Tyscor VS 2 central combination suction unit

EN

Installation and Operating Instructions

CE 0124

7186100001L02

DÜRR DENTAL

1406V002

Contents

Important information

Product description

Mounting

Usage

EN

EN

Trouble-shooting

Annex

Important information

EN

1 Documentation

These Installation and Operating Instructions form an integral part of the unit. They conform to the relevant version of the equipment and the status of technology valid at the time of first operation.

Dürr Dental cannot guarantee smooth operation and safe function of the unit and will not accept any liability where the instructions and notes contained in these installation and operating instructions are not strictly observed.

This translation has been carried out in all good faith. The original German version is decisive. Dürr Dental accepts no liability for incorrect translation.

1.1 Warnings and symbols

Warnings

The warnings in this document are there to point out possible injury to persons or damage to machinery.

The following warning symbols are used:


General warning symbol


Warning - dangerous electrical voltage


Warning - the unit starts up automatically


Biohazard warning

The warnings are structured as follows:


SIGNAL WORD

Description of type and source of danger

Possible consequences of ignoring the safety warning here

- Measures to be taken to avoid any possible danger.

The signal word differentiates between different levels of danger:

– **DANGER**
  High risk of danger of serious injury or death
– **WARNING**
  Possible risk of danger of serious injury or death
– **CAUTION**
  Risk of danger of minor injuries
– **NOTICE**
  Risk of serious damage

Further symbols

These symbols are used within the documentation and on the unit itself:


Notes, e.g. special instructions concerning economical use of the unit.


Heed accompanying electronic documents.


Monitor ambient conditions


Date of manufacture


Switch off the appliance (i. e. unplug and disconnect from mains).


Wear protective gloves

1.2 Notes on copyright

All circuits, processes, names, software and appliances quoted are protected under industrial property rights.

Any reprinting of the technical documentation, in whole or in part, is subject to prior approval of Dürr Dental being given in writing.

2 Safety

Dürr Dental has designed and constructed this appliance so that when used correctly there is no danger to people or property. Nevertheless, there are residual risks. Please follow the instructions below carefully.

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2.1 Correct use

The unit is designed to provide vacuum pressure in order to aspirate saliva, rinsing water and other fluids which are present during dental treatment and to transport these into the waste water system.

This unit is also technically suitable for the aspiration nitrous oxide (laughing gas). When designing a system that will also aspirate nitrous oxide ensure that the other components in the system are also suitable for this purpose. Those responsible for setting up the system must assess this and to approve and release the system for the aspiration of nitrous oxide.

Operating in combination with nitrous oxide is only permitted when the exhaust air is transported to the outside of the building.

2.2 Incorrect use

Any use of this appliance above and beyond that specifically described in these instructions will be deemed to be as not according to the intended use. The manufacturer cannot be held liable for any damage resulting from incorrect usage. The user bears all risks.

- Do not use this appliance to aspirate inflammable or explosive gas mixtures.
- The unit must not be used as a vacuum cleaner.

2.3 General safety notes

- Before using the appliance observe any and all guidelines, laws, regulations and other restrictions which may apply to the appliance.
- Before each use check the function and condition of the appliance.
- Do not convert or change the appliance in any way.
- Observe the Installation and Operating Instructions precisely.
- Keep the Installation and Operating Instructions in an accessible place so that the operator has instant access to them.

2.4 Safe connection of appliance

Danger can arise when connecting units with each other or to parts of the system (e.g. through discharge current).

- Only connect units when there can be no question of danger to operator or to patient.
- Only connect units when there can be no environmental impairment through such interconnection.
- When it is not clear from the unit data sheets that such connection will cause no danger, then a qualified expert should be consulted to ensure no danger (e.g. one of the product manufacturers).

During development and construction of the unit care has been taken to incorporate all requirements of medical products as far as was possible. As a result this appliance is suitable for installation within medical supply equipment.

- Observe the requirements under directive 93/42 EWG as well as all relevant standards when fitting into medical facilities.

A master copy of the system manufacturer‘s declaration according to Article 12 of Directive 93/42/EWG can be found in our download section under www.duerr.de (Document No. 9000-461-264).

2.5 Qualified personnel

Instructions for use

Persons who operate the appliance must, on the basis of their training and knowledge, ensure safe and correct handling of the appliance.

- Ensure personnel are trained in the correct usage of the appliance.

Installation and repair

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

2.6 Protection against electrical current

- When working on and with the appliance always observe the local electrical safety procedures.
- Never come into contact with patients and open plug-in connections on the appliance at the same time.
- Damaged supply lines and connections must be replaced immediately.

Observe guidelines for electro-magnetic compatibility for medical devices

- Heed special precautionary measures with regard to electromagnetic comparability (EMC) for medical products, see "16 Information on EMC according to EN 60601-1-2".

2.7 Only use original parts

- Only use accessories and special accessories stipulated or approved by Dürr Dental.
- Only use original working parts and spare parts.

Dürr Dental accepts no liability for damage or injury caused by the use of accessories, special accessories or parts other than original working parts and spare parts which were not specifically approved by the manufacturer.

2.8 Transport

WARNING

Infection from contaminated unit

- Disinfect the unit before transport.
- Close all media connections.

The original packaging offers the optimum protection for the appliance during transport.

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

Dürr Dental cannot accept any liability for damage caused during transport by the use of unsuitable packaging, this is also valid during the warranty term.

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

2.9 Disposal

The unit may still be contaminated. Inform the waste management company so that they can take all necessary safety steps.

- Non-contaminated parts (e.g. electronics, plastic and metal parts etc.) should be disposed of according to all valid waste disposal regulations.
- If you have any questions concerning the correct disposal of parts please contact your dental trade supplier.

