Operating instructions

HAUG GB

Charging generator
AG 60

Charge Line

Keep in a safe place for future reference!

Table of contents

Types

AG 60 positive	115 V	09.7661.200
	230 V	09.7660.200
AG 60 negative	115 V	09.7663.200
	230 V	09.7662.200

1 Notes on operating instructions

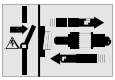
In these operating instructions, the AG 60 is also referred to as "unit".
The AG 60 is a combination instrument and consists of a charging generator and an integrated discharging power pack which are handled separately. The discharging power pack is called power pack for short.

1.1 Pictorial markings used

➢ In these operating instructions

WARNING!
Not for use by persons with pacemaker!

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!



WARNING!
Only plug in/unplug coaxial connector when the unit is switched off!

ATTENTION!
Important instructions!

➢ On the unit

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!

WARNING!
Only plug in/unplug coaxial connector when the unit is switched off!

2 Safety

WARNING!
Persons wearing heart pacemakers must maintain a safety distance of more than 50 cm from the ionizing unit!
Make sure that you read and observe the operating instructions of the connected ionizing units!

ATTENTION!
Make sure that the permitted connected length on the power pack is not exceeded!
If the connected length is exceeded, the power pack will overheat during operation and may get damaged as a result. In addition, proper operation of the connected ionizing units is no longer ensured.

The unit is operationally safe, provided that it is operated in accordance with its intended use.
Operating errors, misuse or defects will result in dangers:
- For life and limb of the operator.
- For the unit and other assets.

Also note Chapter 4.1 (refer to page 12 "Important installation notes").

2.1 Intended use

ATTENTION!
Do not install or use the unit in areas subject to explosion hazards!

For reasons of safety, unauthorized conversions and modifications of the unit are not permitted.
The installation and operating conditions indicated in these Operating Instructions must be adhered to.

The AG 60 is a combination instrument.
The AG 60 contains a charging generator (direct voltage kV_{DC}) for the connection of HAUG charging units and a discharging power pack (alternating voltage kV_{AC}) for the connection of HAUG ionizing units.

Charging generator:
The charging generator is intended exclusively for the high-voltage supply of HAUG charging units. It generates an adjustable direct high voltage of 0...40 kV_{DC}, with positive or negative polarity, depending on the unit type. The charging unit which is supplied with high voltage is intended for the electrostatic charging of material webs in industrial production processes.

Power Pack:
The power pack is intended exclusively for the high-voltage supply of HAUG ionizing units. It generates an alternating high tension of approx. 7 – 8 kV_{AC}. The ionizing unit which is supplied with high voltage is intended for the removal of electrostatic charges from, for example, glass, paper, plastics etc.

2.2 Danger sources

WARNING!
The charging units connected to the charging generator conduct high voltage during operation!
Any contact may lead to injury and consequential accidents.
The operator must provide protective equipment against direct contact when installing the charging units. Make sure that you read and observe the operating instructions of the connected charging units.

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!

WARNING!
Only plug in/unplug coaxial connector
when the unit is switched off!

Defective high-voltage terminals and cables may lead to danger of electric shocks. Shut down the unit immediately in case of visible damage and suspected electrical defects.

2.3 Installer qualifications

The unit may be installed by trained electricians only. The above mentioned person must have read the operating instructions and must follow the instructions, notes and safety advice.

2.4 Operator qualifications

The unit may be maintained and put into operation by trained electricians only or by authorized persons informed about the potential dangers. The above mentioned persons must have read the operating instructions and must follow the instructions, notes and safety advice.

3 Description of unit

Figure 1

Operating elements charging generator

1. Fuse (for replacement refer to page 23, Section 7.1)
2. Reset pushbutton and indicator lamp: lights up yellow when the set current threshold is exceeded and flashes in case of defect
3. Mains switch: green lamp is on when unit is switched on

Operating elements power pack

4. Fuse (for replacement refer to page 23, Section 7.1)
5. Signalling lamp flashes in case of defect.
6. Mains switch: green lamp is on when unit is switched on

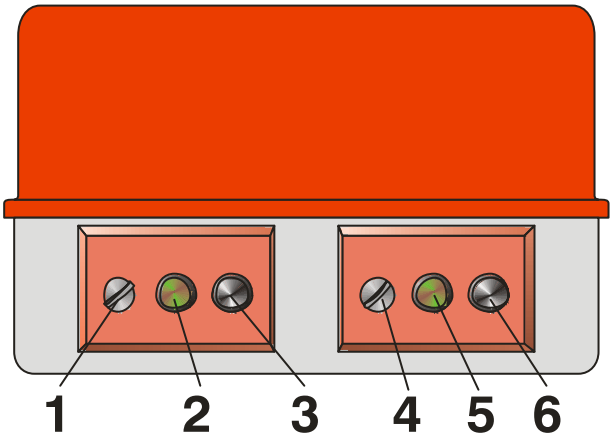


Figure 2

1. Voltage display power pack (kV_{AC})
2. Voltage display charging generator (kV_{DC})
3. High voltage operating potentiometer (charging generator)
4. Current threshold operating potentiometer (charging generator)

