the amalgam collecting container are contaminated with heavy metals and must not be disposed of as household waste or the environment.

– Collection and waste disposal by a waste management company specialised in surgery waste.
– Collection and waste disposal by an approved waste management company.

16 Maintenance

All maintenance work must be performed by a qualified expert or by one of our Service Technicians.

Prior to working on the device or in case of danger, disconnect it from the mains (e. g. pull the mains plug).

WARNING
Infection due to contaminated unit
- Clean and disinfect the suction before working on the unit.
- Wear protective equipment when working (e. g. impermeable gloves, protective goggles and mouth and nose protection).

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Maintenance interval	Maintenance work
Dependent upon the level of usage of the device	› Replace the amalgam collecting container when a fill level of 95% or 100% is indicated on the display panel **Notes concerning prophy powders:** The amalgam separator is not functionally affected by conventional prophy powders. Under certain circumstances however, increased soiling of lines and hoses and a more frequent changing of the amalgam collecting container can be expected.
Annually	› Cleaning of the suction unit in accordance with the operating instructions. › Check the fluid sensors for soiling and clean if necessary. * › Check the inlet and outlet hoses for signs of deposits/blockage or cracks and replace where necessary. * › Check the pump propeller for damage and replace if necessary. * › Check the nonreturn valve and replace if necessary. *
Every 3 years	› Replace the fluid sensor. *
Every 5 years	› Check that the centrifugal drum is seated tightly on the shaft, check for soiling and replace if necessary. *

* Only by customer services service technicians.

16.1 Tests

WARNING
Infection due to contaminated unit
› Clean and disinfect the suction before working on the unit.
› Wear protective equipment when working (e. g. impermeable gloves, protective goggles and mouth and nose protection).

In some countries the owner is required to keep an operating handbook. This operating handbook must document all maintenance work, service work, checks and amalgam disposal.

Annual inspection
This inspection should only be carried out by suitably trained staff.

Work steps to be performed:
› General functional check (e.g. aspiration, spittoon inlet)
› During the sediment fill level measurement, visually inspect the operability of the sediment sensor.
› Service program

Tyscor Pulse (optional)
This test should be performed as an additional test if the device is monitored with Tyscor Pulse.
Requirements for the test:
– Device connected to the network.
– Tyscor Pulse has been started.

Work steps to be performed:
› Check whether any messages are displayed on the PC monitor.
› Check the acoustic signal.

Inspection of the general operating condition every 5 years
This inspection must be carried out every 5 years (in accordance with the German Waste Water Regulations, Annex 50, Dental Treatment) by an inspector in accordance with national regulations.
For inspection, the following are required:
– Empty collecting container
– Measuring beaker

Work steps to be performed:
› Fill the collecting container with water (min. 900 ml) and insert it into the unit.
› Start the device and wait until it switches off again.
› Once the device has switched off, remove the collector vessel and measure the remaining amount of water.

The unit is working correctly if:
– There is at least 610 ml left in the amalgam collecting container.
If there is less fluid, clean the centrifuge drum or check the operation of the unit.

EN

17 Tips for operators and service technicians

Any repairs above and beyond routine maintenance must only be carried out by suitably qualified personnel or by one of our service technicians.

WARNING
Infection due to contaminated unit
- Clean and disinfect the suction before working on the unit.
- Wear protective equipment when working (e. g. impermeable gloves, protective goggles and mouth and nose protection).

Prior to working on the device or in case of danger, disconnect it from the mains (e. g. pull the mains plug).

Fault	Probable cause	Solution
Device does not start	No mains voltage	› Check the mains supply voltage. * › Check the fuses and replace if necessary. *
	Undervoltage	› Measure the supply voltage; call an electrician if necessary. *
	Control electronics defective	› Replace the electronics. *
Device not "ready for operation" **No display on the display panel.**	The main power switch of the treatment unit or surgery is not switched on	› Main power switch ON.
	If an external display panel is fitted: cable not correctly connected	› Check cable connections. *
	Fuses have tripped	› Replace the fuses on the control PCB. *
Unit does not start when fluid enters it	Fluid is not detected by sensors (occurs mainly if water is very soft)	› Adjust the sensitivity of the sensors (connector X10) * or add approximately 20-30 ml of Orotol or other similar disinfectant to improve the conductance of the fluid in the collecting container.
The unit does not switch off	Start signal from sensor, e.g. due to soiling	› Clean sensor. *
	Fluid in the collecting container is not pumped out	› Check that the pump propeller is seated tightly and look for signs of damage. Replace if necessary. *

Fault	Probable cause	Solution
Water escapes from the relief valve when the unit is switched on	The unit is flooded by water from the outlet	› Check that the outlet has sufficient incline and is not blocked. *
	The unit is flooded by water from the suction unit	› Check the suction unit for leakage. *
Display panel working improperly or not at all	Terminals swapped	› Check the terminal assignment and connect correctly. *
	Cable too long (line resistance too high)	› Replace the existing cable with one of greater cross-section. *

* Only by customer services service technicians.

18 Transporting the unit

WARNING
Infection due to contaminated unit
› Disinfect the unit before transport.
› Close all media connections.

Wear protective equipment to avoid any risk of infection (e.g. liquid-tight protective gloves, protective goggles, face mask).

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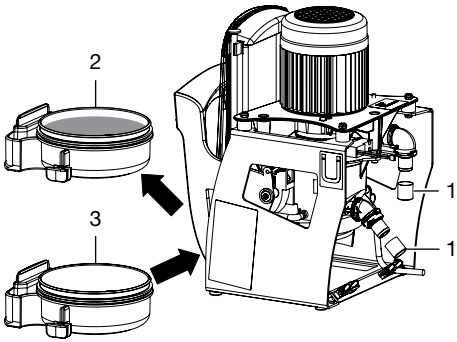
› Before disassembly, clean and disinfect the suction unit and the unit using a suitable disinfectant approved by Dürr Dental.
› Disinfect a defective unit using a suitable surface disinfection agent.
› Seal all connections with sealing caps.
› Pack the unit securely in preparation for transport.

18.1 Close CA 4



1 Sealing cap (order no. 9000-412-98)
2 Filled collecting container
3 Empty collecting container

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