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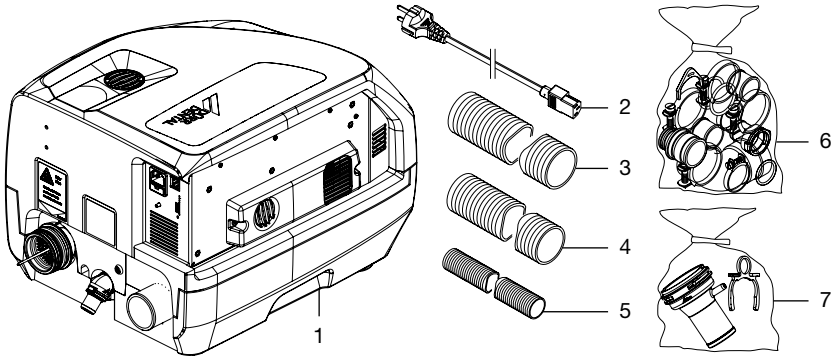
3 Overview



1 Tyscor VS 2 suction unit
2 Mains cable with local mains plug
3 Hose LW 50
4 Hose LW 40
5 Waste hose LW 20
6 Set of connector parts
7 Hose connection kit

3.1 Delivery Contents

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

Tyscor VS 2. . . . . 7186-01/. . .

– Suction unit with 230 V, 1~, 50/60 Hz
– Set of connector parts
– Hose connection kit
– Waste hose LW 20
– Hose LW 50 (0.6 m)
– Hose LW 40 (1.5 m)
– OroCup
– Tyscor Pulse software (CD)
– Quick start instructions

3.2 Special accessories

The following items can be optionally used with the appliance:

Surge tank 7130-991-00
Wall mounting 7130-190-00
Exhaust air filter 0705-991-53
Exhaust air noise reducer 0730-991-00
Rinsing unit 7100-260-00
Flow accelerator 7560-992-00
Screed frame for flow accelerator . 7560-993-00

3.3 Disposable materials

The following materials are used when operating the appliance and must be ordered separately:

Orotol plus
4 x 2.5-liter bottles/cartons CDS110P6150
MD 555 special suction unit cleaner
4 x 2.5-liter bottles/cartons CCS555C6150

3.4 Working parts and spare parts

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

4 Technical data

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Electrical data		
Nominal voltage	V	230 / 1~
Electrical frequency	Hz	50 - 60
Nominal current	A	3,3
Rated power	kW	0,7
Appliance fuse	A	2 x T 4.0 AH / 250 V~ (IEC 60127-2)
Type of protection		IP 21
Protection class		I

Connections		
Vacuum connection (external)	mm	∅ 40
Exhaust air connection (external)	mm	∅ 50
Waste connections (DürrConnect)	mm	∅ 20

Media		
Max. flow rate with free passage	l/min	900
Max. suction system pressure	mbar / hPa	-160
Max. flow rate	l/min	10
Max. suction height	cm	60

Electromagnetic compatibility (EMC)*		
HF-Emissions as per CISPR 11		Group 1 Class B
Harmonics according to IEC 61000-3-2		Class A
Voltage fluctuations/flicker according to IEC 61000-3-3		Conforms completely

*See also "16 Information on EMC according to EN 60601-1-2"

General data		
Max. radial compressor speed (n_v).	rpm	22000
Separation step speed (n_s)	rpm	2850 / 3250
Duty cycle	%	100
Dimensions (W x H x D)	cm	32 x 35 x 43
Weight	kg	11
Noise level* approx.	dB(A)	58
Medical product (class)		IIa

* Noise levels according to EN ISO 1680 Noise emissions; measured in a sound-proofed room. The levels are average values with a tolerance of ±1.5 dB(A). In rooms with poor soundproofing characteristics, higher values may be obtained.

Ambient conditions during storage and transport		
Temperature	°C	-10 to +60
Rel. humidity	%	< 95

Ambient conditions during operation		
Temperatur	°C	+10 to +40
Rel. humidity	%	< 70

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4.1 Model identification plate

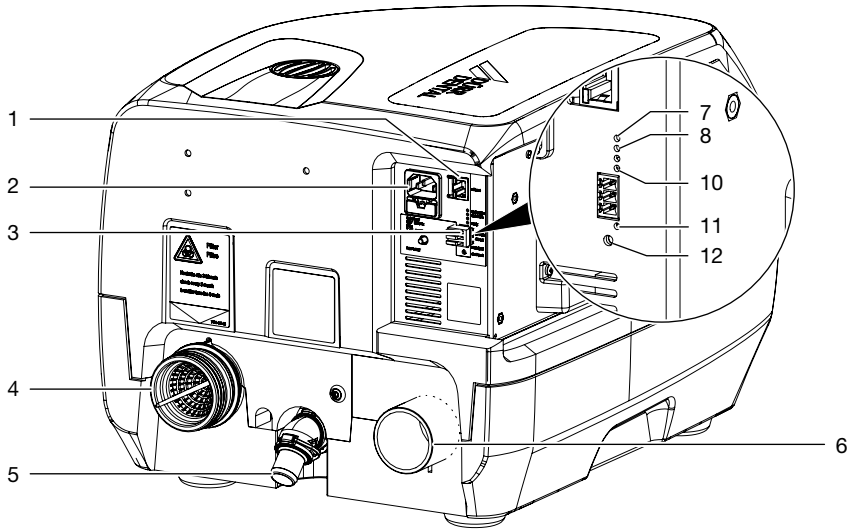
The model identification plate can be found on the upper part of the housing.

REF Order number/Model number
SN Serial number

4.2 Note on Conformity

This appliance has been tested according to the relevant directive of the European Union and the required conformity acceptance procedure. This appliance meets all the necessary requirements.

5 Function



1 Network connection
2 Mains connection with fusing
3 Control connection
4 Inlet connection with protective coarse filter
5 Waste water connection
6 Exhaust air connection
7 Red LED - Radial compressor fault
8 Red LED - Separation system fault
10 Green LED - Ready
11 Blue LED - Start signal
12 Start key

The VS suction unit is used in "wet" suction systems. The unit comprises a radial compressor and a separation system. The radial compressor and the separation system are each driven by their own motor.

