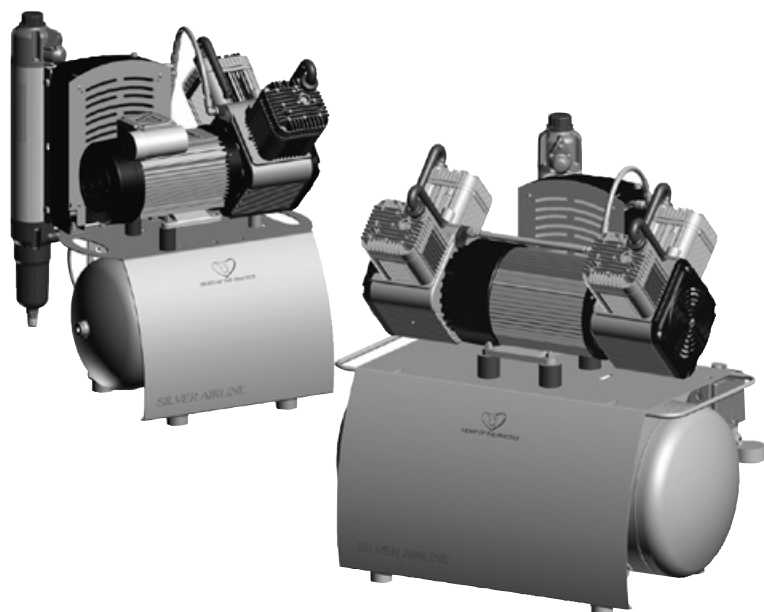


# Duo, Trio, Quattro, Duo Tandem, Quattro Tandem



EN

Installation and operating instructions



9000-610-45/30



 **DÜRR  
DENTAL**

1805V006



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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.

#### 1.1 Warnings and symbols

##### Warnings

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

The following warning symbols are used:



General warning symbol



Warning – risk of dangerous electric voltages



Warning – hot surfaces



Warning - automatic start-up of the unit

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.



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



Air



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



Manufacturer

#### 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. Nevertheless, residual risks can remain. You should therefore observe the following notes.

### 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 usage

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



#### **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 notes

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

### 2.5 Specialist personnel

#### **Operation**

Unit operating personnel must ensure safe and correct handling based on their training and knowledge.

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

#### **Installation and repairs**

- 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 Protection from electric shock

- When working on the units observe all the relevant electrical safety regulations.
- Immediately replace any damaged cables or plugs.

### 2.7 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 MEDICAL 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.

## 2.8 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.

## 2.9 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.



## 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):

<i>Duo 110 V, 1~, with condensate separator</i> . . . . .	5250100004
<i>Duo 110 V, 1~, with membrane drying unit</i> . . . . .	5252100001
<i>Duo 230 V, 1~, with membrane drying unit</i> . . . . .	5252-01
<i>Duo 230 V, 1~, with membrane drying unit</i> . . . . .	5252-01/Service
<i>Duo 400 V, with membrane drying unit</i> . . . . .	5252-51
<i>Trio 230 V, 1~, with membrane drying unit</i> . . . . .	5352-01
<i>Trio 230 V, 1~, with membrane drying unit</i> . . . . .	5352100001
<i>Quattro 400 V, with membrane drying unit</i> . . . . .	5452-51
<i>Quattro 400 V, with membrane drying unit</i> . . . . .	5452100001
<i>Duo Tandem 230 V, 1~, with membrane drying unit</i> . . . . .	4252-01
<i>Duo Tandem CAD/CAM 230 V, 1~, with membrane drying unit *</i> . . . .	4252100004
<i>Quattro Tandem 230 V, 3~, with membrane drying unit</i> . . . . .	4682-52
<i>Quattro Tandem 400 V, 3~, with membrane drying unit</i> . . . . .	4682-53
– Fabric reinforced hose	
– Hose nozzle	
– Hose clamp	
– Installation and operating instructions	
– Appliance log book	
– Collector tray	
* with sterile filter	

### 3.2 Optional accessories

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

Pressure reducer. . . . .	6040-992-00
Sterile filter . . . . .	1640-981-00
Wooden cabinet for for sound insulation of Duo Compressors . . . . .	5150-500-00
Wooden cabinet for for sound insulation of Duo Tandem, Trio and Quattro Compressors . . . . .	4251-500-00

### 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 . . . . .	0832-982-00
Fine filter . . . . .	1610-121-00
Sterile filter . . . . .	1640-981-00
Sintered filter. . . . .	1650-101-00
Fleece filter . . . . .	4280-982-00



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



Information about replacement parts is available from the portal for authorised specialist dealers at:  
[www.duerrdental.net](http://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.



## 4 Technical data

### 4.1 Duo

Electrical data		5252-01		5252-51	
		5252-01/Service			
Nominal voltage	V	230		400	
Electrical frequency	Hz	50	60	50	60
Nominal current at 8 bar (0.8 MPa)	A	6.3	7.0	3.1	2.5
Motor protection switch, recommended settings	A	6.5	7.6	3.1	2.5
Speed	rpm	1360	1600	1410	1690
Type of protection		IP 24		IP 24	
Mains fusing *	A	10		10	
Max. permissible mains impedance in accordance with EN 61000-3-11					
Z-phase	Ω	≤ 0.142		≤ (0.185 + j 0.115)	
Z-neutral	Ω	--		≤ (0.123 + j 0.077)	

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

General technical data					
Pressure tank volume	l	20		20	
Delivery at 5 bar (0.5 MPa)	l/min	115	130	115	130
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) approx.	s	85	70	85	70
Duty cycle	%	100		100	
Start-up pressure	bar (MPa)	6 (0.6)		6 (0.6)	
Cut-off pressure	bar (MPa)	7.8 (0.78)		7.8 (0.78)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)		10 (1)	
Pressure dew point at 7 bar (0.7 MPa) *	°C	$\leq +5$		$\leq +5$	
Dimensions (H x W x D) **	cm	69 x 49 x 46		69 x 49 x 46	
Weight	kg	47		47	
Noise level ***					
without sound insulation	dB(A)	66	69	66	69
with sound insulation	dB(A)	55	61	55	61

\* Value determined at an ambient temperature of +40 °C

\*\* Values without accessories and add-on parts

\*\*\* Noise level in accordance with EN ISO 1680 "Airborne acoustic noise"; measured in a room with sound damping. The levels are average values with a tolerance of  $\pm 1.5$  dB(A). In rooms with reverberating sound characteristics higher values may be obtained.

