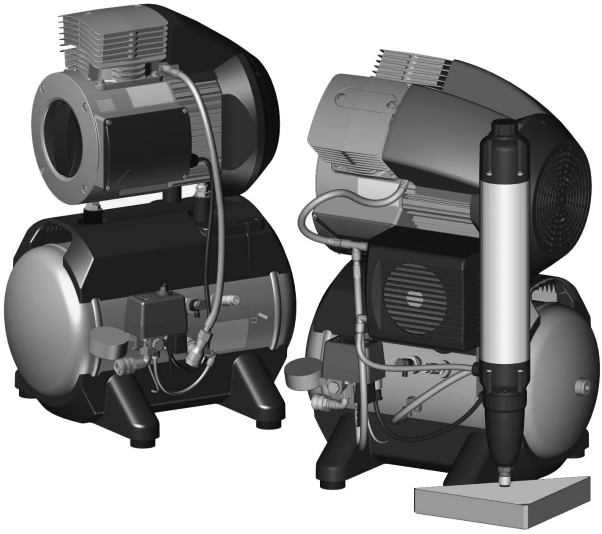
Tornado 1 / Tornado 2



EN Installation and operating instructions

CE 0297

DÜRR DENTAL

9000-610-60/02 2504V012

The current version of the installation and operating instructions is available in the Download Center:

http://qr.duerrdental.com/9000-610-60

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Important information

1 About this document

These installation and operating instructions represent part of the unit.

The manufacturer and the distributor will not offer any guarantee or accept any liability for the safe operation and the safe functioning of the unit if the instructions and information in these installation and operating instructions are not complied with.

The German version of the installation and operating instructions is the original manual. All other languages are translations of the original manual. These installation and operating instructions apply to:

Tornado 1
REF: 5180-01; 5180-03; 5185-01; 5182-01; 5182-02; 5182-03; 5186-01

Tornado 2
REF: 5280-01; 5280-03; 5282-01; 5282-03; 5282100029; 5286-01

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.


Refer to the accompanying electronic documents.


Disconnect all power from the unit.


Air


Filter symbol


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

CE labelling with the number of the notified body

Ukrainian conformity mark with registration number

Conformity mark for the United Kingdom of Great Britain and Northern Ireland, with the number of the designated authority

Authorised representative for Switzerland

REF Order number

SN Serial number

MD Medical device

HIBC Health Industry Bar Code (HIBC)

 Manufacturer

1.2 Copyright information

2 Safety

The unit has been developed and designed in such a way that dangers are effectively ruled out if used in accordance with the Intended Use. 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 electrical 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.

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 operator 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

– The manufacturer recommends that installation, readjustments, alterations, upgrades and repairs be carried out either by the manufacturer itself or by a qualified specialist authorised by the manufacturer.

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.

Notify the manufacturer of any serious incidents under the following email address: incidents@duerrdental.com.

2.8 Only use original parts

– Only use accessories and optional articles named or authorised by the manufacturer.
– Only use only original wear parts and replacement parts.

The manufacturer and distributor accept no liability for damages or injury resulting from the use of non-approved accessories, 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 cables) 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 transportation.
If required, the original packaging for the unit can be ordered.

The manufacturer and the distributor do not accept liability, even during the warranty period, for damage during transportation due to improper packaging.

– Only transport the unit in its original packaging.
– Keep the packing materials out of the reach of children.

2.10 Disposal

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:

http://qr.duerrdental.com/P007100155

Product description

3 Overview

3.1 Scope of delivery

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

Tornado 1 5180-01
Tornado 1 5180-03
Tornado 1, sound-insulated 5185-01
Tornado 2 5280-01
Tornado 2 5280-03

– Compressor
– Fabric reinforced hose
– Hose nozzle
– Hose clamp
– Vibration dampers
– Cable ties
– Mains cable
– Short information

Tornado 1 with membrane drying unit . 5182-01
Tornado 1 with membrane drying unit, 100-110 V, 50 Hz / 100-127 V, 60 Hz . 5182-02
Tornado 1 with membrane drying unit . 5182-03
Tornado 1 with membrane-drying unit, sound-insulated 5186-01
Tornado 2 with membrane drying unit . 5282-01
Tornado 2 with membrane drying unit . 5282-03
Tornado 2 with membrane drying unit 5282100029
Tornado 2 with membrane-drying unit, sound-insulated 5286-01

– Compressor
– Fabric reinforced hose
– Hose nozzle
– Hose clamp
– Vibration dampers
– Cable ties
– Mains cable
– Short information
– Collector tray

3.2 Optional items

The following items can optionally be used with the unit; these items do not bear the CE mark:

Pressure reducer 6040-992-00
Virus bacteria filter 1650100172
Wooden cabinet for sound insulation 5150-500-00

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
Virus bacteria filter 1650100172
Coalescence filter 1650200323
Cup seal repair set 5180-981-00

To configure the required filters or filter sets, you can also use our filter configurator at:
www.duerrdental.com/filterkonfigurator

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

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

If the mains cable of this unit is damaged, it must be replaced by an adequate mains cable (H05VV-F, or abbreviation 60227 IEC 53, minimum cable cross-section 1 mm^2).