5.1 Separation system

In the separation system the aspirated fluids and the solid particles are separated from the compressed air. The separation system functions in two steps. It consists of a cyclone separator and a separation turbine. The suction operation functions continuously.

Step 1:

The mixture drawn in consisting of fluids, solid particles and air passes through the inlet connection into the suction unit. The coarse filter serves to hold the solid particles back. The rest of the mixture passes to the cyclone separator and is set into a spiral motion. In this first step the centrifugal forces generated cause the fluid and smaller particles remaining to be thrown against the outside wall of the separation chamber of the cyclone separator. This initially creates a coarse separation of the fluid waste.

Step 2:

The subsequent second step comprises a separation turbine. It is in the separation turbine that fine separation takes place, whereby the remaining fluid is separated.

The waste water pump in the separation system feeds the fluid together with the finer solid particles through the waste water system connection into the central waste water network.

5.2 Radial compressor

The air, separated from the fluids, is now sucked into the radial compressor. The radial compressor motor is regulated by the unit electronics according to requirements. Finally the aspirated air is passed through the exhaust air connections and out of the unit.

5.3 LEDs and settings

LEDs:

– Green LED is lit continuously by operational readiness.
– Red LED is lit when a fault occurs.
– Blue LED is lit when a start signal from the treatment unit is present.

5.4 Tyscor Pulse (optional)

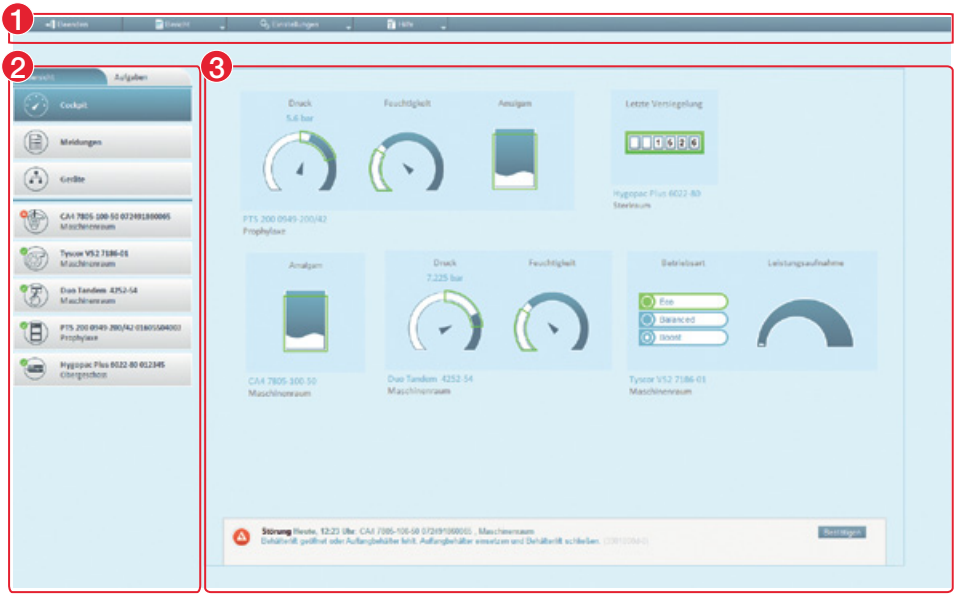
The software is connected to the appliances from Dürr Dental over the network, and displays the current status as well as messages and errors.

All messages are logged and can be printed or sent.

The regular maintenance and care is managed in the tasks. Reminders signal when a task is due.

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

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.

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. The symbol shows the current status of the appliances. If a new message appears, a speech bubble tip also appears.

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6 Prerequisites

The unit can be installed on the same level as the surgery room or in a floor below.

Further information can be found in our suction planning information leaflet. Order number 9000-617-03/..

6.1 Area of installation

The room chosen for set up must satisfy the following criteria:

– Closed, dry, well-ventilated room
– No purpose-built room (e. g. boiler room or wet room)
– Corresponding ambient conditions. "4 Technical data"
– Do not set up within the vicinity of the patients

Take environmental and ambient conditions into account. Do not operate the unit in damp or wet conditions.

– When installing in a cabinet then inlet and outlet ventilation slots must be present, free cross section of at least 120 cm^2.
– Where there is the possibility of the recommended room air temperature being exceeded then additional ventilation (fan) must be provided. The air flow performance must be at least 2 m^3/min.
– Do not cover cooling slots or openings and ensure adequate distance for sufficient cooling.
– Mains cable plug connections freely accessible so they can be quickly disconnected if there is any danger.

6.2 Set-up alternatives

When setting up the unit the following alternatives are available:

– Wall installation using the Dürr Dental wall mounting
– In a ventilated cabinet
– In the Dürr Dental noise reducing housing

6.3 Plumbing materials

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

– Polypropylene (PP, Polypropen),
– chlorinated polyvinyl chloride (PVC-C),
– unplasticised polyvinyl chloride (PVC-U),
– polyethylene (PEh).

The following hose materials may not be used:

– acrylonitrile-butadiene-styrene copolymer (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 of PVC with integrated spiral or equivalent hoses
– hoses of a material which is resistant to the dental disinfectants and chemicals

Hoses of plastic undergo an ageing process. Therefore, they should be inspected regularly and replaced as necessary.

The following hose materials may not be used:

– rubber hoses
– completely PVC hoses
– hoses which are not sufficiently flexible

6.5 Notes on electrical connections

- Ensure that electrical connections to the mains power supply are carried out according to current valid national and local regulations and standards governing the installation of low voltage units in medical facilities.
- Heed the current consumption of the appliances to be connected.

