stomdevice

Tornado 2+

EN



Installation and operating instructions

CE 0297

5286100072L02

DÜRR DENTAL

1909V005

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Important information

1 About this document

These installation and operating instructions represent 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.

The German version of the installation and operating instructions is the original manual. All other languages are translation of the original manual. These installation and operating instructions apply to:
Tornado 2+
Order number: 5286100036

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


Warning – hot surfaces


Warning - automatic start-up of the unit

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.


Disconnect all power from the unit.


Refer to the accompanying electronic documents.


Air


Filter symbol


Dispose of correctly in accordance with EU Directive 2012/19/EU (WEEE).


CE labelling with the number of the notified body


Order number


Serial number


Medical device


Health Industry Bar Code (HIBC)


Manufacturer

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1.2 Copyright information

All circuits, processes, names, software programs and units mentioned in this document are protected by copyright.
The Installation and Operating Instructions must not be copied or reprinted, neither in full nor in part, without written authorisation from Dürr Dental.

2 Safety

Dürr Dental has designed and constructed this unit so that when used properly and for the intended purpose it does not pose any danger to people or property.
Despite this, the following residual risks can remain:

- Personal injury due to incorrect use/misuse
- Personal injury due to mechanical effects
- Personal injury due to electric shock
- Personal injury due to radiation
- Personal injury due to fire
- Personal injury due to thermal effects on skin
- Personal injury due to lack of hygiene, e.g. infection

WARNING

The development of emphysema

Soft tissue can be damaged as a result of careless handling.

› Do not dwell in the area being treated for any longer than is necessary.

2.1 Intended purpose

The compressor is designed to supply compressed air for dental applications.

2.2 Intended use

The air supplied by the compressor is suitable for driving dental tools.
The compressed air generated by the compressor is delivered to the pipeline system of the surgery. The entire compressed air system must be designed in such a way that the quality of the compressed air generated by the compressor is not impaired.
With this prerequisite, the air provided by the compressor is also suitable for blow-drying tooth preparations.

2.3 Improper use

Any use of this appliance / these appliances above and beyond that described in the Installation and Operating Instructions is deemed to be incorrect usage. The manufacturer cannot be held liable for any damage resulting from incorrect usage. The operator will be held liable and bears all risks.

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WARNING

Risk of explosion due to ignition of combustible materials

› Do not operate the unit in any rooms in which inflammable mixtures may be present, e.g. in operating theatres.

› The unit is not suitable for providing an air supply to respirators.

› This unit is not suitable for drawing up fluids or for compressing aggressive gases or potentially explosive gases.

2.4 General safety information

› 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 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.

The following groups are not permitted to operate or use a commercially operated unit:

– People without the necessary experience and knowledge

– People with reduced physical, sensory or mental capabilities

– Children

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.

2.6 Electrical safety

› Observe and comply with all the relevant electrical safety regulations when working on the unit.

› Replace any damaged cables or plugs immediately.

2.7 Notification requirement of serious incidents

The operator/patient is required to report any serious incident that occurs in connection with the device to the manufacturer and to the competent authority of the Member State in which the operator and/or patient is established/resident.

2.8 Only use original parts

› Only use Dürr Dental parts or accessories and special accessories specifically approved by Dürr Dental.

› Only use only original wear parts and replacement parts.

Dürr Dental accepts no liability for damages or injury resulting from the use of non-approved accessories or optional accessories, or from 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 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.

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2.10 Disposal

Unit



The unit must be disposed of properly. Within the European Union, the unit must be disposed of in accordance with EU Directive 2012/19/EU (WEEE).

› If you have any questions about the correct disposal of parts, please contact your dental trade supplier.



An overview of the waste keys for Dürr Dental products can be found in the download area at www.duerrdental.com (document no. P007100155).

2.11 Protection from threats from the Internet

The unit is to be connected to a computer that can be connected to the Internet. Therefore, the system needs to be protected from threats from the Internet.

› Use antivirus software and update it regularly. Look for evidence of possible virus infection and, if applicable, check with the antivirus software and remove the virus.
› Perform regular data backups.
› Restrict access to units to trustworthy users, e.g. via a user name and password.
› Make sure that only trustworthy content is downloaded. Only install software and firmware updates that have been authenticated by the manufacturer.

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Product description

3 Overview

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):
Tornado 2+ . . . . . 5286100036.
- Fabric reinforced hose
- Hose nozzle
- Hose clip
- Cable ties
- Mains cable
- Collector tray
- Network cable
- Installation and Operating Instructions
- Unit logbook

3.2 Optional items

The following optional items can be used with the device:
Pressure reducer 6040-992-00
Sterile filter 1640-981-00

3.3 Wear parts and replacement parts

The following working parts must be replaced at regular intervals (refer also to "Maintenance"); these articles do not bear the CE mark:
Air intake filter 5180-982-00
Fine filter 1610-121-00
Sterile filter 1640-981-00
Sinter filter 1650-101-00
Cup seal repair set 5180-981-00

Any repairs exceeding routine maintenance may only be carried out by qualified personnel or our service.

Information about replacement parts is available from the portal for authorised specialist dealers at:
www.duerrdental.net.

If the mains cable of this unit is damaged it must only be replaced by an original mains cable from the manufacturer.

