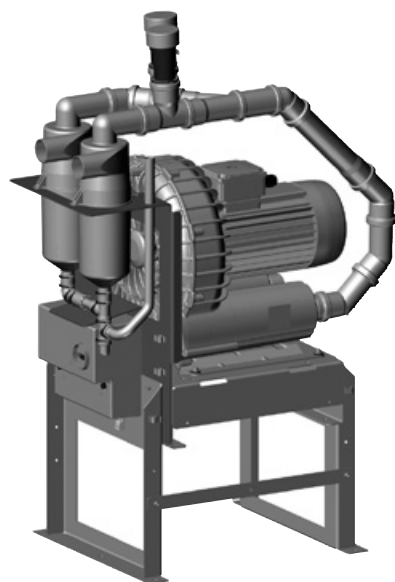


Dürr Dental V 2400



EN

Installation and operating instructions

CE 0297

9000-606-97/30



 **DÜRR
DENTAL**

2017/07SE

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Important information

1. About this document

These installation and operating instructions represent part of the unit.



Failure to comply with the instructions and information in these installation and operating instructions means that 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 – risk of dangerous electric voltages



Warning – hot surfaces



Warning - automatic start-up of the unit



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.



Observe the operating instructions.



Wear protective gloves.



De-energise the unit (e.g. unplug it from mains).



Fuses



Protective ground connection



CE labelling with the number of the notified body



Order number



Serial number



Manufacturer

1.2 Copyright information

All names of circuits, processes, names, software programs and units used in this document are protected by copyright.

The installation and operating instructions may not be copied or reprinted, either in full or in part, without written authorisation from Dürr Dental.

2. Safety

Dürr Dental has developed and designed the unit in such a way that dangers are effectively ruled out if used in accordance with the intended use. Nevertheless, residual risks can remain. You should therefore observe the following notes.

2.1 Intended purpose

The suction unit provides the dental treatment unit with vacuum and volume flow.

2.2 Intended use

Working in combination with the suction unit with treatment unit, suction handpiece and cannula, the media used in dental treatment (e.g. water, saliva, dentine and amalgam) are removed by suction for disposal.

A dry suction system requires a separation to ensure separation of the air and fluid / solid particles before the suction unit.

In addition, a condensation separator should be installed in front of the vacuum entry of the suction unit, to collect any condensate developing in the pipe system and to draw it outwards.

This unit is technically suitable for the aspiration of nitrous oxide (laughing gas). However, when assembling a system for aspiration of nitrous oxide, it is important to 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 approve and release the system for the aspiration of nitrous oxide.



Operation with nitrous oxide is only permitted if the exhaust air is transported from the unit to the outside of the building.

2.3 Improper usage

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

- Do not use this device to aspirate flammable or explosive mixtures.
- The unit must not be used as a vacuum cleaner.
- Do not use chemicals containing chlorine or foaming chemicals.

- Operation in operating theatres of explosive areas is not permissible.
- The unit may not be setup within the patient environment (within a 1.5 m radius).

2.4 General safety notes

- Always comply with the specifications of all guidelines, laws, and other rules and regulations applicable at the site of operation for the operation of this unit.
- Check the function and condition of the unit prior to every use.
- Do not convert or modify the unit.
- Comply with the specifications of the Installation and Operating Instructions.
- The Installation and Operating Instructions must be accessible to all operators of the unit at all times.

2.5 Combining devices safely

Take care when connecting units together or to parts of other systems as there is always an element of risk (e.g. due to leakage currents).

- Only connect units when there can be no question of danger to operator or to patient.
- Only connect units when it is safe to do so and when there is no risk of damage or harm to the surroundings.
- If it is not 100% clear from the unit data sheet that such connections can be safely made or if you are in any doubt, always get a suitably qualified person (e.g. the manufacturer) to verify that the setup is safe.

Where applicable, the requirements for medical products have been taken into account in the development and construction of the device. As a result, this device is suitable for installation within medical supply equipment.