4 Technical data

4.1 Tornado 1

Electrical data		5180-01	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	3.7	4.4
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	10	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	67	77
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	100	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Dimensions (H x W x D) *	cm	66 x 48 x 41	
Weight	kg	31	
Noise level ** With wooden cabinet	dB(A) dB(A)	64 49	- 51

* Values without accessories and add-on parts

** according to ISO 3744

Classification	
Medical Device Class (MDR)	IIa

4.2 Tornado 1

Electrical data		5180-03	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	3.7	4.4
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	10	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	67	77
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	100	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Dimensions (H x W x D) *	cm	66 x 48 x 41	
Weight	kg	31	
Noise level **	dB(A)	64	-

* Values without accessories and add-on parts
** according to ISO 3744

Classification	
Medical Device Class (MDR)	IIa

4.3 Tornado 1

Electrical data		5185-01	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	3.7	4.4
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	10	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20 20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	67	77
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	100	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Dimensions (H x W x D) *	cm	84 x 63 x 53	
Weight	kg	44	
Noise level **	dB(A)	55	57

* Values without accessories and add-on parts

** according to ISO 3744

Classification	
Medical Device Class (MDR)	IIa

4.4 Tornado 1 with membrane drying unit

Electrical data		5182-01	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	3.7	4.4
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	10	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	60	70
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	133	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	65 x 49 x 47	
Weight	kg	35	
Noise level *** With wooden cabinet	dB(A) dB(A)	64 51	- 50

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.5 Tornado 1 with membrane drying unit

Electrical data		5182-02	
Rated voltage	V	100 - 110	100 - 127
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	8.6 - 9.0	9.1 - 8.0
Motor protection switch, recommended settings	A	8.6 - 10	9.1 - 9.1
Type of protection		IP 24	
Mains fuses *	A	16	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	60	70
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	133	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	65 x 51 x 47	
Weight	kg	36	
Noise level ***	dB(A)	64	-

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.6 Tornado 1 with membrane drying unit

Electrical data		5182-03	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	3.7	4.4
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	10	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	60	70
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	133	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	65 x 49 x 47	
Weight	kg	35	
Noise level *** With wooden cabinet	dB(A) dB(A)	64 51	- 50

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.7 Tornado 1 with membrane drying unit

Electrical data		5186-01	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	3.7	4.4
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	10	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	130	155
Delivery at 5 bar (0.5 MPa)	l/min	60	70
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	133	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	49	
Noise level ***	dB(A)	58	60

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.8 Tornado 2

Electrical data		5280-01	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	7.6	6.9
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	16	
Max. permissible mains impedance in accordance with EN 61000-3-11	Ω	(0.276 + j0.172)	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	260	315
Delivery at 5 bar (0.5 MPa)	l/min	124	140
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	53	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Dimensions (H x W x D) *	cm	65 x 48 x 41	
Weight	kg	38	
Noise level ** With wooden cabinet	dB(A) dB(A)	68 51	- 52

* Values without accessories and add-on parts
** ISO 3744

Classification	
Medical Device Class (MDR)	IIa

4.9 Tornado 2

Electrical data		5280-03	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	7.6	6.9
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	16	
Max. permissible mains impedance in accordance with EN 61000-3-11	Ω	(0.276 + j0.172)	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical data			
Pressure tank volume	l	20	
Suction power, approx.	l/min	260	315
Delivery at 5 bar (0.5 MPa)	l/min	124	140
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	53	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Dimensions (H x W x D) *	cm	65 x 48 x 41	
Weight	kg	38	
Noise level ** With wooden cabinet	dB(A) dB(A)	68 51	- 52

* Values without accessories and add-on parts
** ISO 3744

Classification		
Medical Device Class (MDR)		IIa

4.10 Tornado 2 with membrane drying unit

Electrical data		5282-01 5282100029	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	7.7	7.0
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	16	
Max. permissible mains impedance in accordance with EN 61000-3-11	Ω	(0.276 + j0.172)	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical 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	73	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	65 x 49 x 47	
Weight	kg	44	
Noise level *** With wooden cabinet	dB(A) dB(A)	68 51	- 51

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.11 Tornado 2 with membrane drying unit

Electrical data		5282-03	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	7.7	7.0
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	16	
Max. permissible mains impedance in accordance with EN 61000-3-11	Ω	(0.276 + j0.172)	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical 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	73	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	65 x 49 x 47	
Weight	kg	44	
Noise level *** With wooden cabinet	dB(A) dB(A)	68 51	- 51

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.12 Tornado 2 with membrane drying unit

Electrical data		5286-01	
Rated voltage	V	230	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	7.7	7.0
Motor protection		Motor winding overheat protector	
Type of protection		IP 24	
Mains fuses *	A	16	
Max. permissible mains impedance in accordance with EN 61000-3-11	Ω	(0.276 + j0.172)	

* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1

General technical 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	73	-
Duty cycle	%	100	
Cut-In pressure	bar (MPa)	6 (0.6)	
Cut-out pressure	bar (MPa)	7.8 (0.78)	
Cut-off pressure, max. adjustable	bar (MPa)	8 (0.8)	
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	57	
Noise level ***	dB(A)	59	62

* Value determined at an ambient temperature of +40 °C
** Values without accessories and add-on parts
*** In accordance with ISO 3744

Air purity
Air quality in accordance with ISO 22052 chap. 5.3 fulfilled*
* measured with virus-bacteria filter

Classification	
Medical Device Class (MDR)	IIa

4.13 Filter

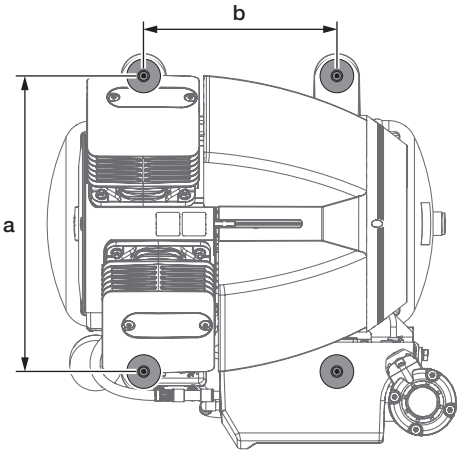
Filter mesh size		
Air intake filter	µm	3
Fine filter	µm	3
Virus bacteria filter	µm	0.01
Coalescence filter	µm	0.01