6.6 Notes on connection lines

Mains line

Only use the mains connected cable provided for connecting the appliance.

control line

Type of layout	Line properties (minimum requirements)
fixed	– Shielded light plastic-sheathed cable (e.g. (N)YM (St)-J)
flexible	– PVC data cable with sheathing as used for data and IT (e.g. LiYCY) or – Light-PVC-control line with sheathed cable

7 System components

The following list contains system components required or recommended for various procedures or for installation.

7.1 Rinsing unit

It is recommended that the suction system is equipped with a rinsing unit, e.g. fitted in the treatment unit. The rinsing unit provides a small amount of water during aspiration. The aspirated fluids (blood, saliva, rinsing water etc.) is thereby diluted and can be transported more effectively.

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

7.2 Exhaust air filter

We strongly recommend the installation of an exhaust air filter in the exhaust air system for hygienic reasons.

If the suction unit is installed in the surgery and the exhaust air is not directed to the outside, it is essential to install an exhaust air filter.

Depending on the version and condition of the exhaust air filter, it must be replaced after 1-2 years at the latest.

The integrated separation unit within the suction unit does not hold bacteria back, which is why it is strongly recommended to install a suitable filter into the exhaust air system.

7.3 Noise reducer

Where the noise level from the exhaust air vent or the flow noise generated is too high, then a noise reducer can be installed in the exhaust air connections.

7.4 Surge tank

The combination of a suction unit together with an amalgam separator requires the installation of a surge tank. The surge tank reduces pressure peaks caused by the suction unit's waste water pump and acts as a buffer against temporary rises in the volume of water.

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

7.5 Flow accelerator

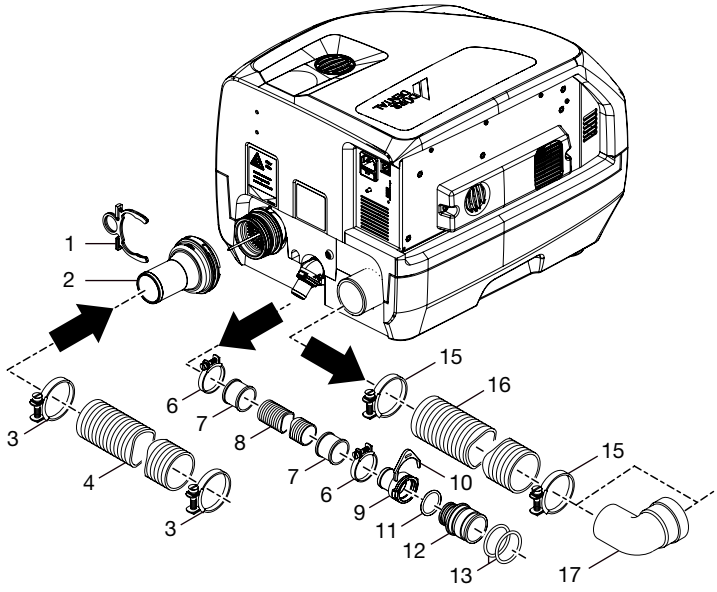
In order that the suction system is kept free of deposits, then a flow accelerator in combination with the spittoon valve can be fitted. When using a bowl rinse system then water can collect before the flow accelerator. The next time suction takes place using the large cannula this fluid which has been collected is flushed with great force and high speed through the suction system. This ensures automatic cleaning of the suction connections.

8 Installation

The actual connection can vary according to the set up method chosen. The connection shown is only an example.

8.1 Setting up hoses and pipes

- Set up connections between plumbing system and suction unit using the flexible hoses supplied. This will reduce the amount of vibration in the plumbing system.
- The connection between the pipe line and suction unit connection should be as short as possible and straight, without bends.
- Waste water connections must be carried out in strict accordance with local and national regulations.



1 Ring clamp
2 Straight connecting sleeve
3 Hose clip
4 Suction hose ∅ 40 mm internally
6 Hose clip ∅ 28 mm
7 Hose sleeve
8 Waste water hose ∅ 20 mm internally
9 Hose sleeve ∅ 20 mm
10 Ring clamp
11 O-Ring 20 x 2.0
12 Connector ∅ 36 mm externally
13 O-Ring 30 x 2
15 Hose clip ∅ 55 mm
16 Exhaust air hose ∅ 50 mm internally
17 Angle connector piece DN 50

8.2 Fitting the rinsing unit

- Screw the rinsing unit with holder firmly onto the upper part of the housing.
- Remove the sealing plugs from the rinse connection of the separation unit.
- Plug the rinse hose onto the rinse connection of the separation unit.
- Connect the rinse hose to the rinsing unit.
- Connect the hose for the water supply of the rinsing unit.
- Connect the voltage supply of the rinsing unit on the control connection of the suction unit to pins 2 and 3.

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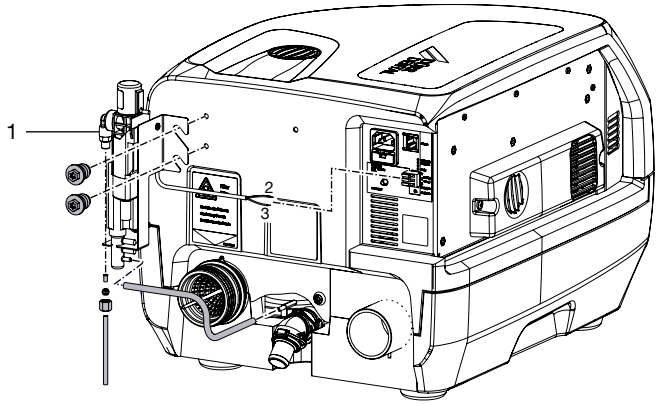
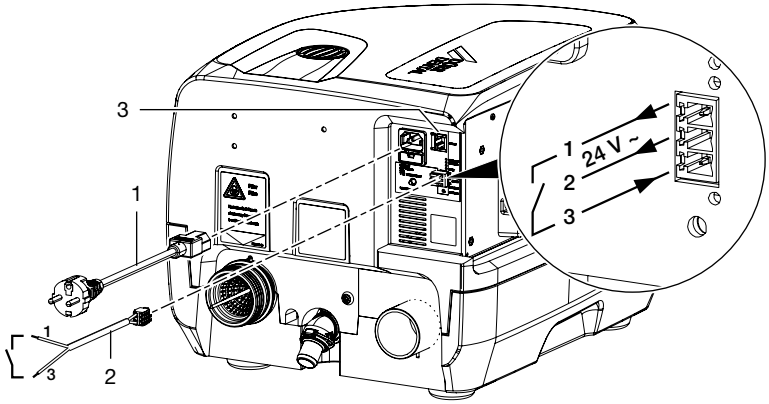