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4 Technical data

Electrical data		5286100036	
Nominal voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	7.7	7.2
Motor protection		Motor winding overheat protector	
Speed	rpm	1390	1650
Type of protection		IP20	
Mains fusing *	A	16	
Max. permissible mains impedance in accordance with EN 61000-3-11	Ω	0.2069	

* Circuit breaker fuse characteristics C in acc. with EN60898-1

General data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	260	315
Delivery at 5 bar (0.5 MPa)	l/min	110	126
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	75	-
Duty cycle	%	100 (S1)	
Start-up pressure	bar (MPa)	5.5 (0.55)	
Cut-off pressure	bar (MPa)	7.5 (0.75)	
Cut-off pressure, max. adjustable	bar (MPa)	9.5 (0.95)	
Switching hysteresis min. Switching hysteresis max.	bar (MPa) bar (MPa)	1 (0.1) 3 (0.3)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Pressure dew point at 7 bar (0.7 MPa) *	°C	≤ +5	
Dimensions (H x W x D) **	cm	84 x 63 x 60	
Weight	kg	59	
Noise level ***	dB(A)	56	59

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3746.

Filter mesh size		
Compressor unit intake filter	µm	3
Fine filter for membrane drying unit	µm	3
Sterile filter for membrane drying unit	µm	0.01
Sintered filter for membrane drying unit	µm	35

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Network connection		
LAN technology		Ethernet
Standard		IEEE 802.3u
Data rate	Mbit/s	100
Connector		RJ45
Type of connection		Auto MDI-X
Cable type		≥ CAT5

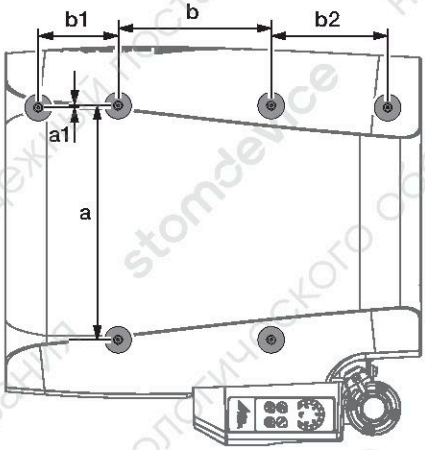
Ambient conditions during storage and transport		
Temperature	°C	-10 to +55
Relative humidity	%	max. 95

Ambient conditions during operation		
Temperature	°C	+10 to +40
Ideal temperature	°C	+10 to +25
Relative humidity	%	max. 95

Classification	
Medical devices class	IIa

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4.1 Distance between rubber feet

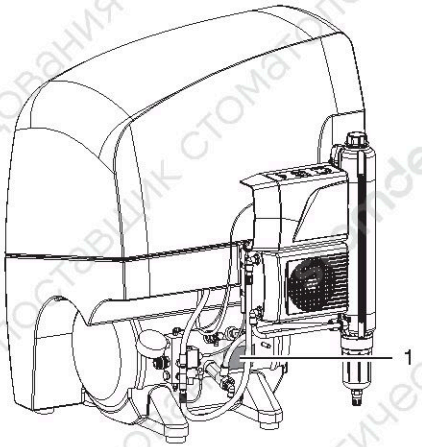


	A (cm)	a1 (cm)	b (cm)	b1 (cm)	b2 (cm)
20 l	35	0.5	23	17.5	12

4.2 Type plate

Complete system

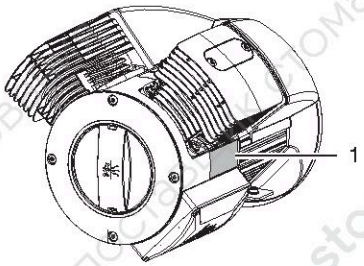
The type plate for the complete system is located on the pressure tank.



1 Type plate for the complete system

Compressor unit

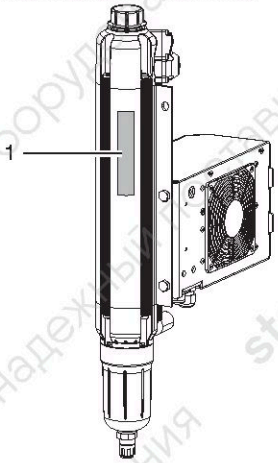
The type plate of the compressor unit is located on the crankcase below the cylinder.



1 Compressor unit type plate

Membrane drying unit

The type plate of the membrane drying unit is located on the membrane drying unit.



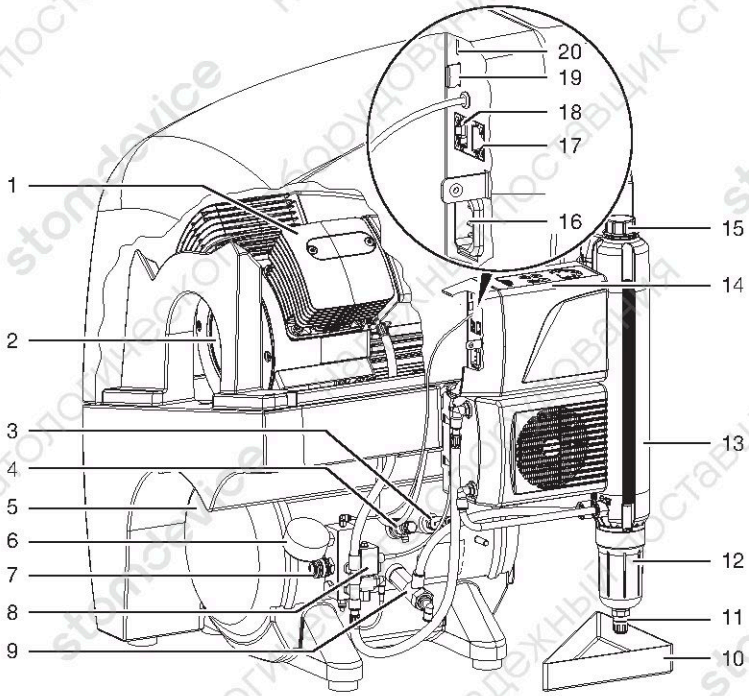
1 Membrane drying unit type plate

4.3 Evaluation of conformity

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.