4.14 Ambient conditions

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

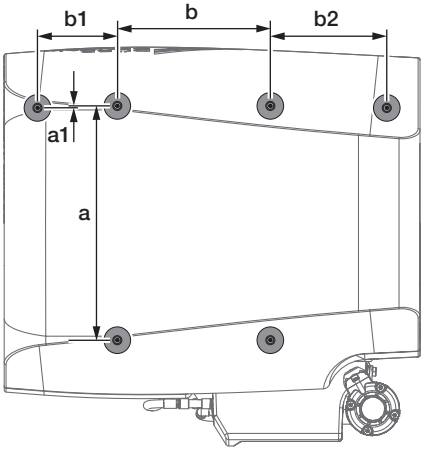
Ambient conditions during operation		
Temperature	°C	+10 - +40
Ideal temperature	°C	+10 - +25
Relative humidity	%	< 95

4.15 Distance between rubber feet



	A (cm)	b (cm)
20 l	35	23

With noise reducing hood

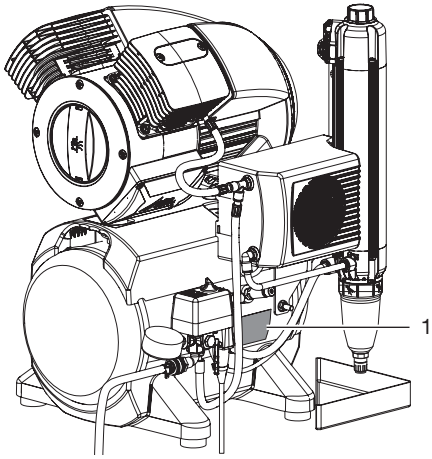


	A (cm)	a1 (cm)	b (cm)	b1 (cm)	b2 (cm)
20 l	35	0.5	23	17.5	12

4.16 Type plate

Complete system

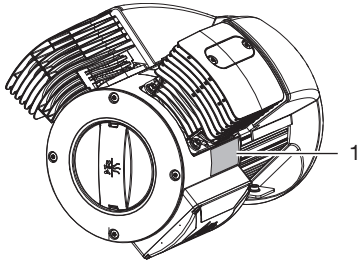
The type plate for the complete system is located on the pressure tank.



1 Type plate for the complete system

Compressor unit Tornado 1 / 2

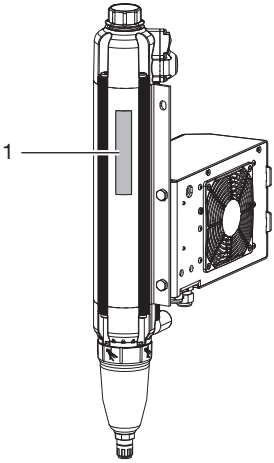
The type plate of the compressor unit is located on the crankcase below the cylinder.



1 Compressor unit type plate

Membrane drying unit

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



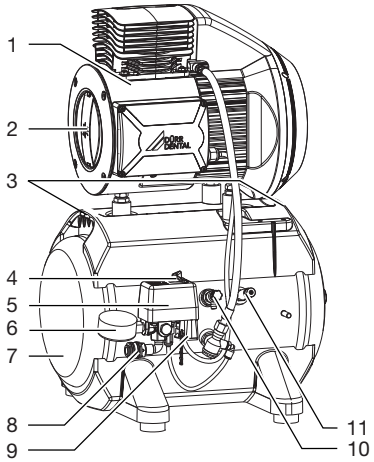
1 Membrane drying unit type plate

4.17 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.

5 Function

5.1 Unit without membrane-drying unit



1 Compressor unit
2 Air intake filter
3 Carry handles
4 On/off switch
5 Pressure switch
6 Pressure gauge/display
7 Pressure vessel
8 Compressed air connection (quick release coupling)
9 Mains connection
10 Condensate drain valve
11 Safety valve

NOTICE

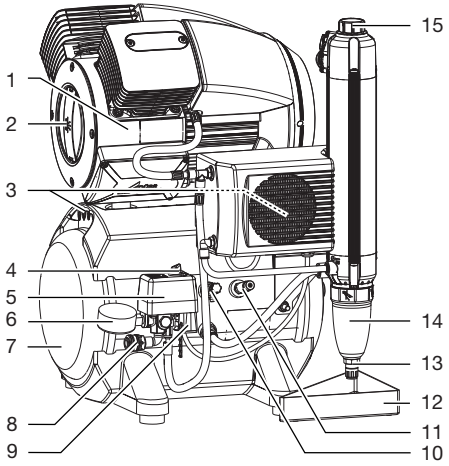
Risk of corrosion of the unit

Moisture can lead to premature corrosion.

› Retrofit a membrane drying unit.

The compressor unit draws in atmospheric air and compresses this air oil-free. The oil-free compressed air is then transported directly to the pressure tank. The oil-free and hygienic air is made available to the consumers in the pressure tank.

5.2 Unit with membrane-drying unit



1 Compressor unit
2 Air intake filter
3 Carry handles
4 On/off switch
5 Pressure switch
6 Pressure gauge/display
7 Pressure vessel
8 Compressed air connection (quick release coupling)
9 Mains connection
10 Condensate drain valve
11 Safety valve
12 Collector tray
13 Automatic/manual condensate drain valve, membrane drying unit
14 Coalescence filter
15 Fine or virus bacteria filter

The compressor unit draws in atmospheric air and compresses this air oil-free. 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.

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, on a floor below (e.g. cellar) or under the roof.
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.
The compressed air network to which the unit is connected must be designed for the maximum pressure of the unit (10 bar).

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 DIN EN ISO 22052 must be observed.