- Where this device is installed within other medical supply equipment, the requirements set out in Directive 93/42 EEC and the relevant standards must be complied with.



A copy of the system manufacturer's declaration in accordance with Article 12 of guideline 93/42/EEC can be found in our download section at www.duerr-dental.com (document no. 9000-461-264)

2.6 Specialist personnel

Operation

Unit operating personnel 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

- All installation, resetting, alteration, extension and repair work must be carried out either by Dürr Dental personnel or by a suitably qualified person approved by Dürr Dental.

2.7 Protection from electric shock

- Comply with all the relevant electrical safety regulations when working on the unit.
- Never touch the patient and unshielded plug connections on the device at the same time.
- Replace any damaged cables or plugs immediately.

2.8 Only use original parts

- Use only those accessories and optional accessories specified or approved by Dürr Dental.
- Only use only original wear parts and replacement parts.



Dürr Dental accepts no liability for damage resulting from the use of non-approved accessories, optional accessories, or the use of non-original wear parts or replacement parts.

The use of non-approved accessories, optional accessories or non-genuine wear parts / replacement 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 unit during transport.

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



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

- Only transport the unit 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



The parts listed as special accessories are **not** included as standard parts with the device but can be ordered separately.

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):

V 2400 in 400 V, 3~, 50-60 Hz

with control box 7137-02

- Suction machine
- Set of connection parts + hoses
- Operator console with control box
- 2 condensate separators
- Auxiliary air valves (50 or 60 Hz)
- Installation and operating instructions

3.2 Special accessories

Noise reduction for exhaust air . . . 0730-991-00

Bacteria filter. 0705-991-50

Filter element 0705-991-05

4. Technical data

Electrical data		7137-02
Nominal voltage	V	400, 3~
Electrical frequency	Hz	50 / 60
Nominal current	A	5.0 / 6.3
Starting current	A	44 / 48
Motor protection switch *	A	7.2 / 8.1
Rated power	W	2880 / 4000
Speed	rpm	2900 / 3400
Duty cycle	%	100 (S1)
Type of protection		IP 21
Protection class		I

* Recommended setting values. As the motor protection switch is subject to a small amount of tolerance, the current should be measured during installation and the motor protection setting adjusted accordingly.

Connections		
Vacuum connection (external)	mm	2 x Ø 50 (DN50)
Exhaust air connection (external)	mm	Ø 50 (DN50)
Condensate connection (DürrConnect)	mm	Ø 20

General data		
Unimpeded flow rate	l/min	4300 - 4700
Auxiliary air valve setting	mbar/hPa	160 / 135
Dimensions (H x W x D)	cm	115 x 79 x 48
Weight, approx.	kg	68
Noise level* c.	dB(A)	70
Medical device		Class IIa

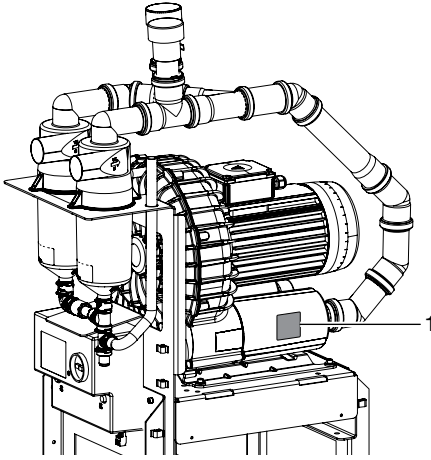
* Noise level in accordance with EN ISO 1680 airborne noise emissions; measured in a sound-proofed room. The levels are average values with a tolerance of ± 3 dB(A). Higher values may be obtained in rooms with reverberating sound characteristics.

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

4.1 Type plate

The model identification plate is located on the turbine housing.



1 Model identification plate

5. Functional description

The V-suction unit is suitable for use in dry air suction systems. The advantage of this system is that the suction unit, regardless of the actual connection layout, can be installed in any available and suitable room (including upper floors or basements). The necessary air flow and vacuum are generated according to the side channel compressor principle.