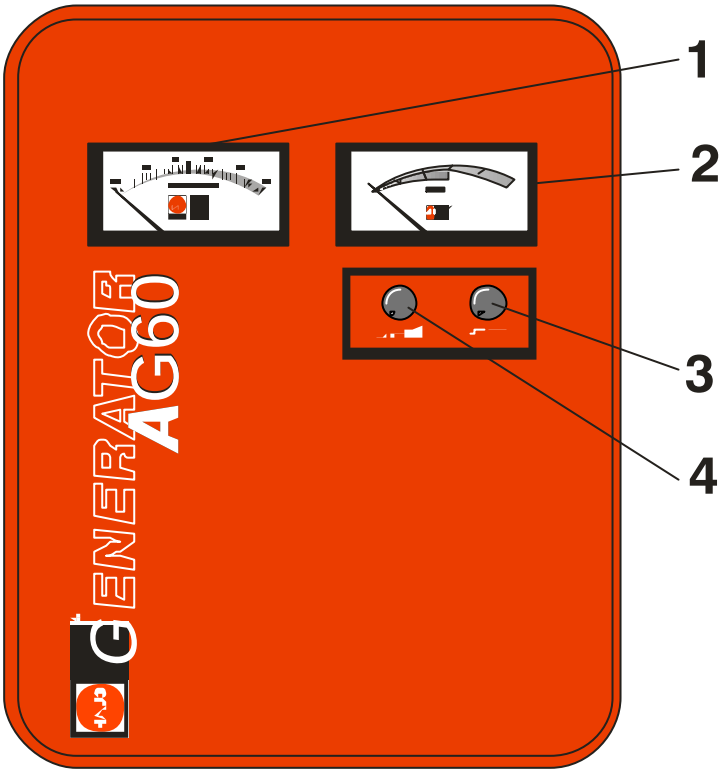
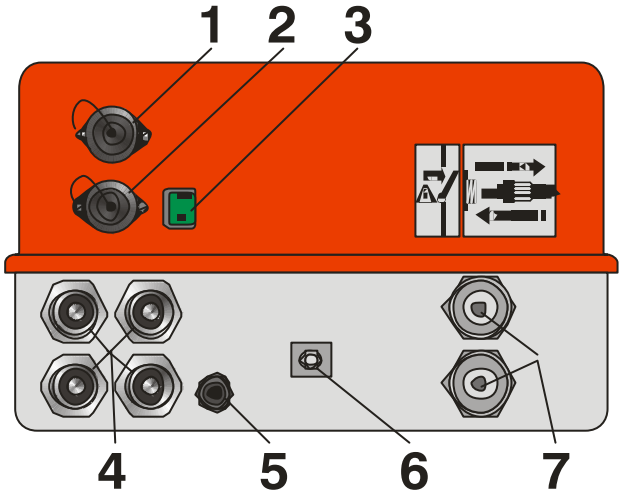


Figure 3

1. Signal terminal power pack
2. Pulse / Signalling connection (charging generator)
3. Changeover switch Pulse / Continuous operating (charging generator)
4. High-voltage terminals (power pack)
5. Mains supply
6. Ground connection
7. High-voltage terminals (charging generator)



4 Installation

The unit may be installed by trained electricians only. The above mentioned person must have read the operating instructions and must follow the instructions, notes and safety advice.

4.1 Important installation instructions

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!

WARNING!
Only plug in/unplug coaxial connector
when the unit is switched off!

The operation of the unit is not affected by the position in which it is installed. However, we recommend installing the unit so that the high-voltage terminals points downwards (to protect it from humidity, oil and dirt).

Do not place the unit on a surface generating or radiating heat. Avoid installation positions exposed to direct sunlight.

4.1.1 Charging generator

WARNING!
The charging units connected to the charging generator conduct high voltage during operation!
Any contact may lead to injury and consequential accidents.
The operator must provide protective equipment against direct contact when installing the charging units. Make sure that you read and observe the operating instructions of the connected charging units.

4.1.2 Power Pack

ATTENTION!
Make sure that the permitted connected length on the power pack is not exceeded!
If the connected length is exceeded, the power pack will overheat during operation and may get damaged as a result. In addition, proper operation of the connected ionizing units is no longer ensured.
You will find the maximum connected length in Section “Technical Data“.