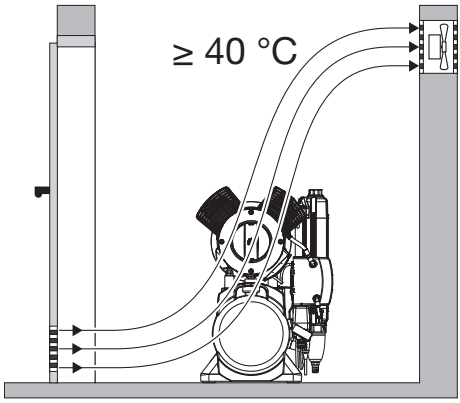
NOTICE

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.

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.

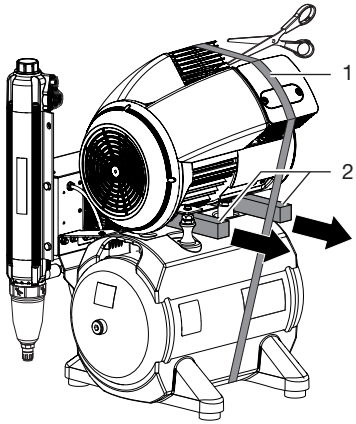
– Protect the unit against moisture, dirt and extreme temperatures during transport.
– Always make sure that the condensate collector chamber is empty before transporting the unit.
– Always transport the unit in an upright position.
– Only transport the unit using the transport handles provided.
– Check the unit for transport damage.

8 Installation

8.1 Remove the transport locks

For safe transport, the unit is secured with foam padding blocks and a transport strap.

1. Cut and remove the transport strap.
2. Remove the foam padding blocks.

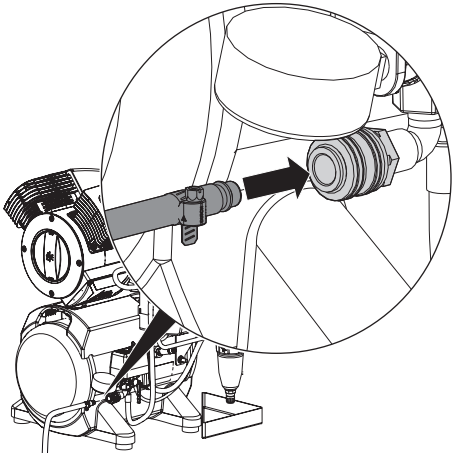


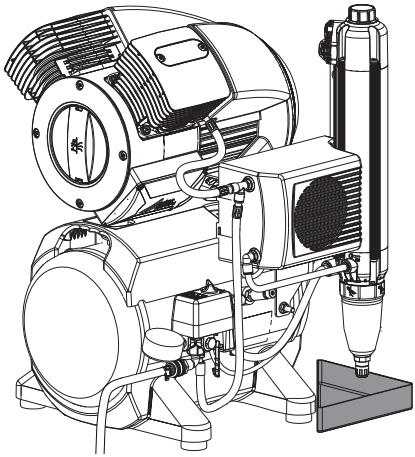
1 Transport strap
2 Foam padding blocks

8.2 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.

1. Connect the pre-assembled connecting sleeve of the pressure hose to the quick release coupling.
2. Measure the required length of the pressure hose and shorten if necessary.
3. 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.
4. Connect the connecting sleeve of the pressure hose to the compressed air tube.





8.3 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 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.

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

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 device 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 taking the unit into operation for the first time, check that the power supply voltage matches the voltage specifications on the type plate.

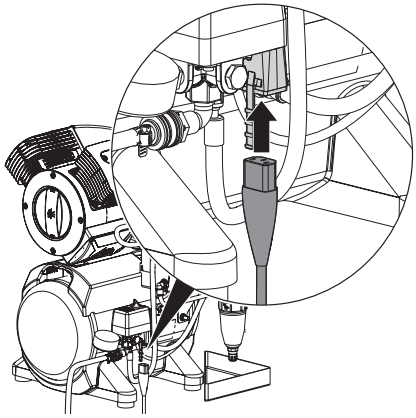
Establishing the electrical connections

DANGER

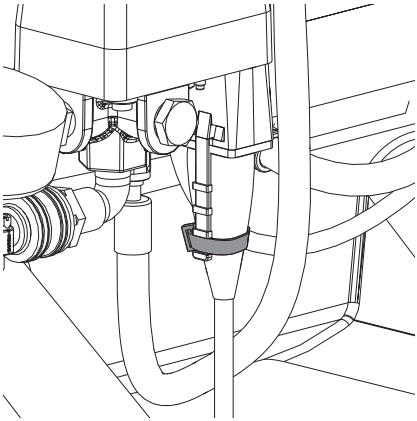
Risk of electric shock due to defective mains cable

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

1. Connect the connector of the mains cable to the corresponding mains plug at the pressure switch.



2. Secure the mains connector using the cable tie provided.



3. Connect the mains plug to an earthed power outlet.

9 Commissioning

1. 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.

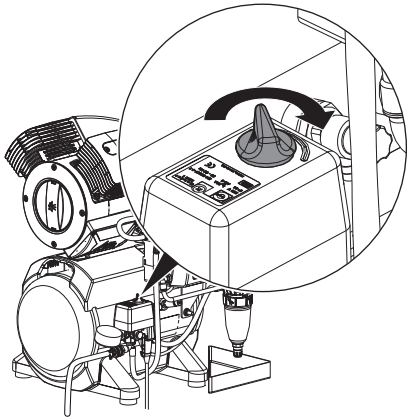
2. Turn on the unit power switch or the main surgery switch.