On the vacuum side the V-suction unit is equipped with a condensate separator that collects any condensation arising within the pipe system and transports it away to the outside. An auxiliary air valve in the condensate separator protects the suction unit against overheating and provides uniform suction power.

The exhaust air from the suction unit should be guided out of the building (via the roof where possible). We recommend the installation of a bacteria filter in the exhaust air line. In addition, it is possible to install a noise-reducing muffler in the exhaust air line in order to reduce the amount of noise generated by the unit and by the air flow.

When an appropriate vacuum for the machine is applied, approx. 300 l air/min. is sucked in through the suction cannula. Here, the air enters the cannula at a speed of approx. 50 m/s. In the suction hose the speed is lowered to 15-20 m/s. This rate of flow still guarantees reliable transportation of all dirt particles.

A fine filter is integrated in the hose manifold that holds back coarse particles. Reliable separation of all dirt components takes place in the separating unit. As a result, the air transported from the separation unit to the suction unit motor is always free of fluid and solid particles. The secretions in the separation unit flow automatically through the drainage hose to the waste connections of the treatment unit.



Installation

6. Setup



More information on this can be found in the planning information for suction machines.

6.1 Installation/setup room

- Installation in a purpose-built room, e.g. in a boiler room, must be checked beforehand with local building regulations.
- Installation in wet rooms is not permitted.
- Installation out of doors is not permitted.

6.2 Setup options

One of the chief advantages of dry air suction systems is the fact that the suction machine can be set up in any suitable room (including on upper floors and basements) without having to worry about supply lines.

- Setup on a special console on the floor.

6.3 Condensation separator

Two condensate separators are installed on the suction machine.



The condensate separator must be installed at the lowest point in the pipe system. If the suction machine is not installed at the lowest point in the pipe system (e.g. cellar), unscrew the condensate separator from the motor console and attach it at the lowest point in the pipe system.

6.4 Bacteria filter / noise reduction

Bacteria filter: For reasons of hygiene we recommend that a bacteria filter is installed in the exhaust air line. Installation of a bacteria filter is absolutely essential if the suction unit is installed in the surgery rooms and the exhaust air cannot be fed to the outside of the building.

Depending on the model type and condition of the bacteria filter, it will need to be replaced every 1-2 years at the latest.

Noise reduction: If the noise of the exhaust air extraction at the outlet is too loud, a muffler can be installed in the exhaust air line.

6.5 Pipe materials



The following must NOT be used:
Acrylonitrile butadiene styrene (ABS) and styrene copolymer blends (e.g. SAN+PVC)

Only the following pipe materials may be used:

Vacuum-tight HT-waste water pipes made of polypropylene (PP), chlorinated polyvinyl chloride (PVC-C), unplasticized polyvinyl chloride (PVC-U) and polyethylene (PE).

6.6 Hose materials



The following must NOT be used:
Hose materials that are not resistant to dental disinfectants and chemicals, rubber hoses or full PVC hoses that are not sufficiently flexible.

Only flexible PVC hoses with spiral reinforcement or equivalent hoses may be used as hoses for waste water systems and suction lines.



Since plastic hoses are subject to ageing they must be regularly inspected and replaced where necessary. When replacing a suction machine, we recommend replacing the connecting hoses at the same time

6.7 Hose and pipe installation

- **Waste water connections**, e.g. downstream of the condensate separator, must be executed in accordance with all local and national regulations.



The connection between the pipe system and the suction unit connection should be kept as short as possible and laid as straight as possible (i.e. without bends) using the flexible hose supplied. This will prevent vibrations from being transmitted to the pipe system.

7. Electrical connections



When making the electrical connections, you must observe all technical regulations concerning the setup of low voltage systems in areas used for medical purposes.



The motor connection cable must be routed in such a way that it does not come into contact with hot surfaces.

- Before commissioning and first start-up, check the mains voltage against the voltage indicated on the model identification plate.
- The suction machine is operated using the controller located in an external control box.