1 Rinsing unit

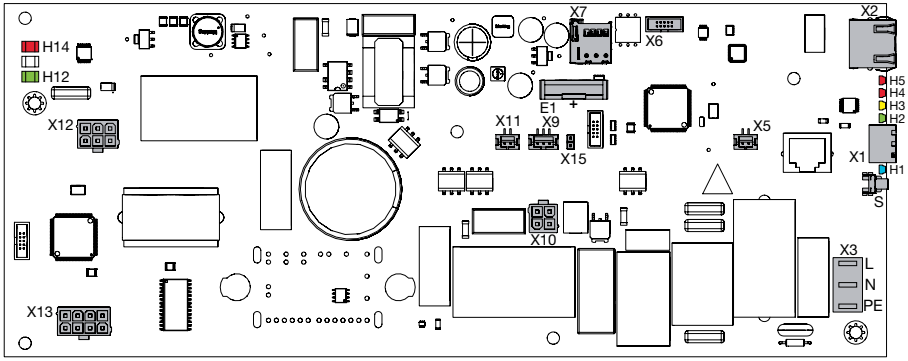
8.3 Electrical connection

- Secure the socket piece to the control line and connect to the suction unit.
- Connect the mains cable to suction unit and insert in socket-outlet.
- Plug the network cable for the Tyscor Pulse into the network connection (optional when using Tyscor Pulse).



1 Mains cable with socket and country-specific plug
2 Control line
3 Network connection socket

8.4 PCB electrical connections



X1 Control voltage output, 24 V AC, 25 VA, control signal input
X2 Network connection
X3 Supply voltage 230 V
X5 Motor control fan connection 2
X6 Service-interface
X7 SD card holder (for Micro SD), optional
X9 Separation motor RPM monitor
X10 Separation motor supply voltage
X11 Motor control fan connection 1
X12 Suction motor supply voltage
X13 Suction motor RPM monitor
X15 Jumper (open = separation active)
H1 Blue LED - Start signal
H2 Green LED - Ready
H3 Yellow LED - reserve
H4 Red LED - Separation system fault
H5 Red LED - Radial compressor fault
H12 Green LED - radial compressor temperature indicator, temperature okay
H14 Red LED - radial compressor temperature indicator, temperature too high
S Start key
E1 Battery (CR2032 button cell), optional

9 Operation

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NOTICE

Interference caused by large particles such as pieces of tooth or fillings

- Do not operate the unit without a coarse filter

- Check that the coarse filters (e. g. in spittoon) have been placed in position.
- Switch on the unit power switch or the main surgery switch.
- Carry out a unit function check.
- Check all connections for signs of leakages.
- Carry out an electrical safety check according to national and local regulations (e.g. any and all regulations concerning set up, operation and application of medical products) and record the results as appropriate, e.g. in the technical log book.

In many countries technical medical products and electrical devices are subject to regular checks at set intervals. The operator should be informed as necessary.

9.1 Monitoring the appliance with Tyscor Pulse

For further information on Tyscor Pulse, refer to the software help and in the Tyscor Pulse handbook (order number 9000-619-22).

To monitor the appliance with the software on the computer, the following prerequisites must be fulfilled:

– The appliance is connected to the network
– Tyscor Pulse software from Version 2.1 installed on the computer

Add appliance

Prerequisite:

✓ The appliance is switched on and connected with the network
✓ Administrator or service technician access level selected in the software

- Click on the *Appliances* tab on the side bar.

  The list of the appliances that are connected or can be connected with the software over the network appears. The new, not yet connected appliance is displayed in dark blue.

- Select the appliance and click on *Use*.

  The appliance appears on the side bar.

Add the appliance to the cockpit

All appliances that are connected with the software can be added to the cockpit.

Prerequisite:

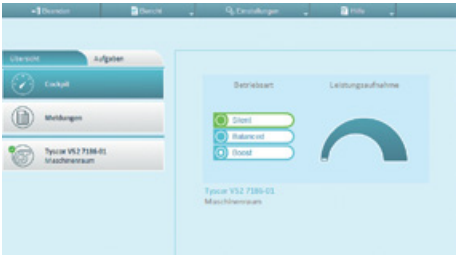
✓ Administrator or service technician access level selected.

- Click on the appliance in the appliance list with the left mouse key and keep the mouse key pressed.
- Keeping the mouse button pressed, drag the appliance onto the cockpit.
- Release the mouse key.

  The block with the current characteristic data and the name of the appliance appears in the cockpit.

- In order to change the position of the appliance block, click on the block and, with the mouse key pressed, drag it to the required location.

Setting the operating type



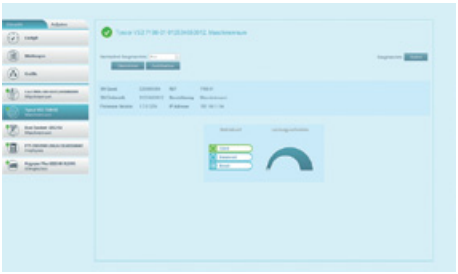
Various operating types can be used in the suction unit. Depending on the installation situation and power requirements, one of the following operating types can be selected: Eco, Balanced and Boost. On delivery, the suction unit is set to Balanced.