3. 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 Check the motor protection switch

In the case of compressors that are operated at 100 – 127 V, the motor protection switch must be checked and adjusted in the event of deviations. The motor protection switch is combined with the pressure switch in a shared unit. It was set to the recommended setting in the factory (see "4 Technical data").
Compressors that are operated at 230 V have a motor winding protector instead of a motor protection switch, which cannot be adjusted.

1. Switch on the unit at the pressure switch by turning it to the position "I AUTO".



2. Measure the maximum current consumption (this is the value just before the cut-off pressure is reached).

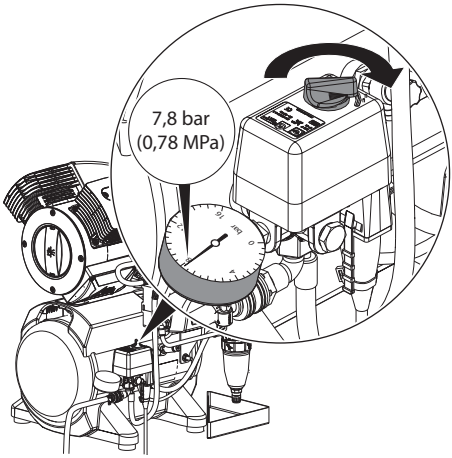
   If the reading deviates from the recommended setting, then the motor protection switch needs to be adjusted (see "10.2 Adjusting the motor protection switch").

9.2 Checking the switch-on/cut-off pressure

The switch-on/cut-off pressure is preset at the factory. Check the setting during first start-up.

1. Switch on the unit at the pressure switch by rotating it to the position "I AUTO".
2. Read off the cut-off pressure from the pressure gauge.
3. Drain the air from the pressure tank (e.g. via the condensate drain valve) until the unit starts and then close it again.
4. Read off the pressure when the unit switches on.

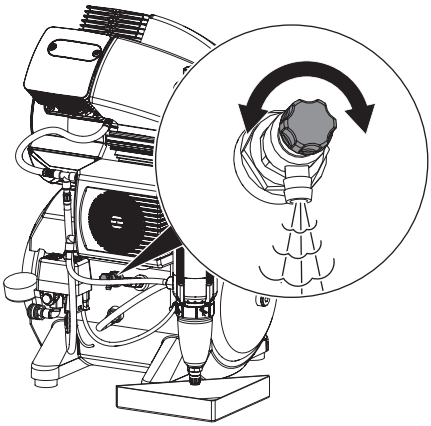
   If the readings deviate from the values preset at the factory, adjust the pressure switch to the factory settings.



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.

1. Switch on the unit at the pressure switch and wait until the cut-off pressure is reached.
2. At maximum tank pressure, slowly open the condensate drain valve.
3. Close the condensate drain valve as soon as all of the accumulated condensation water has been blown out.



10 Adjustment options

10.1 Adjusting the pressure switch

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.

DANGER

Exposed live parts

Risk of electric shock due to live parts

› Disconnect all power from the unit.

› Use insulated tools.

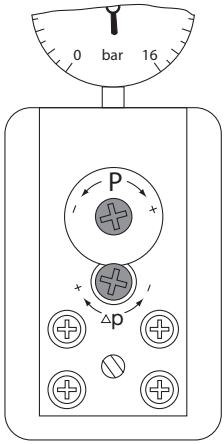
› Do not touch live parts.

The cut-off pressure must be at least 0.5 bar (0.05 hPa) below the maximum pressure of 10 bar (1 hPa) of the safety valve. Otherwise the safety valve can open too early, the cut-off pressure will not be obtained, and the compressor generator will run continuously. The maximum permitted pressure is marked by a red line on the attached pressure gauge.

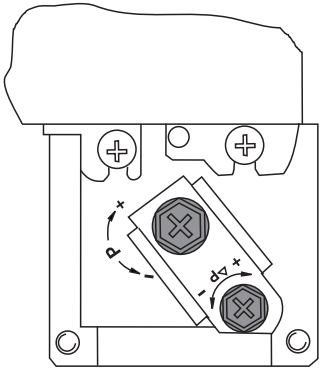
If the read-off values differ from the factory settings or if other settings are required, the cut-off pressure of the compressor can be adjusted at the adjusting screw on the pressure switch. The start-up pressure can then be adjusted using the pressure difference Δp.

1. Take off the pressure switch cover.
2. Adjust the cut-off pressure P at the adjustment screw.
   The cut-off pressure increases in the "+" arrow direction and decreases in the "-" arrow direction. The pressure difference Δp is also influenced by this adjustment.
3. Adjust the start-up pressure via the pressure difference Δp at the adjustment screw.
   The pressure difference increases in the "+" arrow direction and decreases in the "-" arrow direction.
   The maximum permissible pressure difference must not be set to more than 3 bar.

MDR 1



MDR 3



10.2 Adjusting the motor protection switch

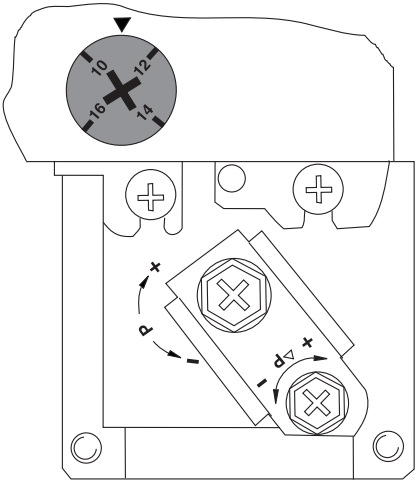
NOTICE

Danger of overheating if the motor protection switch is set too high

If the motor protection switch is set too high, motor damage can occur as a result of overheating.

› Set the motor protection switch properly.