Circuit protection: LS-switch 16 A, characteristics B, C and D in accordance with EN 60898

7.1 Notes on connecting cables

400 V connecting cable (mains connection, flexible):

The connection between the control box and suction unit or between the unit power supply socket and the suction machine should be made using PVC sheathed cables:

H05 VV-F 5G1.5 mm²

or rubber cables:

H05 RN-F 5G1.5 mm²

H05 RR-F 5G1.5 mm²

24 V control cable

Protective low voltage for:

- Hose manifold
- Place selection valve

Fixed installation: (N)YM (St)-J 4x 1.5 mm² shielded sheathed cable.

Flexible installation: PVC data cable LiYCY 4x 1.0 mm² with a shielded sheath as used in telecommunication and information processing systems, or lightweight PVC control cable with a shielded sheath.



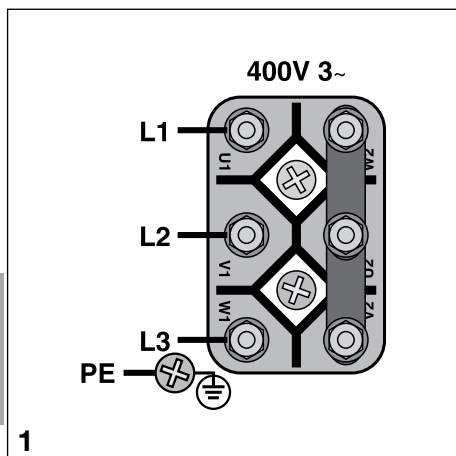
In order to avoid danger, if the mains connection cable of the device is damaged it must be replaced by the manufacturer or the manufacturer's customer service department, or by a similarly qualified person.

7.2 Control box

The suction machine must be connected via a control box, which is included in the scope of delivery. Connection plans and circuit diagrams can be found in the installation and operating instructions of the control box.

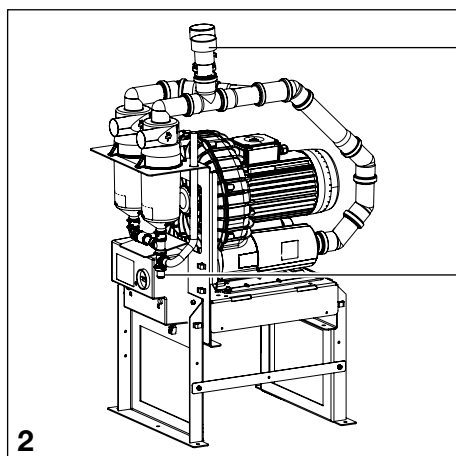


The adjustment range of the control box is matched to the suction unit at 50 Hz electrical frequency. This must be taken into account given operation at 60 Hz or if replacing the suction unit or control box.



7.3 Motor terminal box connection

Connect the power supply line from the control box to the appropriate terminals in the motor terminal box.

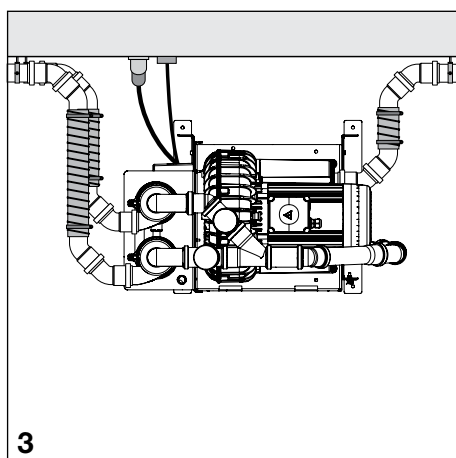


8. Installation

- Detach the suction machine from the transport pallet and position it in the required position for installation. Remove the transport locks.
- Drill at least two mounting points in the floor, fit anchors and bolt down the suction machine.



Take care to avoid any pipes or electric cables in the floor.