Filter mesh size		
Compressor air intake filter	$\mu\text{m}$	3
Fine filter for membrane drying unit	$\mu\text{m}$	3
Sterile filter for membrane drying unit	$\mu\text{m}$	0.01
Sintered filter for membrane drying unit	$\mu\text{m}$	35



### 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 Directive (93/42/EEC)	Class IIa
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## 4.2 Duo

Electrical data		5250100004		5252100001	
Nominal voltage	V	110-115	110-127	110-115	110-127
Electrical frequency	Hz	50	60	50	60
Nominal current at 8 bar (0.8 MPa)	A	14.1-14.6	14.2-13.3	14.1-14.6	14.2-13.3
Motor protection switch, recommended settings	A	17	16	17	16
Speed	rpm	1350-1370	1560-1640	1350-1370	1560-1640
Type of protection		IP 24		IP 24	
Mains fusing *	A	20		20	
* Circuit breaker fuse characteristics B, C or D in acc. with EN 60898-1					

General technical data					
Pressure tank volume	l	20		20	
Delivery at 5 bar (0.5 MPa)	l/min	130	145	115	130
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) approx.	s	75	65	85	70
Duty cycle	%	100		100	
Start-up pressure	bar (MPa)	6 (0.6)		6 (0.6)	
Cut-off pressure	bar (MPa)	7.8 (0.78)		7.8 (0.78)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)		10 (1)	
Pressure dew point at 7 bar (0.7 MPa) *	°C	-		≤ +5	
Dimensions (H x W x D) **	cm	69 x 49 x 44		69 x 49 x 46	
Weight	kg	46		50	
Noise level ***					
without sound insulation	dB(A)	66	69	66	69
with sound insulation	dB(A)	55	61	55	61

\* Value determined at an ambient temperature of +40 °C

\*\* Values without accessories and add-on parts

\*\*\* Noise level in accordance with EN ISO 1680 "Airborne acoustic noise"; measured in a room with sound damping. The levels are average values with a tolerance of ± 1.5 dB(A). Higher values may be obtained in rooms with reverberating sound characteristics.

Filter mesh size		
Compressor air 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
Fleece filter for automatic condensate drain	µm	5

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 Directive (93/42/EEC)	Class IIa
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### 4.3 Trio

Electrical data		5352-01 5352100001
Nominal voltage	V	230
Electrical frequency	Hz	50
Nominal current at 8 bar (0.8 MPa)	A	8.6
Motor protection switch, recommended settings	A	8.6
Speed	rpm	1350
Type of protection		IP 24
Mains fusing *	A	10
Max. permissible mains impedance in accordance with EN 61000-3-11		
Z-phase	$\Omega$	$\leq (0.066 + j 0.041)$
Z-neutral	$\Omega$	--

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

General technical data		
Pressure tank volume	l	50
Delivery at 5 bar (0.5 MPa)	l/min	160
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) approx.	s	140
Duty cycle	%	100
Start-up pressure	bar (MPa)	6 (0.6)
Cut-off pressure	bar (MPa)	7.8 (0.78)
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)
Pressure dew point at 7 bar (0.7 MPa) *	°C	$\leq +5$
Dimensions (H x W x D) **	cm	76 x 74 x 52
Weight	kg	70
Noise level ***		
without sound insulation	dB(A)	69
with sound insulation	dB(A)	54

\* Value determined at an ambient temperature of +40 °C

\*\* Values without accessories and add-on parts

\*\*\* Noise level in accordance with EN ISO 1680 "Airborne acoustic noise"; measured in a room with sound damping. The levels are average values with a tolerance of  $\pm 1.5$  dB(A). In rooms with reverberating sound characteristics higher values may be obtained.

Filter mesh size		
Compressor air intake filter	$\mu\text{m}$	3
Fine filter for membrane drying unit	$\mu\text{m}$	3
Sterile filter for membrane drying unit	$\mu\text{m}$	0.01
Sintered filter for membrane drying unit	$\mu\text{m}$	35

**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 Directive (93/42/EEC)	Class IIa
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## 4.4 Quattro

Electrical data		5452-51 5452100001	
Nominal voltage	V	400	
Mains frequency	Hz	50	60
Nominal current at 8 bar (0.8 MPa)	A	4.4	4.8
Motor protection switch, recommended settings	A	4.4	5.0
Speed	rpm	1440	1700
Type of protection		IP 24	
Mains fuses *	A	10	
Max. permissible mains impedance in accordance with EN 61000-3-11			
Z-phase	Ω	≤ (0.061 + j 0.038)	
Z-neutral	Ω	≤ (0.041 + j 0.025)	

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

General technical data			
Pressure tank volume	l	50	
Delivery at 5 bar (0.5 MPa)	l/min	215	240
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) approx.	s	105	95
Duty cycle	%	100	
Start-up pressure	bar (MPa)	6 (0.6)	
Cut-off pressure	bar (MPa)	7.8 (0.78)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)	
Pressure dew point at 7 bar (0.7 MPa) *	°C	$\leq +5$	
Dimensions (H x W x D) **	cm	76 x 74 x 52	
Weight	kg	82	
Noise level ***			
without sound insulation	dB(A)	70	75
with sound insulation	dB(A)	54	55

\* Value determined at an ambient temperature of +40 °C

\*\* Values without accessories and add-on parts

\*\*\* Noise level in accordance with EN ISO 1680 "Airborne acoustic noise"; measured in a room with sound damping. The levels are average values with a tolerance of  $\pm 1.5$  dB(A). In rooms with reverberating sound characteristics higher values may be obtained.