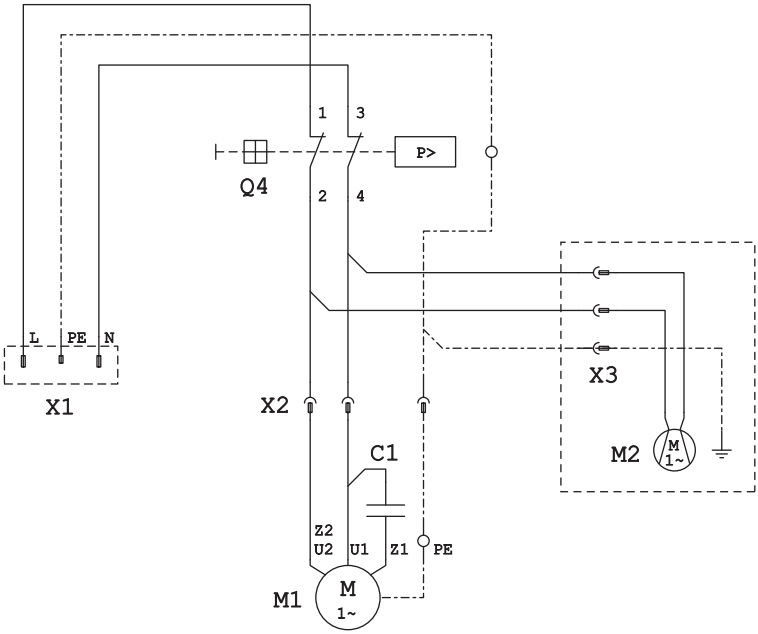
1. Take off the pressure switch cover.
2. Use the setting screw to set the motor protection switch to the required value (see "4 Technical data").



11 Circuit diagrams

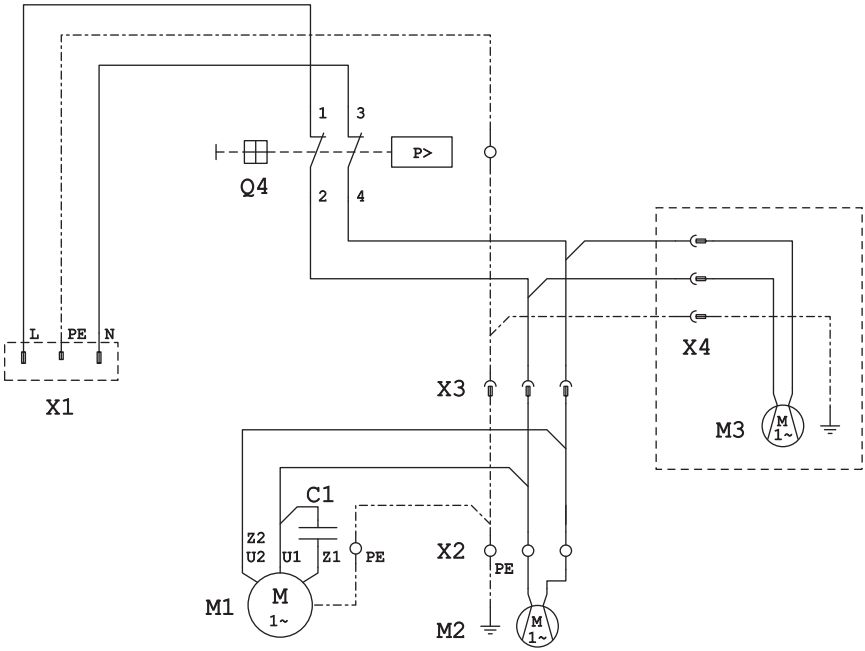
11.1 230 V units

Units without a membrane-drying unit



C1 Condenser
M1 Compressor motor
M2 Fan motor, noise reduction hood (if required)
Q4 Pressure switch
X1 Mains connection 1/N/PE AC 230 V
X2 Compressor motor plug connection
X3 Plug connection for fan motor, noise reduction hood (if required)

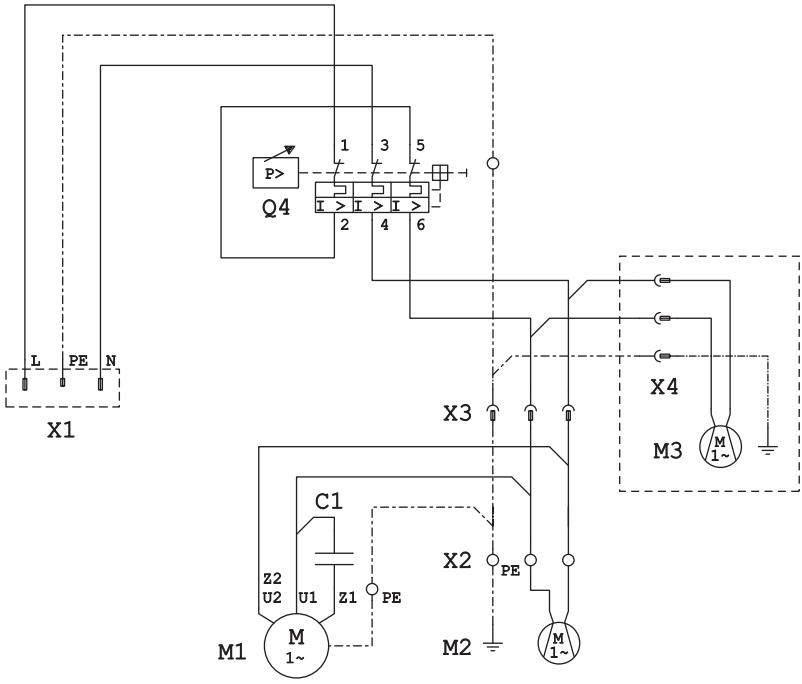
Unit with membrane-drying unit



C1 Condenser
M1 Compressor motor
M2 Cooling fan motor, membrane drying unit
M3 Fan motor, noise reduction hood (if required)
Q4 Pressure switch
X1 Mains connection 1/N/PE AC 230 V
X2 Plug connection for fan motor, cooling, membrane drying unit
X3 Plug connection for compressor motor and cooling, membrane drying unit
X4 Plug connection for fan motor, noise reduction hood (if required)