- Connect the waste water drain hose to the condensate separator (1) and route it to the building waste water system. A suitable waste water collector can also be used if no waste water drainage system is available. This then needs to be emptied on a regular basis. Make sure staff in the surgery or clinic are told about this.
- Remove the dummy plugs (2).
- Use the necessary auxiliary air valves according to the electrical frequency:
For 50 Hz: 0729-060-00
For 60 Hz: 7137-060-00
- Push on the pipe bends at the condensate separators and at the exhaust air connection.
- Connect hoses between the suction machine and the building installation.
 - Plastic hoses on the suction side.
 - Aluminium hose on the exhaust air side.



Keep the hoses straight during installation to prevent them from collapsing under suction.

- Connect the control line from the building installation to the control box.



Connection plans can be found in the Control Box Installation and Operating Instructions.

- Connect the mains plug.

9. Commissioning

- Turn on the unit power switch or the main surgery switch.



Disconnect the connection pipes on the condensation separator and the exhaust air sockets of the suction units before checking the direction of rotation of the motor.

- Perform a function check of the suction machine and the control box.
Check the direction of rotation of the motor (3/N/PE AC).
Adjust the motor protection switch in the control box.
- Check all connections for leak tightness.
- Carry out an electrical safety check of the control box and the suction machine in accordance with the applicable national and local regulations (e.g. regulations concerning the setup, operation and use of medical devices) and record the results accordingly, e.g. in the technician's report.



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



Usage

10. Disinfecting and cleaning the suction unit



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.

10.1 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.

10.2 Daily after the end of treatment



After higher workloads before the mid-day break and in the evening

The following are required for disinfection/cleaning:

- Material-compatible, non-foaming disinfection/cleaning agents approved by Dür Dental e.g. Orotol? plus.
- 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.

10.3 Once or twice a week before the midday break



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

The following are required for cleaning:

- Material-compatible, non-foaming special detergent for suction systems approved by Dür Dental, e.g. MD 555 cleaner
- 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.

11. 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
Every 1-2 years	<ul style="list-style-type: none">• Replace the exhaust air filter (where fitted).
Every 2 years	<ul style="list-style-type: none">• Check the auxiliary air valve and clean or replace as necessary• Check the function of the outflow valves on the condensation separator and replace if necessary.



Troubleshooting



Any repairs above and beyond routine maintenance must only be carried out by suitably qualified personnel 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).

Error	Possible cause	Solution
1. Suction unit will not start up	<ul style="list-style-type: none">• No mains voltage.• Undervoltage.• Motor protection switch set too low.• Motor protection switch defective.• Turbine blocked either by solid particles or sticky dirt (e.g. due to use of unsuitable cleaning agent and disinfectant); motor protection switch activated.	<ul style="list-style-type: none">• Check the mains fuse and the fuse in the control box or on the PCB and replace if necessary. Check the mains supply voltage.• Measure the supply voltage; call an electrician if necessary.• Measure the current. Set the motor protection switch accordingly.• Check the motor protection switch; replace if defective.• Disassemble the suction unit and clean the turbine.• Check the function of the upstream separation units and condensate separators and clean them if necessary.
Suction unit generating unusual noises	<ul style="list-style-type: none">• Solid particles in the turbine chamber.	<ul style="list-style-type: none">• Disassemble the suction unit and clean the turbine.
3. Water leaking from the exhaust air connection	<ul style="list-style-type: none">• Foam in the turbine due to use of incorrect cleaning agent or disinfectant.• Build-up of condensate in the exhaust air line.	<ul style="list-style-type: none">• Use non-foaming cleaning and disinfectant agents.• Check the pipe system; avoid over-cooling.
4. Suction unit performance too low	<ul style="list-style-type: none">• Mechanical sluggishness of turbine caused by dirt• Leak in the suction line	<ul style="list-style-type: none">• Disassemble the suction unit and clean the turbine.• Check and if necessary establish leak-tightness of suction system and connections.

13. 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).

- Before disassembly, clean and disinfect the suction unit and the unit via aspiration of a suitable disinfectant approved by Dürer 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.



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