Requirements:

✓ Administrator or service technician access level selected.

- Select the suction unit in the side bar.
- Click on the required operating type with the left mouse key.

Start the appliance manually



Start the appliance manually for testing.

Prerequisite:

✓ Service technician access level selected.

- Select the appliance in the appliance list.
- Click on the Start button with the left mouse key (possibly also keep it pressed depending on the appliance).

Transfer the maintenance schedule into the software

It is recommended to transfer the tasks from the maintenance schedule (see "13 Maintenance") into the maintenance schedule of the software.

- Select the *Tasks* view in the software.
- Add task.

Result:

The task appears on the side bar and in the maintenance schedule.

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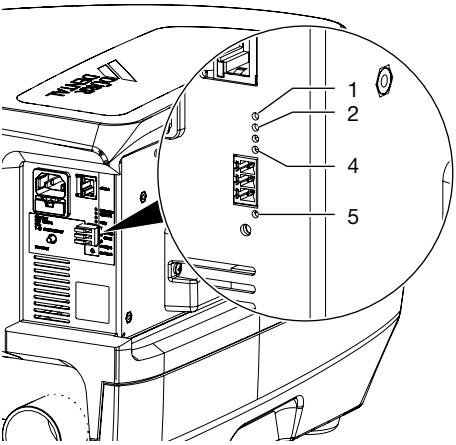
10 LEDs



1 Red LED - Radial compressor fault
2 Red LED - Separation system fault
4 Green LED - Ready
5 Blue LED - Start signal

10.1 Ready

GREEN LED lights

10.2 Hose manifold start signal

BLUE LED lights
Manifold signal active and machine running.

10.3 Fault

RED LED lights

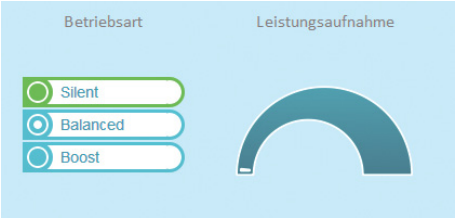
Depending on where the fault lies, one of the red LEDs lights up.

11 Monitoring the appliance with Tyscor Pulse

For further information on Tyscor Pulse, refer to the software help and in the Tyscor Pulse handbook (order number 9000-619-22).

11.1 Monitor the function

The appliance must have been added to the cockpit so that the graphical appliance block is shown in the cockpit.



The following are shown in the appliance block of the suction unit:
– Operating type
– Power consumption of the suction stage

11.2 Querying the messages

Trouble-free operation

Fault
Operation of the appliance interrupted

Warning
Operation of the appliance restricted

Note
Important information on the appliance

Information

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

If several messages occur, basically the symbol of the respective highest message level is displayed.

As soon as a message concerning an appliance occurs, the symbol in the task bar also changes to the relevant message symbol. If the message requires it, an acoustic signal also sounds.

- In order to query the message details, switch to the cockpit or to the appliance.

11.3 Carry out the task

Due tasks appear as a message in the cockpit.

The task can be assigned to an access level (operator, administrator or service technician), so that it can only be confirmed from this access level.

- Carry out the task.
- Confirm the task in the software.

Result:

The due date of the task is set to the next date.

11.4 Creating a report

A current report can be printed or sent per e-mail.

The report contains all messages and a screenshot of the view that is displayed when the report is sent.

12 Disinfection and cleaning

NOTICE

Unit interference or damage by using incorrect agents

This will lead to loss of any claims under the guarantee.

- Do not use any foaming agent, e.g. household cleaning agent or instrument disinfection agent.
- Do not use abrasive cleaners.
- Do not use agents containing chlorine.
- Do not use any sort of solvent such as acetone.

12.1 For reasons of hygiene and perfect function, after every patient treatment

- Aspirate a glass of cold water through the large and the small suction hoses. Carry out this, even when for example only the small suction hose was actually used during treatment.

Aspiration using the larger suction hose allows a greater amount of fresh air to be drawn up and this increases considerably the cleaning efficiency.

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12.2 Daily after completing treatment

After higher workloads before the midday break and evenings

For disinfection/cleaning you require:

- ✓ Material-compatible, non-foaming disinfection/cleaning agents as approved by Dürr Dental , e.g. Orotol® plus.
- ✓ Unit care system, e.g. OroCup

- As pre-cleaning suck up 2 liters of water with the care system.
- Aspirate the disinfection/cleaning agent together with the care system material.

12.3 Once or twice a week before the midday break

In more intense conditions (e.g. hard or calcareous water or frequent use of prophylaxis powders) 1 x daily before the midday break

For cleaning you require:

- ✓ Material-compatible, non-foaming special cleaning agents as approved by Dürr Dental , e.g. MD 555 cleaner
- ✓ Unit care system, e.g. OroCup

- As pre-cleaning suck up 2 liters of water with the care system.
- Aspirate the cleaning agent together with the care system material.
- Rinse with ca. 2 liters water after the application time.

13 Maintenance

To avoid any danger of infection protective clothing should be worn (e.g. protective gloves, goggles, mask)

Maintenance interval	Maintenance work
Every 3 months	• Check the filter at unit suction connection and clean if necessary.
Annually	• Have waste valve function checked by a Service Technician and replaced if necessary.
Every 1-2 years	• Replace exhaust air filter (where fitted).

14 Tips for Operators and Technicians

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Repairs above and beyond simple maintenance may only be carried out by a qualified technician or one of our service technicians.

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

CAUTION
Electric shock from discharging of capacitors
- Wait for the discharge time.
- Watch for the LEDs going out.