Filter mesh size			
Compressor air intake filter	$\mu\text{m}$	3	
Fine filter for membrane drying unit	$\mu\text{m}$	3	
Sterile filter for membrane drying unit	$\mu\text{m}$	0.01	
Sintered filter for membrane drying unit	$\mu\text{m}$	35	



### 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 Directive (93/42/EEC)	Class IIa
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## 4.5 Duo Tandem

Electrical data		4252-01		4252100004	
Nominal voltage	V	230		230	
Electrical frequency	Hz	50	60	50	60
Nominal current at 8 bar (0.8 MPa)	A	12.2	14.3	12.2	14.3
Motor protection switch, recommended settings	A	6.5	7.6	6.5	7.6
Speed	rpm	1410	1690	1410	1690
Type of protection		IP 24			
Mains fusing *	A	20			
Max. permissible mains impedance in accordance with EN 61000-3-11					
Z-phase	Ω	≤ (0.046 + j 0.029)			
Z-neutral	Ω	--			

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

General technical data					
Pressure tank volume	l	50			
Delivery at 5 bar (0.5 MPa)	l/min	230	260	230	260
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) approx.	s	115	100	115	100
Duty cycle	%	100			
Start-up pressure	bar (MPa)	6 (0.6)		> 7 (0.7)	
Cut-off pressure	bar (MPa)	7.8 (0.78)		9 (0.9)	
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)			
Pressure dew point at 7 bar (0.7 MPa) *	°C	≤ +5		≤ +5 **	
Dimensions (H x W x D) ***	cm	76 x 79 x 52			
Weight	kg	90			
Noise level ****					
without sound insulation	dB(A)	69	74	69	74
with sound insulation	dB(A)	55	56	55	56

\* Value determined at an ambient temperature of +40 °C

\*\* With ORANGE rinsing nozzle

\*\*\* Values without accessories and add-on parts

\*\*\*\* Noise level in accordance with EN ISO 1680 "Airborne acoustic noise"; measured in a room with sound damping. The levels are average values with a tolerance of  $\pm 1.5$  dB(A). In rooms with reverberating sound characteristics higher values may be obtained.

Filter mesh size		
Compressor air intake filter	$\mu\text{m}$	3
Sterile filter for membrane drying unit	$\mu\text{m}$	0.01
Sintered filter for membrane drying unit	$\mu\text{m}$	35



### 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 Directive (93/42/EEC)	Class IIa
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## 4.6 Quattro Tandem

Electrical data		4682-52		4682-53	
Nominal voltage	V	230 / 3~		400 / 3~	
Electrical frequency	Hz	50	60	50	60
Nominal current at 8 bar (0.8 MPa)	A	15.2	16.6	8.8	9.6
Motor protection switch, recommended settings	A	-	-	-	-
Speed	rpm	1440	1700	1440	1700
Type of protection		IP 24		IP 24	
Mains fusing *	A	20		20	
Max. permissible mains impedance in accordance with EN 61000-3-11					
Z-phase	Ω	≤ 0.445		--	
Z-neutral	Ω	--		--	

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

General technical data					
Pressure tank volume	l	90			
Delivery at 5 bar (0.5 MPa)	l/min	430	480	430	480
Pressure build-up phase 0 - 7.5 bar (0 - 0.75 MPa) c.	s	90	80	90	80
Duty cycle	%	100			
Start-up pressure	bar (MPa)	6.5 (0.65)			
Cut-off pressure	bar (MPa)	8.5 (0.85)			
Safety valve, maximum permissible operating pressure	bar (MPa)	10 (1)		10 (1)	
Pressure dew point at 7 bar (0.7 MPa) *	°C	≤ +5			
Dimensions (H x W x D) **	cm	76 x 102 x 62			
Weight	kg	143			
Noise level ***	dB(A)	69	74	69	74

\* Value determined at an ambient temperature of +40 °C

\*\* Values without accessories and add-on parts

\*\*\* Noise level in accordance with EN ISO 1680 "Airborne acoustic noise"; measured in a room with sound damping. The levels are average values with a tolerance of  $\pm 1.5$  dB(A). Higher values may be obtained in rooms with reverberating sound characteristics.

Filter mesh size		
Compressor air intake filter	$\mu\text{m}$	3
Fine filter for membrane drying unit	$\mu\text{m}$	3
Sterile filter for membrane drying unit	$\mu\text{m}$	0.01
Sintered filter for membrane drying unit	$\mu\text{m}$	35

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

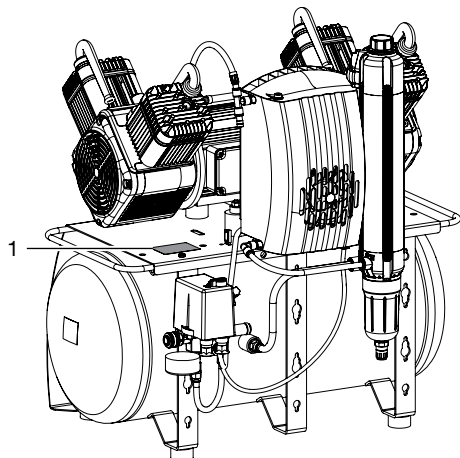
### Classification

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## 4.7 Type plate

### Complete system

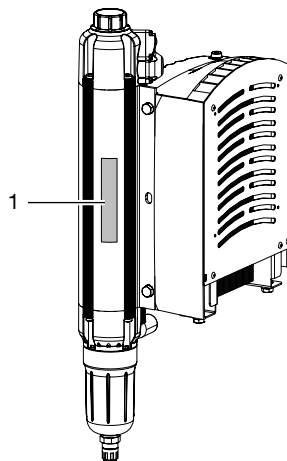
The type plate of the overall system is located on the mounting plate for the compressor unit.



1 Type plate for the complete system

### Membrane drying unit

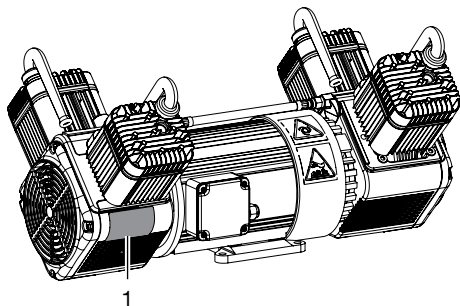
The type plate of the membrane drying unit is located on the side of the membrane drying unit.