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5 Operation



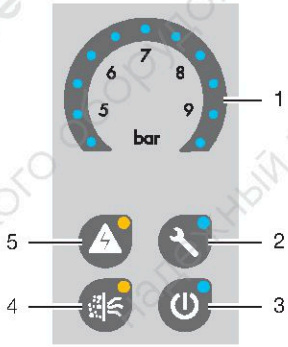
1 Compressor unit
2 Air intake filter
3 Safety valve
4 Condensate drain valve
5 Pressure tank
6 Pressure gauge/display
7 Compressed air connection (quick release coupling)
8 Pressure relief solenoid valve
9 Non-return valve
10 Condensate collector tray
11 Automatic/manual condensate drain valve, membrane drying unit
12 Sintered filter for membrane drying unit
13 Membrane drying unit
14 Electronic control with displays and operating elements
15 Fine filter or sterile filter, membrane drying unit
16 Mains connection
17 Network connection (LAN)
18 CAN bus for main device / auxiliary device
19 SD card slot
20 Switch between main device / auxiliary device

The compressor unit draws in atmospheric air and compresses it without oil. It then transports the oil-free compressed air to the membrane drying unit. The cooler and the membrane dryer extract moisture from the compressed air. The oil-free, hygienic and dry air is stored in the pressure tank ready for use in connected devices.

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All of the measurement data for the appliance comes together in the controller (e.g. pressure in the pressure tank), where it is then evaluated. Likewise, various settings (e.g. switch-on/cut-off pressure) can be adjusted, or the unit can be connected via the network to Tyscor Pulse.

5.1 Operating panel



1 Pressure range display/adjustment
2 Service key with blue LED
3 Standby button with blue LED
4 Filter change button with orange LED
5 Fault button with orange LED

Different messages and the status of the unit are displayed on the operating panel. In addition, different functions can be started via the buttons.

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Assembly

6 Requirements

The unit must not be set up or operated within the vicinity of the patients (within a radius of 1.5 m).

The unit can be installed either at the same level as the surgery room or on a floor below (e.g. cellar).
Due of the amount of noise generated, we recommend that the unit is installed in an adjoining room.
The pipes provided on-site must at least meet the country-specific requirements for drinking water.

Further information can be found in our separate planning information leaflet for compressed air.

6.1 Installation/setup room

The room chosen for set up must fulfil the following requirements:
- Closed, dry, well-ventilated room
- Should not be a room made for another purpose (e. g. boiler room or wet cell)
- If the unit is installed in a machine room, e.g. in an adjoining room or cellar, the requirements set out in ISO-TS 22595 must be complied with.

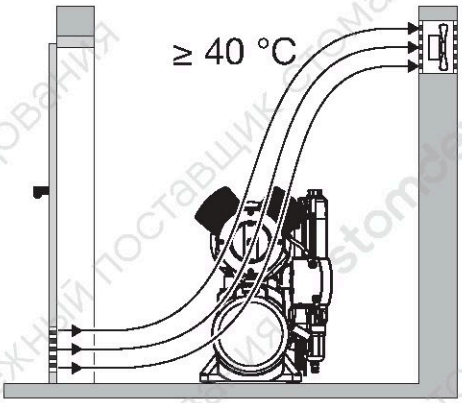
NOTICE

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

The following conditions must be taken into account for installation:

The air is filtered when it is sucked in. This does not alter the composition of the air. For this reason it is important to keep the sucked-in air free of harmful substances (e.g. do not suck in exhaust gases or contaminated exhaust air).

- Clean, level and sufficiently stable subsurface (note the weight of the unit).
- Type plate easy to read.
- Unit easy to access for operation and maintenance.
- Easy-to-access power outlet to which the unit is connected.
- Maintain sufficient distance to the wall (at least 20 cm).
- The compressed air pipe should be routed as closely as possible to the place of installation (note the length of the hose supplied).

6.3 Information about electrical connections

› Ensure that the electrical connections to the mains power supply are established in accordance with current valid national and local regulations and standards governing the installation of low voltage units in medical facilities.

› Observe the current consumption of the devices that are to be connected.

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7 Transport

WARNING

Risk of explosion of the pressure tank and pressure hoses

› The pressure tank and the pressure hoses must be vented before they are stored or transported.

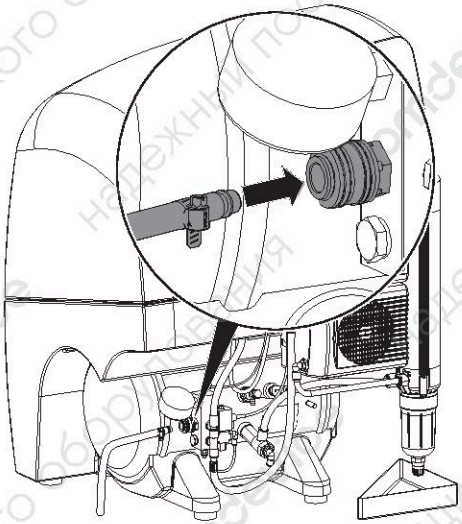
› Protect the unit against moisture, dirt and extreme temperatures during transport ("4 Technical data").
› Always make sure that the condensate collector chamber is empty before transporting the unit ("14 Taking out of use").
› Always transport the unit in an upright position.
› Only transport the unit using the transport handles provided.
› Check the unit for transport damage.