14.1 General errors

Problem	Probable cause	Solution
Unit does not start	No supply voltage	• Check the supply voltage. • Check the fusing, replace if necessary.
	Under voltage	• Measure the supply voltage, if necessary call an electrician.
	Control electronics defect	• Replace electronics
Water is leaking from exhaust air connection	Membrane valve defective	• Check the membrane valve at waste water connection and if necessary clean or replace.
	Foam in turbine through using incorrect cleaning and disinfectant agents	• Do not use foaming cleaning and disinfectant agents.
	Condensed water build-up in the exhaust air line	• Check plumbing system; avoid sudden dramatic cooling of unit.
Reduced suction performance	Coarse filter blocked	• Clean coarse filter at intake nozzle.
	Suction system leaking	• Check the suction system and connections for leaks and correct as necessary.
	Poor laying of pipes	• Use higher operating type level.
No suction	Radial compressor defective	• Replace the radial compressor
Water not being pumped away	Separation system defective	• Replace the separation system

14.2 Error messages in Tyscor Pulse

The error messages are displayed in Tyscor Pulse. If the appliance is not connected to the network, the messages can be read via a terminal client (e. g. PuTTY).

Problem	Probable cause	Solution
Speed of Sepa is low	Motor defective	• Replace the separation stage.
	Hall sensor PCB defective	• Replace the Hall sensor PCB, check the magnets in the Sepa fan.
	Centrifuge soiled or damaged	• Check the centrifuge and clean or replace if necessary.
Vacuum motor overheated	Motor suction stage defective	• Replace the suction stage.
CPU overheated	Insufficient ventilation or poor set-up conditions	• Check the setup conditions, ensure adequate ventilation.
	Fan in the foam housing soiled	• Clean the fan and ventilation slots for supply and exhaust air.
	Fan in foam housing defective	• Replace the fan.
	Control electronics defect	• Replace the electronics.
Power Pack overheated	Insufficient ventilation or poor set-up conditions	• Check setup conditions, ensure adequate ventilation.
	Fan on the electronic housing soiled	• Remove the cover on the electronics housing, clean the fan and heat sink.
	Fan on electronic housing defective	• Replace fan
	Control electronics defect	• Replace electronics.

15 Transporting the unit

To avoid any danger of infection protective clothing should be worn (e.g. protective gloves, goggles, mask)

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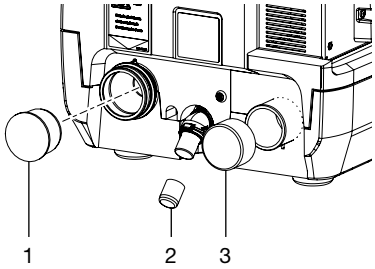
- Before disassembly, clean and disinfect the suction unit and the suction system using a disinfectant approved by Dürr Dental.
- Disinfect a defective unit using a suitable surface disinfection agent.
- Close all connections where fluids could possibly seep out using a cap.
- Pack the unit securely in preparation for transport.



1 Suction connection sealing caps (order number 9000-315-38)
2 Waste water connection sealing caps (order number 9000-412-98)
3 Exhaust air connection sealing caps (order number 9000-412-81)

16 Information on EMC according to EN 60601-1-2

16.1 General notes

The information in this leaflet includes excerpts from the relevant European standards for electrical, medical appliances. The information reproduced here should be observed during the installation of individual appliances and when combining Dürr Dental appliances with products of other manufacturers. If there is any question of doubt, the complete standard must be checked.

16.2 Abbreviations

EMC	Electro-magnetic compatibility
HF	High frequency
U_T	Voltage rating of appliance (supply voltage)
V_1, V_2	Level of consistency for testing according to IEC 61000-4-6
E_1	Level of consistency for testing according to IEC 61000-4-3
P	Rated power of transmitter in watts (W) according to manufacturer's information
d	Recommended safety distance in metres (m)

16.3 Guidelines and manufacturer's information

Electromagnetic transmissions for all appliances and systems

The appliance is designed for operation in one of the electromagnetic environments as outlined below. The customer/operator of such an appliance is obliged to ensure that the appliance is operated in such an environment.

Interference measurements	According to	Electro-magnetic environment – guidelines
HF transmissions according to CISPR 11	Group 1	The appliance employs HF energy exclusively for internal functions. Therefore, any HF transmissions are of extremely low nature and it is highly improbable that any other electronic components will receive any interference.
HF transmissions according to CISPR 11	Group 2	The appliance must transmit electromagnetic energy in order to fulfil the functions for which it has been designed. Other electronic appliances in the vicinity could be affected.
HF transmissions according to CISPR 11	Class [A or B]	The appliance is designed for use in all types of environment including those in residential areas and other suitable areas which are connected directly to the local power supply serving residential buildings.
Harmonic limits according to IEC 61000-3-2	[Class A, B, C, D or Not Applicable]	
Voltage fluctuations/flicker according to IEC 61000-3-3	[Fully compatible or not applicable]	

Table 1: Electromagnetic transmissions for all appliances and systems

Electromagnetic resistance for all appliances and systems

The appliance is designed for operation in one of the electromagnetic environments as outlined below. The customer/operator of such an appliance is obliged to ensure that the appliance is operated in such an environment.