1 Membrane drying unit type plate

### Compressor unit

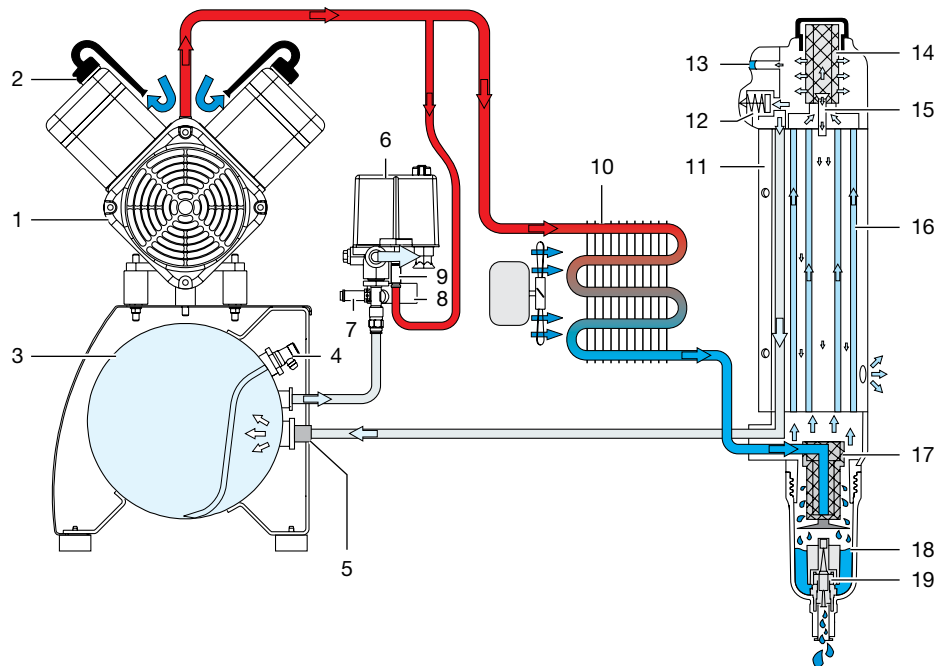
The type plate of the compressor unit is located on the crankcase below the cylinder.



1 Compressor unit type plate

## 5 Operation

### 5.1 Duo with membrane drying unit



- 1 Compressor unit
- 2 Air intake filter
- 3 Pressure tank
- 4 Condensate drain valve
- 5 Non-return valve
- 6 Pressure switch
- 7 Safety valve
- 8 Pressure gauge/display
- 9 Pressure relief valve
- 10 Cooler with ventilating fan
- 11 Membrane drying unit
- 12 Pressure limiting valve
- 13 Humidity display
- 14 Fine or sterile filter
- 15 Rinsing nozzle
- 16 Membrane fibre
- 17 Sintered filter
- 18 Water collection chamber
- 19 Water outlet valve

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.



## 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.

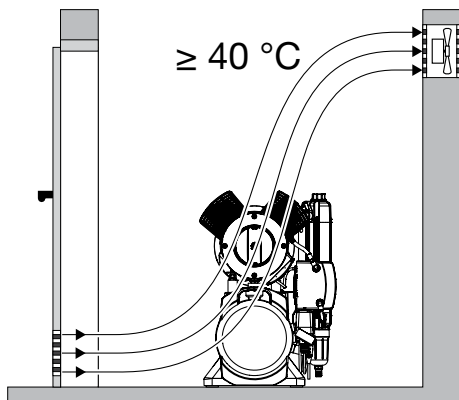


#### NOTICE

##### **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  $\geq 40^\circ\text{C}$  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 electrical connections to the mains power supply are carried out in accordance with current valid national and local regulations and standards governing the installation of low voltage units in medical facilities.
- › Install an all-pole disconnect switch with a contact opening width of at least 3 mm in the electrical connection to the mains power supply.
- › Observe the current consumption of the devices that are to be connected.

## 7 Transport



### WARNING

#### **Risk of explosion of the pressure tank and pressure hoses**

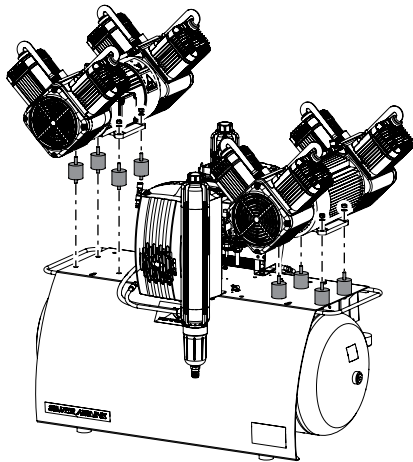
- › The pressure tank and the pressure hoses must be vented before they are stored or transported.
- › Protect the unit against moisture, dirt and extreme temperatures during transport ("4 Technical data").
- › Always make sure that the condensate collector chamber is empty before transporting the unit ("15 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.



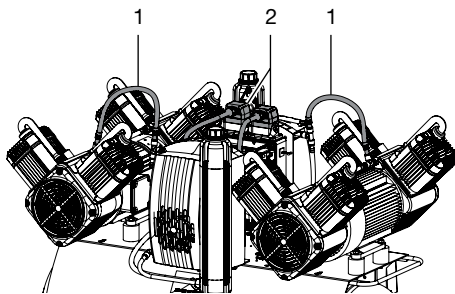
## 8 Quattro Tandem assembly and installation

For weight reasons the unit is not supplied fully assembled. Instead, the compressor units are installed at the site of use.

- › Set up the tank at the planned installation site.
- › Screw the vibration reducers into the motor mounting.
- › Place the compressor units on the vibration reducers.
- › Attach the compressor units with the lock washers and nuts.



- › Insert the compressed air connections from the compressor unit into the cooler.
- › Plug in the electrical connections of the compressor units at the control box. Connect the left-hand unit to the left-hand plug connector and the right-hand unit to the right-hand plug connector.



- 1 Compressed air connections
- 2 Electrical connections

## 9 Installation

### 9.1 Remove the transport locks

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

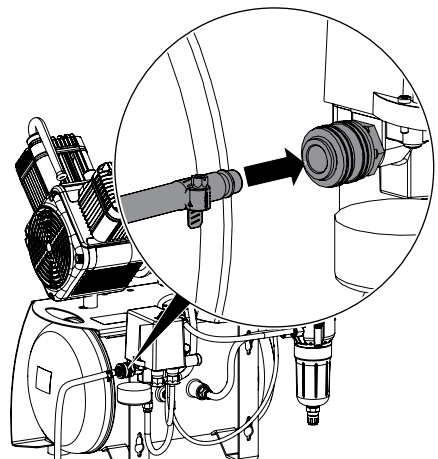
- › Cut and remove the transport strap.
- › Remove the foam padding blocks.

### 9.2 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.

- › 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.