8 Installation

8.1 Establishing the compressed air connection

The supplied flexible pressure hose between the pipe system and the compressor prevents vibrations from being transmitted and thus reduces noise. This ensures safe and reliable operation.

› Connect the pre-assembled connecting sleeve of the pressure hose to the quick release coupling.
› Measure the required length of the pressure hose and shorten if necessary.
› Press a fitting hose connector (not included in the scope of delivery) onto the pressure hose (internal diameter 10 mm) and secure it with a hose clip.
› Connect the connecting sleeve of the pressure hose to the compressed air tube.



8.2 Place a collector tray underneath

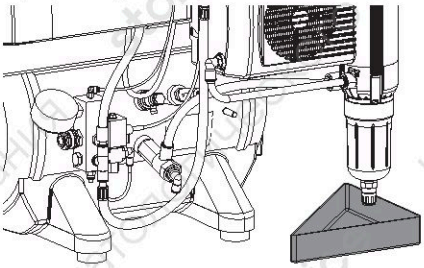
During operation, condensation water on the unit is continuously separated and automatically drained. In order to prevent water damage due to

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drained condensation, it is collected in the collector tray.

As an option, the condensation can also be drained through a hose into the waste water system. Always comply with applicable national regulations for waste water systems.

› Place a collector tray under the condensate separator or the membrane drying unit (depending on type).



8.3 Network connection

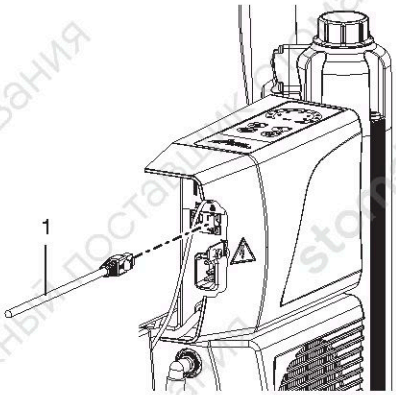
Purpose of the network connection

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

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

› Plug the network cable into the control and into a network socket.
› Establish a connection to the computer network using the network cable.



1 Network cable

8.4 Electrical connections

Safety when making electrical connections

The unit has no main power switch. For this reason it is important that the unit is be set up in such a way that the plug can be easily accessed and unplugged if required.

› The unit must only be connected to a correctly installed power outlet.
› Make sure that none of the electrical cables leading to the unit are under any mechanical tension.
› Before initial start-up check that the mains supply voltage and the voltage stated on the type plate match (see also "4. Technical data").

Establishing the electrical connections

DANGER

Risk of electric shock due to defective mains cable

› Mains cables must not be allowed to come into contact with any hot surfaces on the unit.

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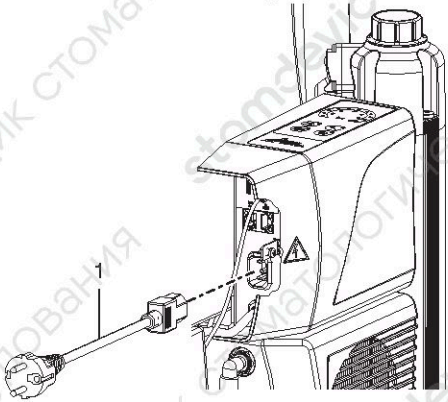
› Plug the male connector of the mains connection into the female mains connector on the controller.

The male mains connector is mechanically secured so that it cannot drop out. To unplug the male mains connector from the device, press the red lever on the connector in the unplugging direction. Then unplug the male mains connector from the device.

› Connect the mains plug to an earthed power outlet.

The device will run approx. 10 s after the mains plug is plugged in.

› Check whether the power outlet is switched via the surgery main power switch.
This ensures that the unit starts up automatically after the surgery main switch is routinely switched off and back on again.



1 Mains cable with socket and country-specific mains plug

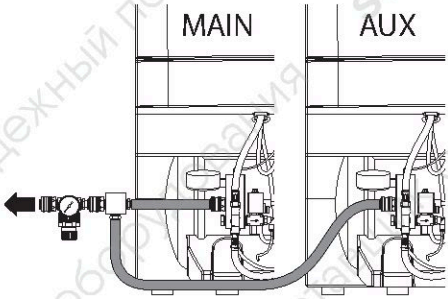
8.5 Two devices in a single compressed air network

With the compressor it is possible for two units to be connected to a single compressed air network. To do this,
- the pressure vessels need to be connected to each other;
- the controllers of the compressors need to be connected to each other;
- the controllers need to be set up accordingly.

Connecting pressure vessels

If two devices are connected to a single compressed air network, pressure equalisation must take place between the pressure vessels. To do this, the pressure vessels need to be connected to each other.

So that the pressure can be equalised, no non-return valves must be installed between the pressure vessels.