11.2 Devices with 110 - 127 V

Unit with membrane-drying unit



C1 Condenser
M1 Compressor motor
M2 Cooling fan motor, membrane drying unit
M3 Fan motor, noise reduction hood (if required)
Q4 Pressure switch
X1 Mains connection 1/N/PE AC 110 - 127 V / 230 V
X2 Plug connection for fan motor, cooling, membrane drying unit
X3 Plug connection for compressor motor and cooling, membrane drying unit
X4 Plug connection for fan motor, noise reduction hood (if required)

Usage

12 Operation

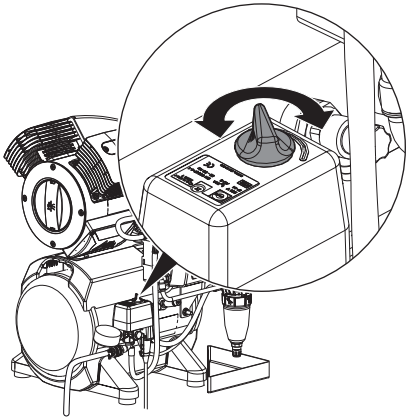
Prior to working on the unit or in case of danger, disconnect it from the mains.

12.1 Switching the unit on/off

1. Switch on the unit at the pressure switch by turning it to the position "I AUTO".

   The compressor unit will run automatically and the pressure tank will be filled. When the cut-off pressure has been reached, the compressor unit will switch off automatically.

2. The unit can be switched off when required by turning the pressure switch to the "0 OFF" setting.



13 Maintenance

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

WARNING

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.

Unit without membrane-drying unit

Maintenance interval	Maintenance work
At regular intervals	› Drain the condensation water – daily if the humidity is high.
Annually	› Replace the air intake filter – every six months if the concentration of dust is high.
Every 5 years	› Replace the vibration dampers. › 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.

Unit with membrane-drying unit

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 fine or virus-bacteria filter. › Replace the coalescence filter.
Every 5 years	› Replace the vibration dampers. › 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.

13.2 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
Virus bacteria filter 1650100172
Coalescence filter 1650200323
Cup seal repair set 5180-981-00

To configure the required filters or filter sets, you can also use our filter configurator at:
www.duerrdental.com/filterkonfigurator

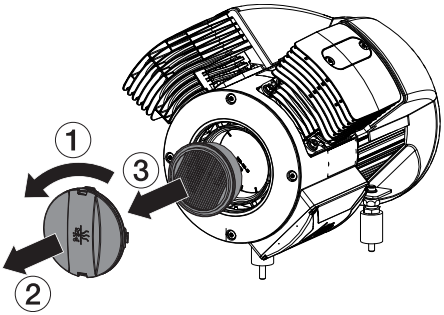
Any repairs exceeding routine maintenance may only be carried out by qualified personnel or our service.

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

13.3 Replacing the air intake filter

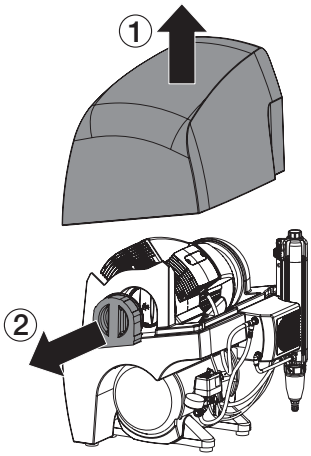
Units without a noise reduction hood

1. Switch off the compressor at the pressure switch.
2. Disconnect all power from the device.
3. Release the filter cover by rotating it **anti-clockwise** and then take it off.
4. Remove the air intake filter.
5. Insert a new air intake filter.
6. Place the filter cover in position and lock it by turning it **clockwise**.

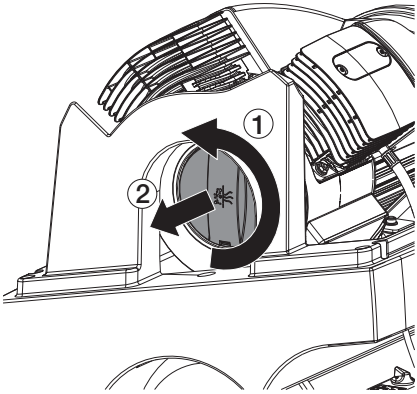


Units with a noise reduction hood

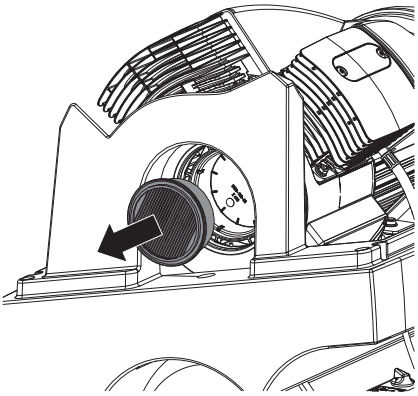
1. Switch off the compressor at the rotary switch of the pressure switch.
2. Disconnect all power from the unit.
3. Take off the noise reducing hood and the foam filter cover.



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



5. Remove the air intake filter.

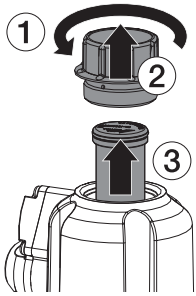


6. Insert a new air intake filter.
7. Place the filter cover in position and lock it by turning it **clockwise**.
8. Fit the the foam filter cover and the noise reducing hood.