4.2 Setting up, connecting

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!

WARNING!
Only plug in/unplug coaxial connector
when the unit is switched off!

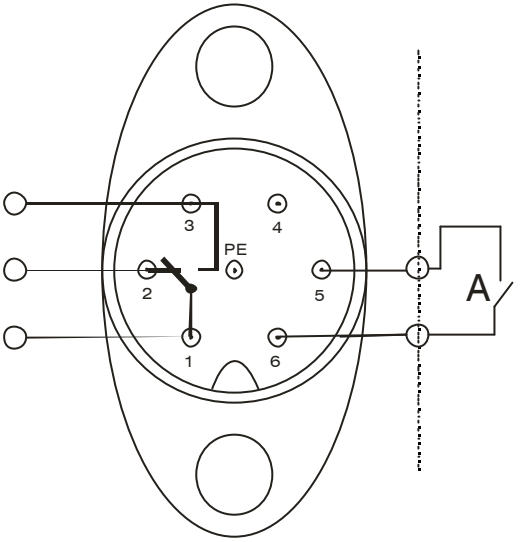
ATTENTION!
No destructive electrical loads may be applied to the signalling contacts (to protect the electronic system of the unit). Before plugging in the signal line K1, please self-discharge by touching grounded machine parts.

1. Before connecting always check that the unit is suitable for the local mains voltage (the voltage is indicated on the name plate). Incorrect mains voltage may result in damage to the unit.
2. Attach unit at the desired location using the enclosed retaining plates.
3. Ensure that the unit is switched off (for mains switch, refer to page 9, Fig. 1, item 3 and item 6).
4. Connect the ionizing / charging units to the high-voltage terminals.
5. Connect the PE conductor (green-yellow) with the protective earth of the mains. Connecting the PE conductor via parts of a machine body is insufficient.
6. If required, connect signaling line K1 (see page11, Figure 3, items 1 and 2).
7. Connect the unit to the mains.
8. Put unit into operation.

4.3 Pulse / Signalling connection for charging generator

Figure 4

A: External pulse switch



Output states:

	Operating conditions		Contacts closed
Normal operation	Mains voltage present	High voltage present	1 and 2
Malfunction	Mains voltage present	High voltage failure	1 and 3

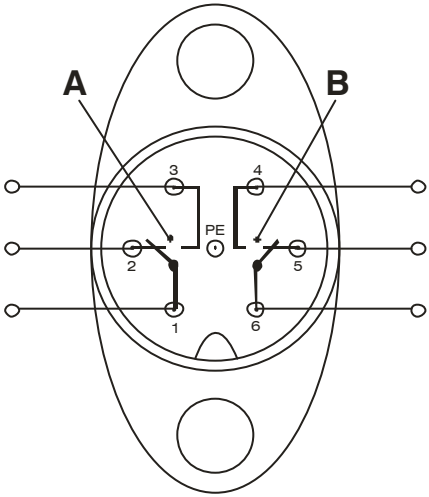
Contact rating: Max. 24 V_{AC} / 35 V_{DC}, max. 50 mA

4.4 Signal terminal for power pack

Figure 5

Connection of monitoring

– Connect the plug connector for the external signalling unit in accordance with the following assignment plan.
  A Relay contacts power failure
  B Relay contacts operational failure
– Plug in connector for external signalling unit.
– The power pack indicates mains and operational failures.



Output states:

	Operating conditions		Contacts closed	
Normal operation	Mains voltage present	High voltage present	1 and 3	5 and 6
Internal fault	Mains voltage present	High voltage failure	1 and 3	4 and 6
External fault	Mains failure	Not defined	1 and 2	5 and 6

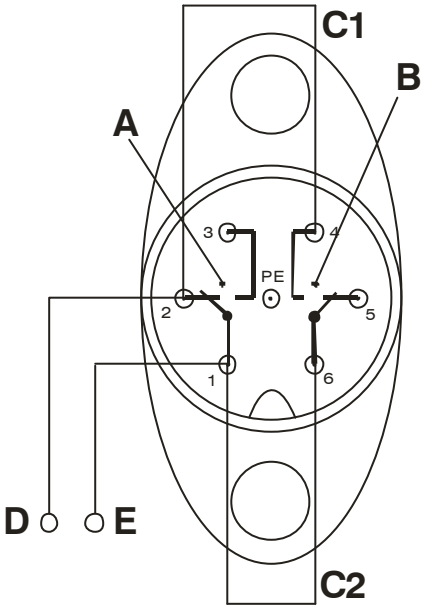
Contact rating: Max. 24 V_{AC} / 35 V_{DC}, max. 50 mA