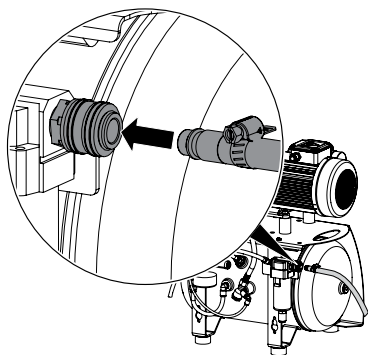
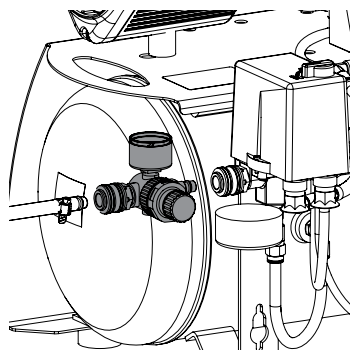


Figure 1: Duo with condensate separator


### 9.3 Pressure reducer

- › Insert the pressure reducer into the quick release coupling.
- › Insert the pressure hose into the quick release coupling on the pressure reducer.

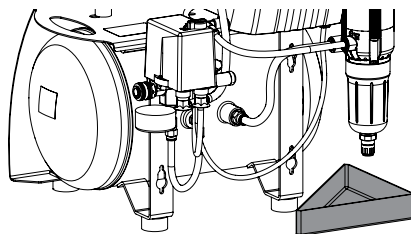


### 9.4 Place a collector tray underneath

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.

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



## 9.5 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.

- › Connect the mains plug to an earthed power outlet.

## 10 Commissioning

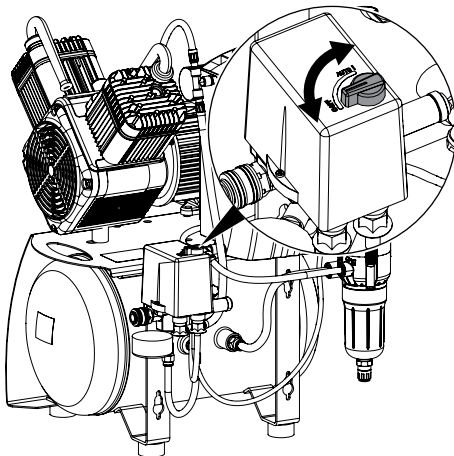
 In many countries technical medical products and electrical devices are subject to regular checks at set intervals. The owner must be instructed accordingly.

- 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.

### 10.1 Check the motor protection switch

After installation of the compressor the motor protection switch needs to be checked and adjusted if it is not set up correctly. It was set to the recommended setting in the factory (see "4 Technical data").

- Switch on the unit at the pressure switch by rotating the switch to the "I" position.



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

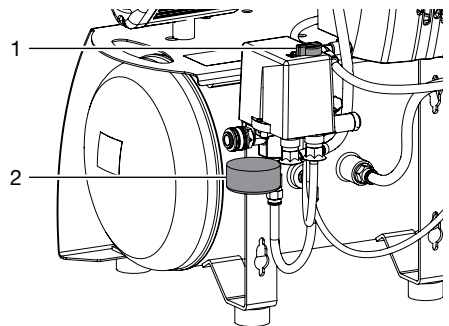
If the reading deviates from the recommended setting then the motor protection switch needs to be adjusted (see "11.2 Adjusting the motor protection switch").

### 10.2 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.

- Switch on the unit at the pressure switch by rotating it to the position "I AUTO".
- 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 switches on.

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



- 1 On/off switch
- 2 Pressure gauge

## 10.3 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.



### **DANGER**

**Risk of explosion of the pressure tank and pressure hoses**

- › Do not change the safety valve settings.

- › Switch on the unit at the pressure switch and fill the pressure tank to the cut-off pressure.



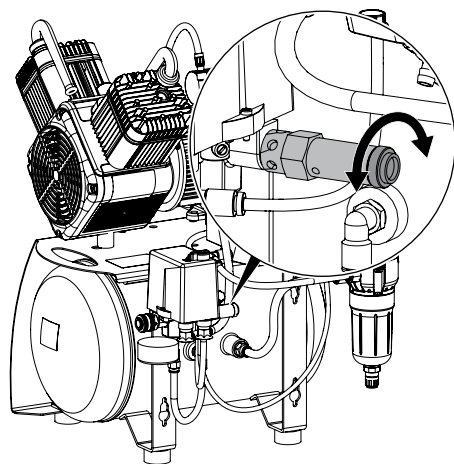
### **WARNING**

**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.



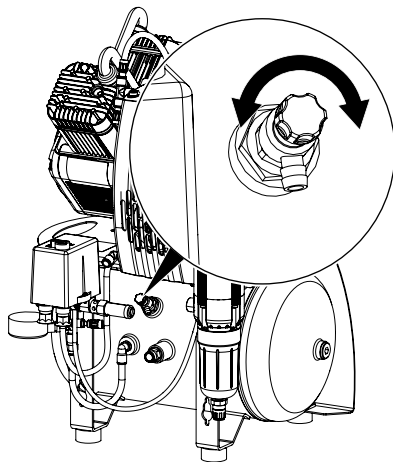
## 10.4 Draining the condensation water

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.

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

### **Pressure tank**

- › At maximum tank pressure, open the condensate drain valve.
- › Close the condensate drain valve as soon as all of the accumulated condensation water has been blown out.



## Condensate separator

- › At maximum tank pressure, unscrew the bottom screw fitting on the condensate separator.
- › Close the screw connection as soon as all of the condensate has been blown out.

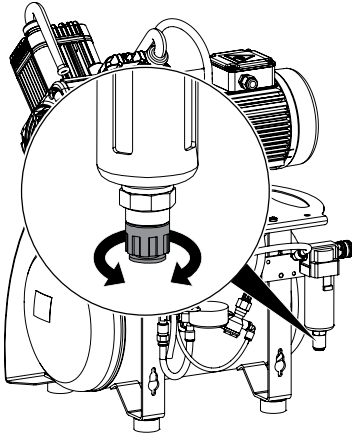


Figure 2: Duo with condensate separator

## 10.5 Adjusting the rate of flow at the pressure reducer

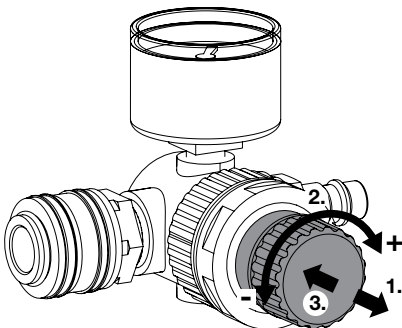
The pressure reducer regulates the rate of flow in the system and adjusts it to the required operating pressure. In order to adjust the rate of flow air needs to be extracted via a consumer.

- › Activate the air consumer unit.
- › Lift the rotary knob at the pressure reducer.
- › Adjust the rate of flow via the rotary knob.