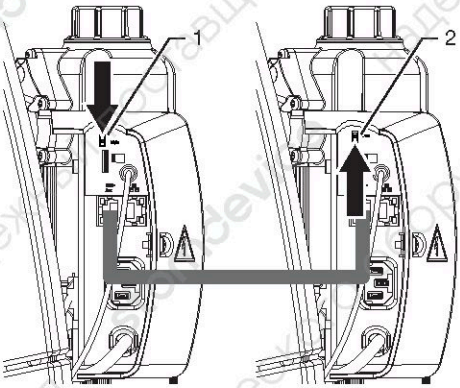
1 Main device (MAIN)
2 Auxiliary device (AUX)

CAN bus for main device / auxiliary device

Before connecting or disconnecting the network cable, switch off the device and make sure it is not connected to the power supply (e.g. disconnect the mains plug).

If two devices are connected to a single compressed air network, the controllers must communicate with each other. To do this, connect the CAN bus interfaces to the controllers with a network cable and set one of the controllers to MAIN, the other to AUX.

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1 MAIN
2 AUX

9 Commissioning

› Before taking the unit into operation, check for any damage. Damaged units must not be used.

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.

9.1 Checking the switch-on/cut-off pressure

The switch-on/cut-off pressure is preset at the factory. Check the adjustment during first start-up.
When the mains plug is connected the compressor will start up after a delay of 10 s. If the compressor was in standby mode before it was last taken out of operation, then it will be in standby mode again after the mains plug is connected.

› Read off the cut-off pressure from the pressure gauge.

› Drain the air from the pressure tank (e.g. via the condensate drain valve) until the unit starts and then close it again.

› Read off the pressure when the unit starts up.

Result:
If the readings deviate from the values preset at the factory, adjust the values to a different required pressure if necessary.

9.2 Checking the safety valve

Correct operation of the safety valve must be checked when the unit is started up for the first time and again subsequently at regular intervals.

At the factory, the safety valve is set to 10 bar (1 hPa), checked and stamped.

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DANGER

Risk of explosion of the pressure tank and pressure hoses

› Do not change the safety valve settings.

› Fill the pressure tank to the cut-off pressure.

WARNING

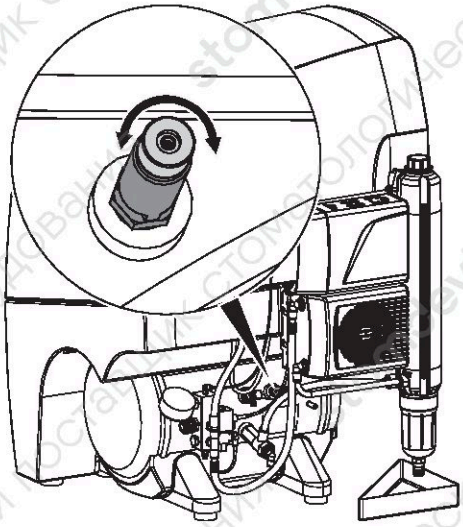
Risk of damage to the safety valve

Risk of explosion of the pressure tank and pressure hoses due to a defective safety valve

› Do not use the safety valve to vent the pressure tank.

› To open, rotate the screw of the safety valve anti-clockwise until the valve begins to blow off. Only allow the safety valve to blow for a short period.

› Then turn the screw clockwise as far as it will go to close the valve. The valve must now be closed again.



9.3 Draining the condensation water

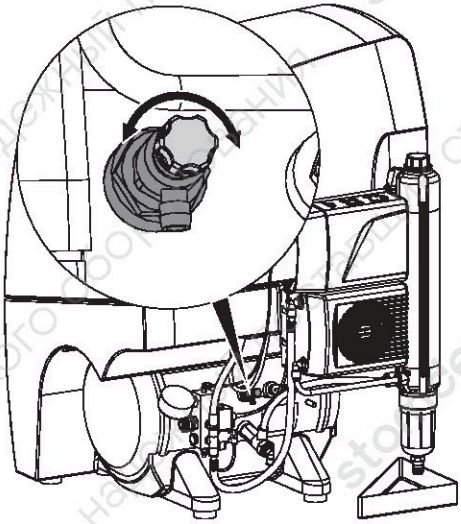
Temperature changes during transport may cause condensation water to accumulate in the pressure tank. The condensation water can only be drained from the pressurised pressure tank.

› Start up the unit and wait until the cut-off pressure is reached.

Pressure tank

› At maximum tank pressure, slowly open the condensate drain valve.

› Close the condensate drain valve as soon as all of the accumulated condensation water has been blown out.



9.4 Monitoring the unit via the network

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

– Unit connected to the network

– Current monitoring software installed on the computer

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Combining devices safely

- The overall safety of the unit and its main 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 utilises part of the bandwidth of the network. Interactions with other medical devices cannot be completely ruled out. 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.

Network protocols and ports

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

1) The port can vary depending on the configuration.

10 Adjustment options

10.1 Adjustment of the switch-on/cut off pressure

WARNING

Risk of explosion of the pressure vessel

The pressure vessels used in the compressors are designed to withstand continuous pressure changes of 2 bar and can be used continuously under these pressure changes.

› For load changes > 2 bar (max. permissible: 3 bar), comply with the maximum load change cycles specified in the operating instructions of the pressure vessel.

The pressure adjustment is performed in standby mode.

› Press the standby button for at least 2 seconds.

› Touch the service key for at least 2 seconds.
The blue LEDs in the operating panel flash. They are touch-sensitive and can be adjusted accordingly.



The pressure adjustment is performed in 0.5 bar increments by touching the LED.

› Touch the first flashing LED with your finger and swipe to the required **switch on pressure**.

› Touch the last flashing LED with your finger and swipe to the required **cut off pressure**.

› Confirm with the service key .