13.4 Replacing the filter of the membrane drying unit

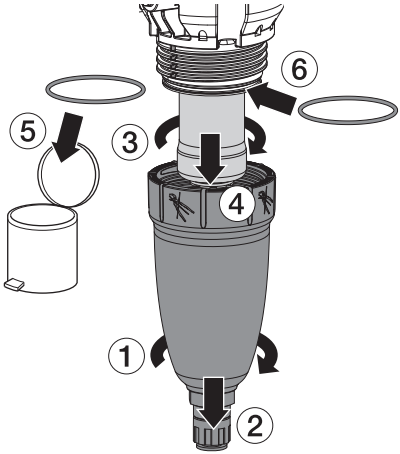
Fine or virus bacteria filter

1. Unscrew and remove the filter cover.
2. Remove the filter.
3. Insert a new filter.
4. Replace the filter cover and close.



Coalescence filter

1. Unscrew and remove the filter housing.
2. Remove the filter.
3. Replace O-ring.
4. Insert a new filter.
5. Replace the filter housing and close.



13.5 Checking the safety valve

The functioning of the safety valve must be checked at regular intervals in accordance with national regulations.

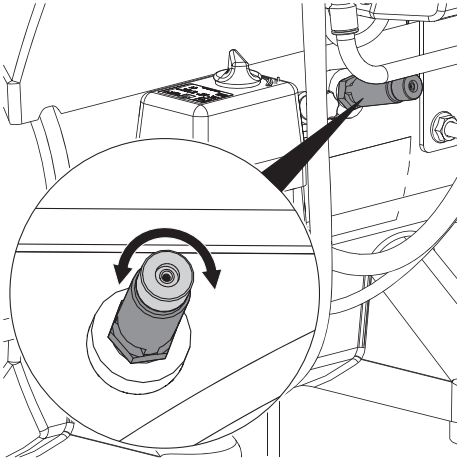
WARNING

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.

1. Switch on the unit at the pressure switch and fill the pressure tank to the cut-off pressure.
2. 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.
3. Then turn the screw clockwise as far as it will go to close the valve. The valve must now be closed again.



14 Taking out of use

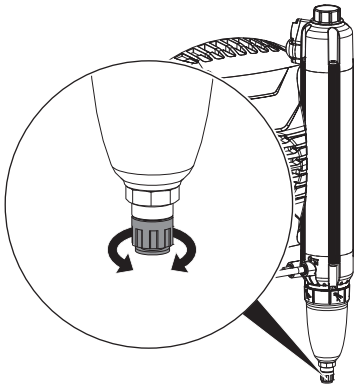
14.1 Taking the unit out of use

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.

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

Membrane drying unit

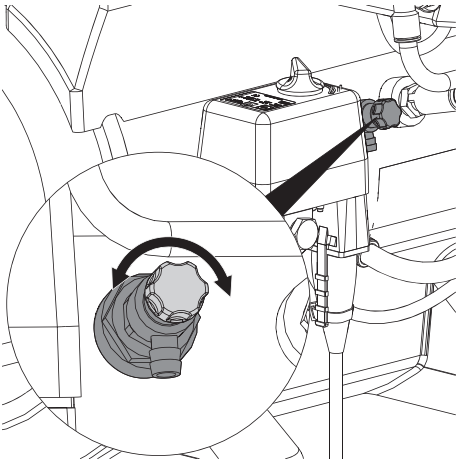
1. Open the condensate drain valve on the membrane drying unit with the compressor unit running. When no more condensation water emerges, close the condensate drain valve.
2. Switch off the device.



Pressure tank

1. Open the condensate drain valve.

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



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 storage (refer to the section on "Ambient conditions").
– Only store the unit when it has been completely emptied.

Troubleshooting

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 mains voltage; call an electrician if necessary.
	Pressure switch not switched on	› Switch on the pressure switch. › Inform a service technician.
	Motor winding overheating protector tripped (overheating)	› Allow the unit to cool down.
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.

Error	Possible cause	Remedy
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.
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.
Working cycles of the compressor are very short, even if only small amounts of air are removed	Condensed water in the tank	› Drain off condensed water › The dry air units of compressors fitted with dry air units need to be checked and replaced, if applicable.

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:

17 Country representatives

Country		Address
GB	UK CA XXXX	**UK Responsible Person:** Duerr Dental (Products) UK Ltd. 14 Linnell Way Telford Way Industrial Estate Kettering, Northants NN 16 8PS
UA	UA.TR.099	**Уповноважений представник в Україні:** Приватне підприємство “Галіт” вул. 15 квітня, 6Є, с. Байківці, Тернопільський р-н, 47711, Україна тел.: 0800 502 998; +38 050 338 10 64 www.galit.te.ua; e-mail: office@galit.te.ua Виробник: Дюрр Дентал ЕсЕ Хьопфігхаймер Штрассе 17, Д-74321 Бітігхайм-Біссінген, Німеччина email: info@duerrdental.com
CN		**备**案人/生**产**企**业**： DÜRR DENTAL SE 德国迪珥**齿**科股份公司 住所/生**产**地址： Höpfigheimer Str. 17, 74321 Bietigheim-Bissingen, Germany **联**系方式： **电话**： + 49 7142 705-0 **邮**箱： info@duerrdental.com 网址： www.duerrdental.com 代理人/售后服**务单**位：迪珥医**疗**器械（上海）有限公司 住所：上海市**长**宁区天山路 641 号 2 号楼 (20 幢) 303 室 **联**系方式： **电话**：+ 86 21 6381 0270 **传**真：+ 86 21 6381 0290 **邮**箱：info@duerr.cn 网址：http://www.duerrdental.com

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