Turn the knob in the "+" direction to increase the rate of flow.

Turn the knob in the "-" direction to reduce the rate of flow.

- › Press in the rotary knob until it engages and cannot be adjusted.



## 11 Adjustment options

### 11.1 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 device.
- › Use insulated tools.
- › Do not touch live parts.



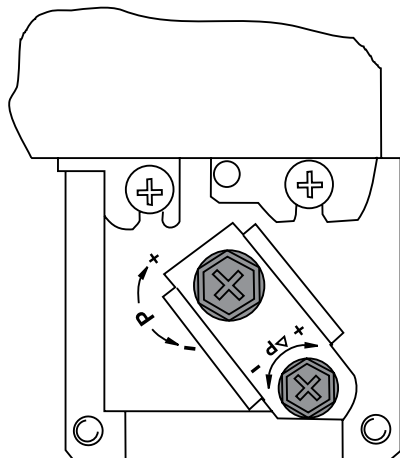
The cut-off pressure must be at least 0.5 bar (0.05 hPa) below the maximum pressure of 10 bar (1 hPa) of the safety valve. Otherwise the safety valve can open too early, which will prevent the compressor unit from attaining the cut-off pressure, as a result of which it will run continuously. The maximum 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  $\Delta p$ .

- › Take off the pressure switch cover.
- › Adjust the cut-off pressure P at the adjustment screw.

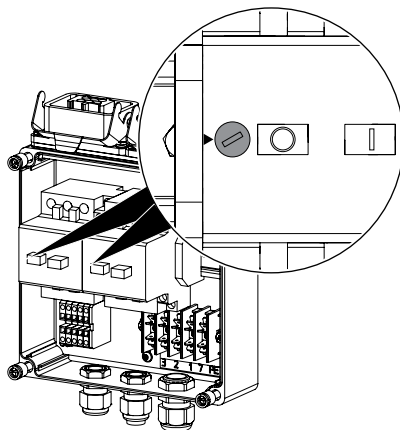
The cut-off pressure increases in the "+" arrow direction and decreases in the "-" arrow direction. The pressure difference  $\Delta p$  is also influenced by this adjustment.

- Adjust the start-up pressure via the pressure difference  $\Delta p$  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.



## Controller

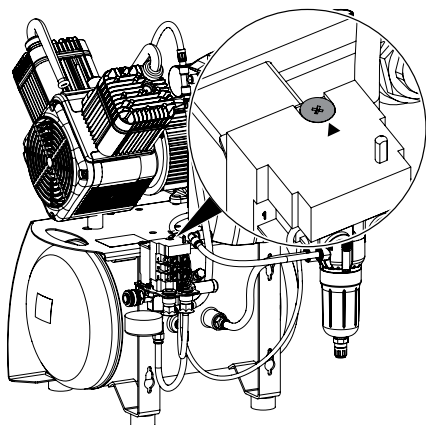
- Remove the cover from the controller.
- Adjust the motor protection switch with the adjustment screw to the measured value (observe the range between the MIN permissible setting and the MAX permissible setting of the motor protection switch, see "4 Technical data").



## 11.2 Adjusting the motor protection switch

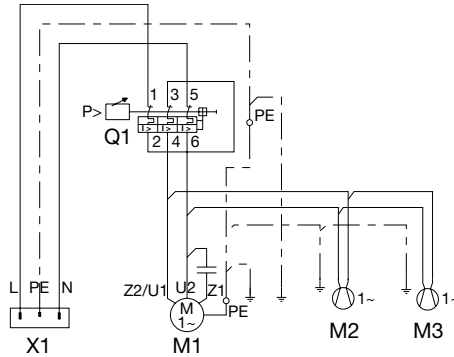
### Pressure switch

- Take off the pressure switch cover.
- Adjust the motor protection switch with the adjustment screw to the measured value (observe the range between the MIN permissible setting and the MAX permissible setting of the motor protection switch, see "4 Technical data").



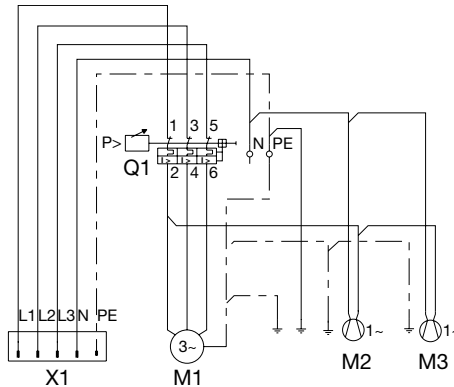
## 12 Circuit diagrams

### 12.1 1/N/PE AC 110-127 V, 230 V layout



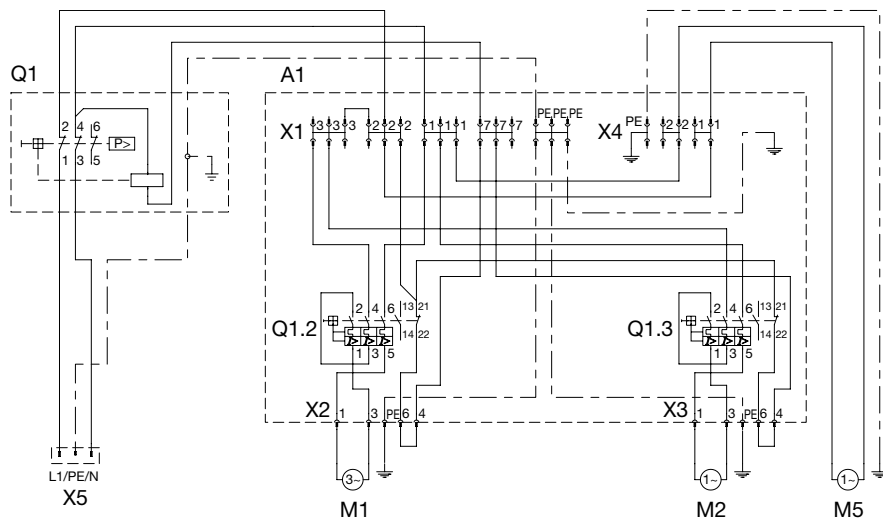
- X1 Mains connection L/N/PE AC 230 V
- Q1 Pressure switch
- M1 Compressor unit
- M2 Fan motor, membrane drying unit
- M3 Fan motor, noise insulation (if required)