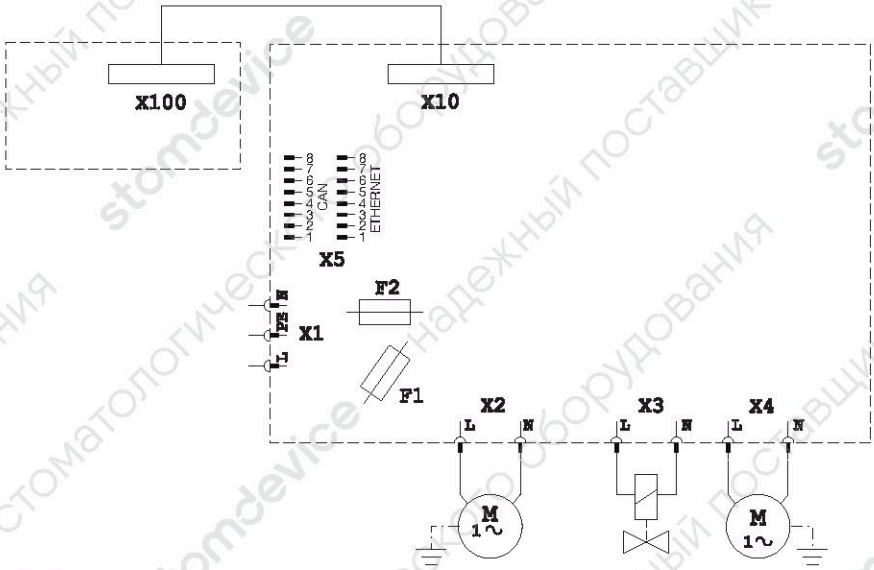
If no touch pulse is received for 30 seconds, the system will automatically switch to standby operation. The settings are not saved.

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11 Controller

11.1 Circuit diagram



Main PCB (main board)

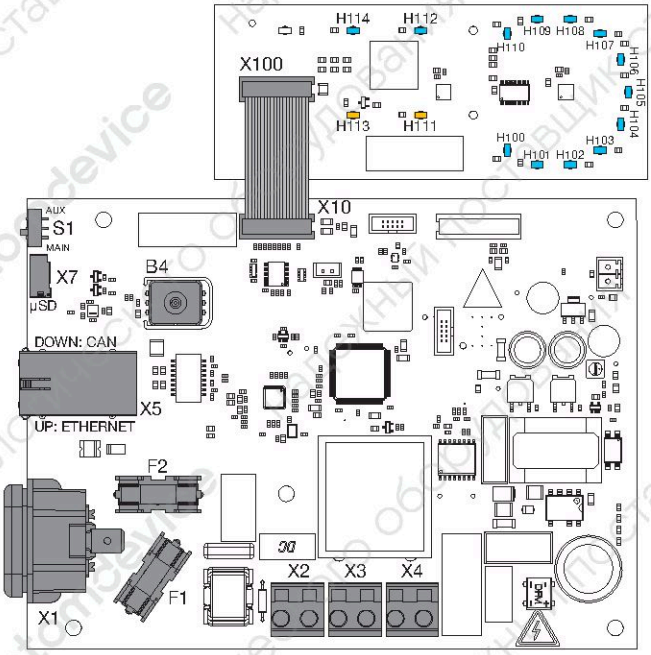
F1	Fuse for motor, valve, fan
F2	Fuse for controller
X1	Supply voltage, 230 V
X2	Compressor unit
X3	Relief valve
X4	Cooling fan motor, membrane drying unit
X5	Network and CAN bus
X10	Connector to the display PCB

Display/controller PCB

X100	Connector to the main PCB

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11.2 Electrical connections, controller



Main PCB (main board)

F1	Fuse for motor, valve, fan
F2	Fuse for controller
X1	Supply voltage, 230 V
X2	Compressor unit
X3	Relief valve
X4	Cooling fan motor, membrane drying unit
X5	Network and CAN bus
X7	SD card holder (for Micro SD), optional
X10	Connector to the display PCB
B4	Pressure sensor
S1	Selector switch for main device (MAIN) / auxiliary device (AUX)

Display/controller PCB

X100	Connector to the main PCB
H100-H110	Pressure display
H111	Orange display / fault button
H112	Blue display / service key
H113	Orange display / filter replacement button
H114	Blue display / standby button

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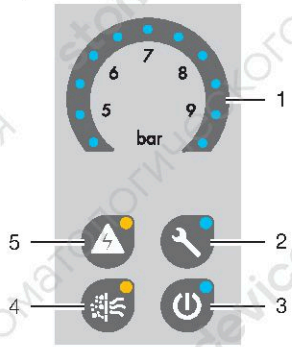
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Usage

12 Operation

Prior to working on the unit or in case of danger, disconnect it from the mains.

12.1 Operating panel



1 Pressure range display/adjustment
2 Service key with blue LED
3 Standby button with blue LED
4 Filter change button with orange LED
5 Fault button with orange LED

Different messages and the status of the unit are displayed on the operating panel. In addition, different functions can be started via the buttons.

Buttons

Fault button	Display of alarm messages with different levels of importance. This can be faults, warning messages and information.
Filter replacement button	"Maintenance required" display for the various filters.
Service key	Check of the safety valve and adjustment of the pressure range.
Standby button:	Switching between normal operation and standby mode.

Pressure range

The pressure is displayed and can be adjusted in this area.
The pressure is displayed via:
1. Blue LED (≤ 4.5 bar):
only illuminates while the pressure is building up during start-up operation
2. - 10. Blue LEDs (= 5 - 9 bar):
these indicate the pressure status in increments of 0.5 bar
11. Blue LED (≥ 9.5 bar):
the pressure in the container is too high (i.e. outside the adjustment range).