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Resistance to interference checks	IEC 60601 - test levels	Level of consistency	Electro-magnetic environment – guidelines
Discharge of static electricity (ESD) according to IEC 61000-4-2	±6 kV contact discharge ±8 kV discharge to air	±6 kV contact discharge ±8 kV discharge to air	Floors should be of wood or concrete or be covered by ceramic tiles. If the floor is covered by synthetic material, the relative humidity must be at least 30%.
Rapid transient electrical bursts according to IEC 61000-4-4	±2 kV for mains connections ±1 kV at input and output connections	±2 kV for mains connections ±1 kV at input and output connections	The quality of the supply voltage should be that of a typical office building or of a hospital environment.
Surges according to IEC 61000-4-5	±1 kV voltage external-external conductor ±2 kV voltage external-ground conductor	±1 kV push-pull voltage ±2 kV push-pull voltage	The quality of the supply voltage should be that of a typical office building or of a hospital environment.
Voltage drops, interruptions and fluctuations according to IEC 61000-4-11	< 5% U_T (> 95% retardation of U_T) for 1/2 period 40% U_T (60% retardation of U_T) for 5 periods 70% U_T (30% retardation of U_T) for 25 periods < 5% U_T (> 95% retardation of U_T) for 5 s	< 5% U_T (> 95% retardation of U_T) for 1/2 period 40% U_T (60% retardation of U_T) for 5 periods 70% U_T (30% retardation of U_T) for 25 periods < 5% U_T (> 95% retardation of U_T) for 5 s	The quality of the supply voltage should be that of a typical office building or of a hospital environment. Where the operator of the appliance requires continued function even during a power out, we recommend that the appliance is supplied by an uninterrupted power supply, e.g. battery power.
Magnetic field under supply frequency (50/60 Hz) according to IEC 61000-4-8	3 A/m	3 A/m	Magnetic fields of the supply voltage should have the values found in a typical office building or of a hospital environment.

Table 2: Electromagnetic resistance for all appliances and systems

Electromagnetic resistance to interference for non life-supporting appliances or systems

Portable and cordless radio appliances should not be used close to the appliance, including any electrical supply lines, as the recommended safety distance which has been calculated from the transmission frequency.

Resistance to interference checks	IEC 60601 - test levels	Level of consistency	Recommended safety distance
Conductive HF interference factor according to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	$[V_1]$ V	$d = [3.5 / V_1] \cdot \sqrt{P}$ $d = 1.2 \cdot \sqrt{P}$
Radiated HF interference factor according to IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	$[E_1]$ V/m	$d = [3.5 / E_1] \cdot \sqrt{P}$ for 80 MHz to 800 MHz $d = 1.2 \cdot \sqrt{P}$ for 80 MHz to 800 MHz $d = [7 / E_1] \cdot \sqrt{P}$ for 800 MHz to 2.5 GHz $d = 2.3 \cdot \sqrt{P}$ for 800 MHz to 2.5 GHz

Table 3: Electromagnetic resistance to interference for non life-supporting appliances or systems

P Rated power of transmitter in watts (W) according to manufacturer's information

d Recommended safety distance in metres (m)

The field strength of stationary radio transmitters for all frequencies must be, according to investigation carried out on-site[a] lower than the consistency level.[b]

Some interference is possible in environments surrounding appliances where the following symbol is present.

Note 1 Where 80 MHz and 800 MHz are present, the higher frequency range becomes valid.

Note 2 These guidelines are not applicable for all possible situations. The exact amount of electro-magnetic transmissions can be considerably influenced by the rate of absorption and reflection within the building, and the presence of objects and people.

[a] The field strength of stationary transmitters, e.g. base station of radio telephones or cordless landline phones, amateur radio stations, on AM and FM radio or TV, cannot be theoretically exactly calculated in advance. In order to establish the electromagnetic environment taking these stationary transmitters into account, a study of the electromagnetic phenomena of the actual location must be undertaken. If the field strength measured at the location where the appliance is used exceeds the above level of consistency, the appliance should be observed in order to demonstrate the intended function. If any unusual behaviour of the appliance is observed, additional steps will be required, e.g. changing the orientation or location of the appliance.

[b] The field strength is less than $[V_1]$ V/m over the frequency range of 150 kHz to 80 MHz.

Recommended safety distances between portable and mobile HF communications devices and the appliance

The appliance is designed for operation in one of the electromagnetic environments as outlined below in which the HF interference is controlled. The customer/operator of the appliance can help to prevent electromagnetic interference by maintaining minimum distances as recommended between portable and mobile HF communications devices (transmitters) and the appliance as outlined below according to the maximum output of the communications device.

EN

Rated power of transmitter (W)	Safety distance dependent on transmission frequency (m)		
	150 kHz to 80 MHz $d = 1.2 \cdot \sqrt{P}$	**80 MHz to 800 MHz** $d = 1.2 \cdot \sqrt{P}$	**800 MHz to 2.5 GHz** $d = 2.3 \cdot \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

Table 4: Recommended safety distances between portable and mobile HF communications devices and the appliance

For transmitters whose maximum rated current is not included in the table above the recommended safety distance d in metres (m) can be calculated using the following mathematical formula and the appropriate column, where P is the maximum rated current of the transmitter in watts (W) according to the information of the manufacturer of the transmitter.

Note 1 Where 80 MHz and 800 MHz are present, the higher frequency range becomes valid.

Note 2 These guidelines are not applicable to all possible situations. The exact amount of electro-magnetic transmissions can be considerably influenced by the rate of absorption and reflection within the building and the presence of objects and people.

16.4 Table of calculation

If the measured values deviate from the standard, the values in chapter "4 Technical data" are specified.

The safety distances can then be calculated in the tables shown below.

P : .....

V_1: .....

E_1: .....

P Rated power of transmitter in watts (W) according to manufacturer's information

V_1 Level of consistency for testing according to IEC 61000-4-6

E_1 Level of consistency for testing according to IEC 61000-4-3

Resistance to interference checks	IEC 60601- test levels	Level of consistency	Recommended safety distances
Conductive HF interference factor according to IEC 61000-4-6	3 V_{eff} 150 kHz to 80 MHz	[V_1] V	d = [3.5 / V_1] · √P
Radiated HF interference factor according to IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	[E_1] V/m	d = [3.5 / E_1] · √P For 80 MHz to 800 MHz
			d = [7 / E_1] · √P For 800 MHz to 2.5 GHz

Rated power of transmitter (W)	Safety distance dependent on transmission frequency (m)		
	150 kHz to 80 MHz d = [3.5/V_1] ·√P	**80 MHz to 800 MHz d = [3.5/E_1]·√P**	**800 MHz to 2.5 GHz d = [7 / E_1] ·√P**
0.01			
0.1			
1			
10			
100			

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