### 12.2 3/N/PE AC 400 V layout



- X1 Mains connection 3/N/PE AC 400 V
- Q1 Pressure switch
- M1 Compressor unit
- M2 Fan motor, membrane drying unit
- M3 Fan motor, noise insulation (if required)

## 12.3 1/N/PE AC 230 V layout, Duo Tandem



X5 Mains connection L/N/PE AC 230 V

Q1 Pressure switch

A1 Controller

X1 Distributor rail

X2 Plug connection of compressor unit

X3 Plug connection of compressor unit

X4 Distributor rail

Q1.2 Motor protection switch

Q1.3 Motor protection switch

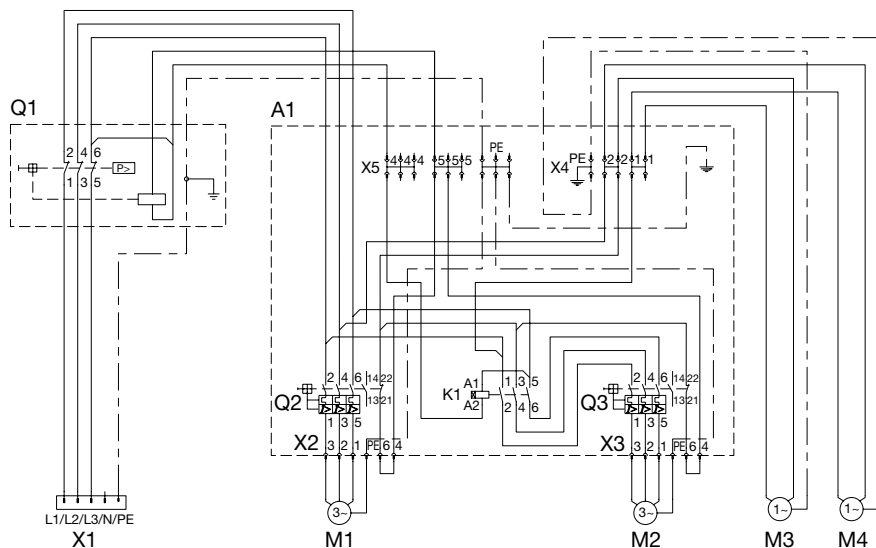
M1 Compressor unit

M2 Compressor unit

M5 Fan motor, membrane drying unit



## 12.4 3/N/PE AC 230 V layout, Quattro Tandem



X1 Mains connection 3/N/PE AC 230 V

Q1 Pressure switch

A1 Control box

X2 Plug connection of compressor unit

X3 Plug connection of compressor unit

X4 Distributor rail

X5 Distributor rail

Q2 Motor protection switch

Q3 Motor protection switch

K1 Time-lag relay

M1 Compressor unit

M2 Compressor unit

M3 Fan motor, membrane drying unit

M4 Fan motor, membrane drying unit



## 13 Operation



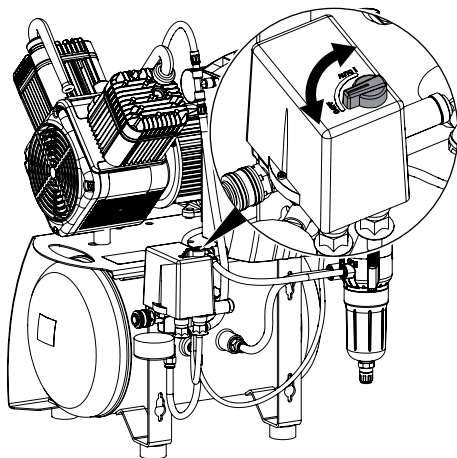
Prior to working on the device or in case of danger, disconnect it from the mains (e. g. pull the mains plug).

### 13.1 Switching the unit on/off

- › Switch on the unit at the pressure switch by rotating it to the position "I AUTO".

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.

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



## 14 Maintenance



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



### 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.

### 14.1 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.

#### Unit with condensate separator

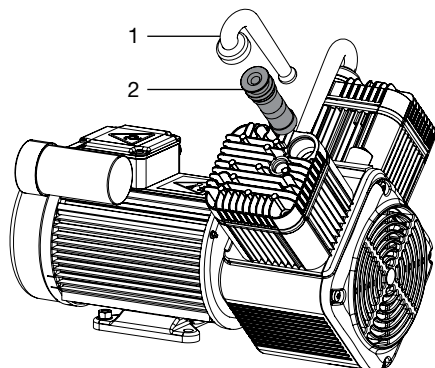
Maintenance interval	Maintenance work
At regular intervals	› Empty the collector tray under the condensate separator (the interval may vary depending on the ambient conditions and method of working; empty it daily if the humidity is high).
Annually	<ul style="list-style-type: none"> <li>› Replace the air intake filter in the compressor unit – do this every six months if there is a high concentration of dust.</li> <li>› Replace the fleece filter in the condensate separator.</li> </ul>
Every 4 years	› Replace the vibration reducers.
In accordance with national law	<ul style="list-style-type: none"> <li>› Check the safety valve.</li> <li>› Carry out recurring safety inspections (e.g. pressure tank inspections, electrical safety inspections) in accordance with applicable national laws.</li> </ul>

#### 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	<ul style="list-style-type: none"> <li>› Replace the air intake filter in the compressor unit – do this every six months if there is a high concentration of dust.</li> <li>› Replace the fine or sterile filter.</li> <li>› Replace the sintered filter.</li> </ul>
Every 4 years	› Replace the vibration reducers.
In accordance with national law	<ul style="list-style-type: none"> <li>› Check the safety valve.</li> <li>› Carry out recurring safety inspections (e.g. pressure tank inspections, electrical safety inspections) in accordance with applicable national laws.</li> </ul>

## 14.2 Replacing the air intake filter

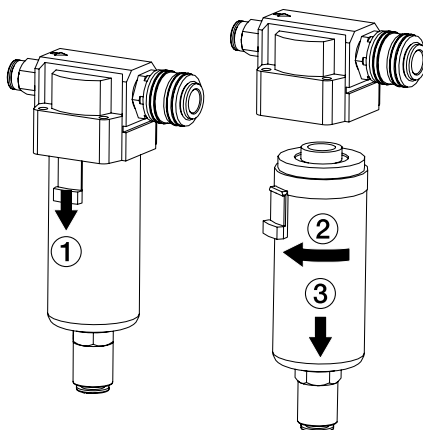
- › Switch off the compressor at the pressure switch.
- › Pull off the noise reducer from the air intake filter.
- › Remove the air intake filter.
- › Insert a new air intake filter.
- › Push on the noise reducer onto the air intake filter.