12.2 Switching the unit on/off

› Switch the unit on and off via the surgery main switch.
The compressor unit will start up automatically and fill the pressure tank. When the cut-off pressure is reached the compressor unit switches itself off automatically.

12.3 Standby mode

In standby mode the appliance is taken out of operation without disconnecting it from the mains.

› Press the standby button for at least 2 seconds.
The standby button and service key are active. Normal operation is reactivated with the standby button.
The system can switch to setting mode with the service key. To do so, press the service key for at least 2 seconds.

12.4 Fault

The controller monitors the functions of the unit and signals faults according to their importance. Faults, warnings or information can be displayed. Faults are triggered as a result of faults in component assemblies or as a result of sensor defects. The device is switched off and the LED of the fault button flashes or lights up.
Fault button, orange LED *flashes*
Normal mode or emergency mode can be activated.
Fault button, orange LED *lights up*
As well as faults, the LED on the fault button also lights up to indicate warning messages and information.
The device continues to operate in normal mode.

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This keeps the operator informed about emergency mode, humidity, leaks or overheating. Warning messages and information are automatically deactivated after the fault has been rectified, with exception of emergency mode.

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13 Maintenance

Prior to working on the unit or in case of danger, disconnect it from the mains.

CAUTION

Risk of infection due to burst filters

Particles enter the compressed air network and can therefore enter the mouth of the patient.

› Replace filters in accordance with the maintenance schedule.

13.1 Maintenance schedule

NOTICE

Risk of damage to the unit due to blocked filters

Continuous running due to reduced delivery. Damage to the unit due to burst filters.

› Replace filters in accordance with the maintenance schedule.

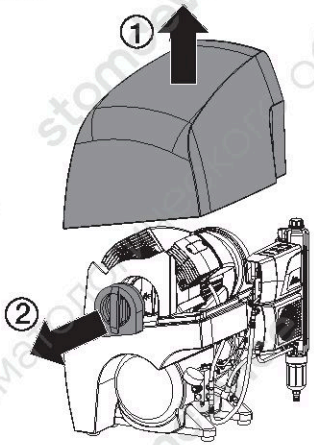
Every time you work with the unit, check it visually for damage to ensure safe and reliable operation. Damaged units must not be taken back into use.

Maintenance interval	Maintenance work
At regular intervals	› Empty the collector tray under the membrane drying unit (the interval may vary depending on the ambient conditions and method of working; empty it daily if the humidity is high).
Annually	› Replace the air intake filter in the compressor unit – do this every six months if there is a high concentration of dust. › Replace the fine or sterile filter. › Replace the sintered filter.
Every 5 years	› Replace the vibration reducers. › Change the cup seal.
In accordance with national law	› Check the safety valve. › Carry out recurring safety inspections (e.g. pressure tank inspections, electrical safety inspections) in accordance with applicable national laws.

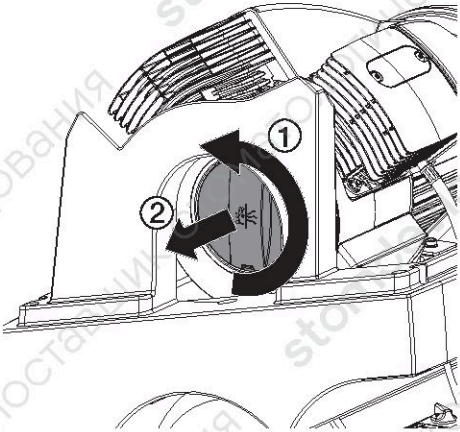
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13.2 Replacing the air intake filter

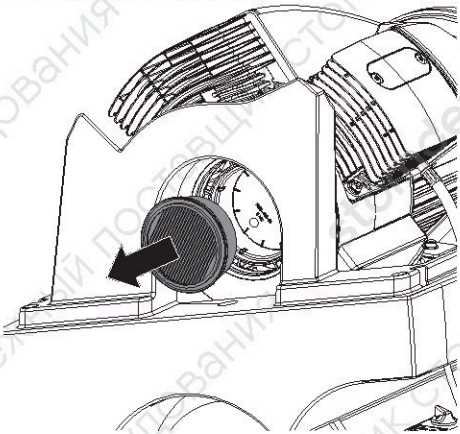
› Switch the compressor to standby mode with the standby button.
› Unplug the mains plug.
› Take off the noise reducing hood and the foam filter cover.



› Release the filter cover by rotating it **anti-clockwise** and then take it off.



› Remove the air intake filter.

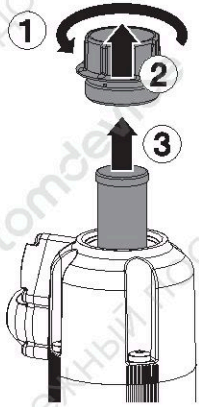


› Insert a new air intake filter.
› Place the filter cover in position and lock it by turning it **clockwise**.
› Fit the the foam filter cover and the noise reducing hood.

13.3 Replacing the filter of the membrane drying unit

Fine/sterile filter

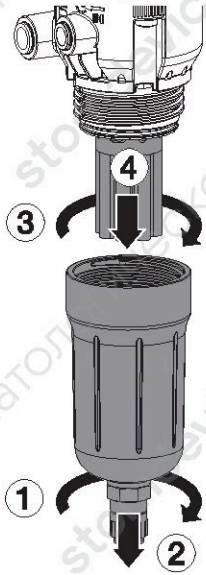
› Switch off the unit.
› Disconnect all power from the device.
› Unscrew and remove the filter cover.
› Remove the fine/sterile filter.
› Insert the new fine/sterile filter.
› Replace the filter cover and close.