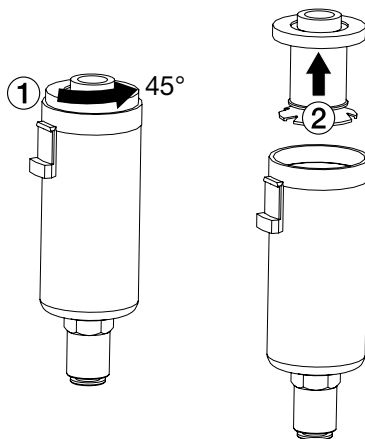
- 1 Noise reducer
- 2 Air intake filter

## 14.3 Replacing the filter in the condensate separator

- › Switch off the compressor at the pressure switch.
- › Unplug the mains plug.
- › Release the pressure from the pressure tank. To do this, unscrew the bottom screw fitting on the condensate separator.
- › Push the slider of the housing locking mechanism downwards.
- › Open the housing by rotating and pulling downwards.

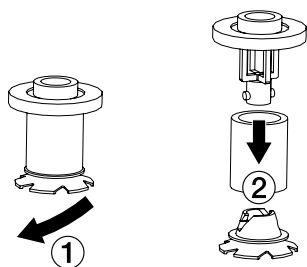


- › Rotate the black filter mount (approx. 45°).
- › Remove the filter mount upwards from the water accumulation chamber.




- › Unscrew the rejected part downwards.

- › Remove the filter element.



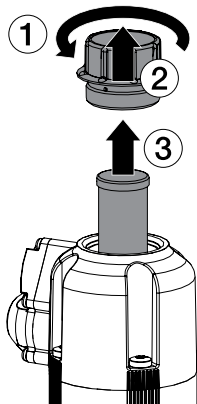
- › Replace the filter element.
- › Re-assemble the condensate separator.

 During assembly pay attention to detents and markings.

## 14.4 Replacing the filter of the membrane drying unit

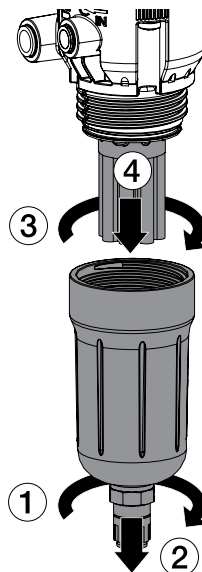
### Fine/sterile filter

- › 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.



### Sintered filter

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



## 15 Taking out of use

### 15.1 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.

#### Condensate separator

- › Open the condensate drain valve on the condensate separator.

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 emerges.
- › Disconnect the mains plug.
- › Disconnect the compressed air connection on the quick release coupling.

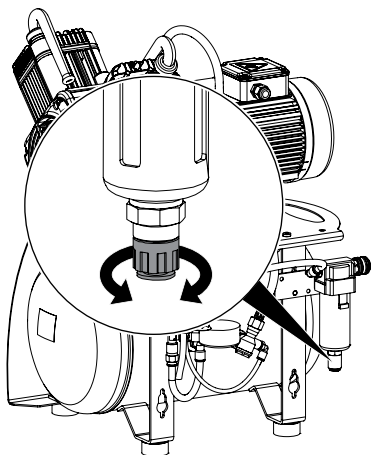
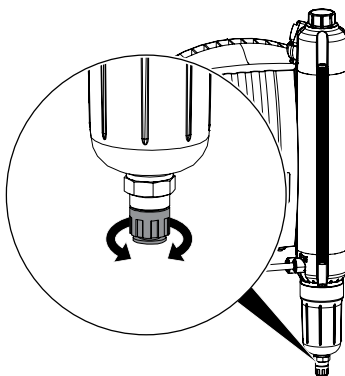


Figure 3: Duo with condensate separator

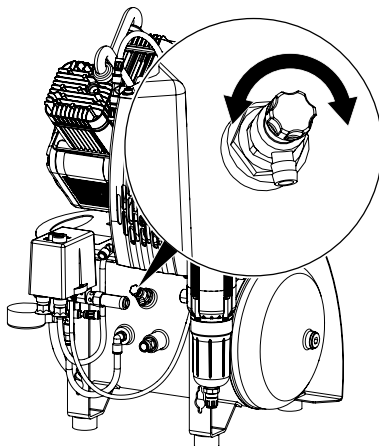
#### Membrane drying unit

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



#### 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.



## 15.2 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.



## 16 Tips for operators and service technicians



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



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

Fault	Probable cause	Solution
<b>Compressor will not start</b>	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.
<b>Compressor does not switch off</b>	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.
<b>Compressor switches on from time to time even though no air is being taken for a consumer unit</b>	Leak in the compressed air system	› Locate and seal the leak. › Inform a service technician.
<b>Knocking or loud noises on the compressor</b>	Compressor unit defective	› Disconnect all power from the device and inform a service technician.
<b>Reduced delivery. Compressor needs longer to charge the pressure tank, see charging times in "4 Technical data"</b>	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.



Fault	Probable cause	Solution
<b>Water dripping from air consumers</b>	Maintenance work not carried out regularly (without membrane drying unit)	➤ Regularly drain the condensation water from the pressure tank, see "10.4 Draining the condensation water"
	Defective membrane drying unit	➤ Inform a service technician.

## 17 Tips for service technicians



The following information about troubleshooting is intended solely for service technicians. Repairs must only be carried out by service technicians.



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

Fault	Probable cause	Solution
<b>Compressor will not start</b>	No mains voltage. On three-phase units: one phase is missing or not connected (generation of a humming sound)	› Check the mains fuse; if necessary, switch the circuit breaker back on. If the fuse is defective, replace it. Check the mains supply voltage.
	Undervoltage or overvoltage	› Measure the supply voltage; call an electrician if necessary.
	Relief valve defective, unit starts against pressure	› Check that the relief valve discharges after switching off the unit. Free up the movement of the relief valve operable or replace it.
	Mechanical sluggishness of a unit (piston is stuck); motor protection has tripped	› Switch the unit off and disconnect it from the power supply, remove the fan hood from the blocked compressor and turn the fan wheel. If this is not possible, replace the piston and cylinder or the complete unit.
<b>Humming noise from motor</b>	Motor capacitor is defective	› Replace the capacitor.





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