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Sintered filter

› Unscrew and remove the filter housing.
› Remove the sintered filter.
› Insert a new sintered filter.
› Replace the filter housing and close.



14 Taking out of use

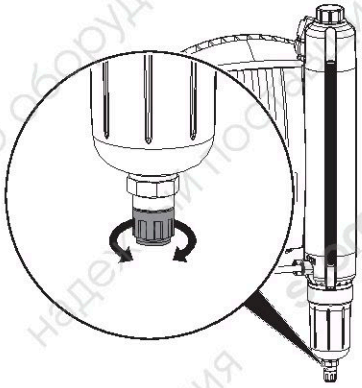
14.1 Taking the unit out of use

If the unit is not to be used for a prolonged period of time, we recommend that it is properly shut down and taken out of use.
To do this, the accumulated condensation water from the unit must be drained.

› Switch on the unit and wait until the cut-off pressure is reached.

Membrane drying unit

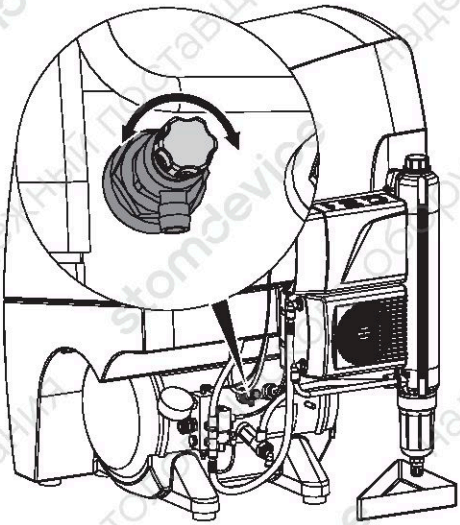
› While the compressor unit is running, open the condensate drain valve on the membrane drying unit. When no more condensation water emerges, close the condensate drain valve.
› Switch off the device.



Pressure tank

› Open the condensate drain valve.
Once the start-up pressure has been reached the compressor will switch on.
› With the compressor switched on and the condensate drain valve open, wait until no more condensation water emerges.
› Switch off the unit.
› Close the condensate drain valve when no more air escapes.
› Disconnect all power from the device.
› Disconnect the compressed air connection on the quick release coupling.

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14.2 Storage of the unit

WARNING

Risk of explosion of the pressure tank and pressure hoses

› The pressure tank and the pressure hoses must be vented before they are stored or transported.

› Protect the unit against moisture, dirt and extreme temperatures during transport (refer to the section on "Ambient conditions").

› Only store the unit when it has been completely emptied.

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15 Tips for operators and service technicians

Any repairs exceeding routine maintenance may only be carried out by qualified personnel or our service.

Prior to working on the unit or in case of danger, disconnect it from the mains.

Error	Possible cause	Remedy
Compressor will not start	No mains voltage	› Check the mains fuse; if necessary, switch the circuit breaker back on. If the fuse is defective, replace it.
	Undervoltage or overvoltage	› Measure the supply voltage; call an electrician if necessary.
	Device in standby mode	› Switch on the device.
Humming noise from motor	Motor capacitor is defective	› Replace the capacitor.
Compressor does not switch off	Wrong size of compressor, air intake too high	› Calculate the air requirement (this can be up to 50 l/min per treatment unit), if necessary install a larger compressor.
	Leak in the compressed air system	› Locate and seal the leak. › Inform a service technician.
	Defective membrane drying unit	› Check whether there is an increased flow of air at the filter housing of the membrane drying unit (bottom), if necessary replace the membrane drying unit.
Compressor switches on from time to time even though no air is being taken for a consumer unit	Leak in the compressed air system	› Locate and seal the leak. › Inform a service technician.
Knocking or loud noises on the compressor	Compressor unit defective	› Disconnect all power from the device and inform a service technician.
Reduced delivery. Compressor needs longer to charge the pressure tank, see charging times in "4 Technical data"	Air intake filter dirty	› Replace the air intake filter at least 1x per year. The air intake filter must never be cleaned.
	Defective membrane drying unit	› Replace the membrane drying unit. › Inform a Service Technician.
	Cup seal worn at the piston or defective	› Replace the cup seal or the entire piston.

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Error	Possible cause	Remedy
Water dripping from air consumers	Maintenance work not carried out regularly (without membrane drying unit)	› Regularly drain the condensation water from the pressure tank, see "9.3 Draining the condensation water"
	Defective membrane drying unit	› Inform a service technician.

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Appendix

16 Handover record

This document confirms that a qualified handover of the medical device has taken place and that appropriate instructions have been provided for it. This must be carried out by a qualified adviser for the medical device, who will instruct you in the proper handling and operation of the medical device.

Product name	Order number (REF)	Serial number (SN)

- ☐ Visual inspection of the packaging for any damage
- ☐ Unpacking the medical device and checking for damage
- ☐ Confirmation of the completeness of the delivery
- ☐ Instruction in the proper handling and operation of the medical device based on the operating instructions

Notes:

Name of person receiving instruction:	Signature:

Name and address of the qualified adviser for the medical device:

Date of handover:	Signature of the qualified adviser for the medical device:

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