4.4.1 **Application examples**

There is only one signalling output indicating a signal in case of any internal or external fault.
Optional connection: E. g. to PLC

Figure 6

A: Relay contact for mains failure
B: Relay contact for high voltage failure
C1: Bridge 1
C2: Bridge 2
D: Output
E: Input



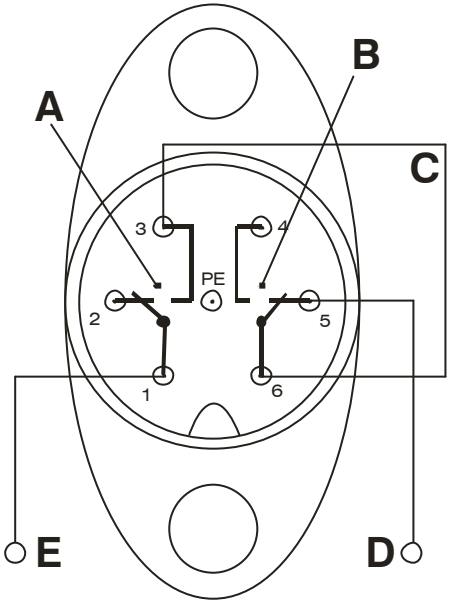
Output states:

High voltage	Continuity
Normal operation	no
Malfunction	yes

Contact rating: Max. 24 V_{AC} / 35 V_{DC}, max. 50 mA

Figure 7

A: Relay contact for mains failure
B: Relay contact for high voltage failure
C: Bridge
D: Output
E: Input



Output states:

High voltage	**Continuity**
Normal operation	yes
Malfunction	no

Contact rating: Max. 24 V_{AC} / 35 V_{DC}, max. 50 mA

5 Application

The unit may be put into operation by trained electricians only or by persons instructed in the potential dangers. The above mentioned persons must have read the operating instructions and must follow the instructions, notes and safety advice.

The unit is intended exclusively for the supply of high voltage to HAUG ionizing and charging units.
The unit generates an alternating high voltage of approx. 7 kV_{AC} at the power pack and a direct high voltage of approx. 40 kV_{DC} at the charging generator.

5.1 Putting into operation

Preconditions:
The unit and the ionizers/charging units must be connected correctly.

5.1.1 Charging generator

ATTENTION!
The adjustment under Point 6 should be performed within 10 s as otherwise a protective relay will switch off the high voltage; the indicator lamp will light up in this case.
Continue adjusting the setting according to item 6 after pressing the reset pushbutton.

1. Switch on the unit at the mains switch of the charging generator. The green lamp will light up for confirmation.
2. Turn high voltage operating potentiometer to the extreme left (minimum).
3. Turn current threshold operating potentiometer to the extreme right (maximum).
4. Put changeover switch for pulsed/continuous operation into required operation mode.
5. Set the required high voltage using the control potentiometer. The voltage indicator (see page 10, Figure 2, item 2) will indicate the voltage set.
6. Once the process is running, turn the current threshold operating potentiometer towards the minimum until the signalling lamp lights up. Then turn it back slightly towards the maximum until the signalling lamp is extinguished.

Note:
The output voltage depends on the current load. This is why the voltage increases if an existing counter electrode is covered with insulating material.

If spark-over occurs, please set a lower voltage or increase the distance between the charging unit and the counter electrode or the opposing metal parts.

5.1.2 Power Pack

1. Switch on the unit using the mains switch of the power pack. The green lamp will light up for confirmation.
2. After switching on, the power pack will not signal readiness for operation via the monitoring contacts until after a few seconds.
3. The dial of the voltage display must remain in the green range of the display (refer to page 10, figure 2, section 1).
4. In case of operational malfunctions, the yellow indicator will start to flash and the operational malfunction relay will operate.
5. After switch-off, wait a few seconds before switching the unit back on again, as otherwise false signals may result.

6 Remedy of defects

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!

WARNING!
Only plug in/unplug coaxial connector
when the unit is switched off!

Any remedy of defects must be carried out by trained electricians only. The above mentioned person must have read the operating instructions and must follow the instructions, notes and safety advice.

6.1 Charging generator

In case of defects regarding the charging generator and the charging unit, please check for correct installation and fusing first (for replacement, refer to page 23, chapter 7.1).

6.1.1 Troubleshooting

Faults	Measures
No charging	Check mains voltage
	Check fuse (for replacement, refer to page 23, chapter 7.1)
	Check connection
	Clean charging unit
	Check charging unit for damages. If damaged, immediately shut down and secure against restarting.

If this does not remedy the defect, please return the charging generator and the charging unit to HAUG GmbH & Co. KG (see address on back page) for examination.

6.2 Power Pack

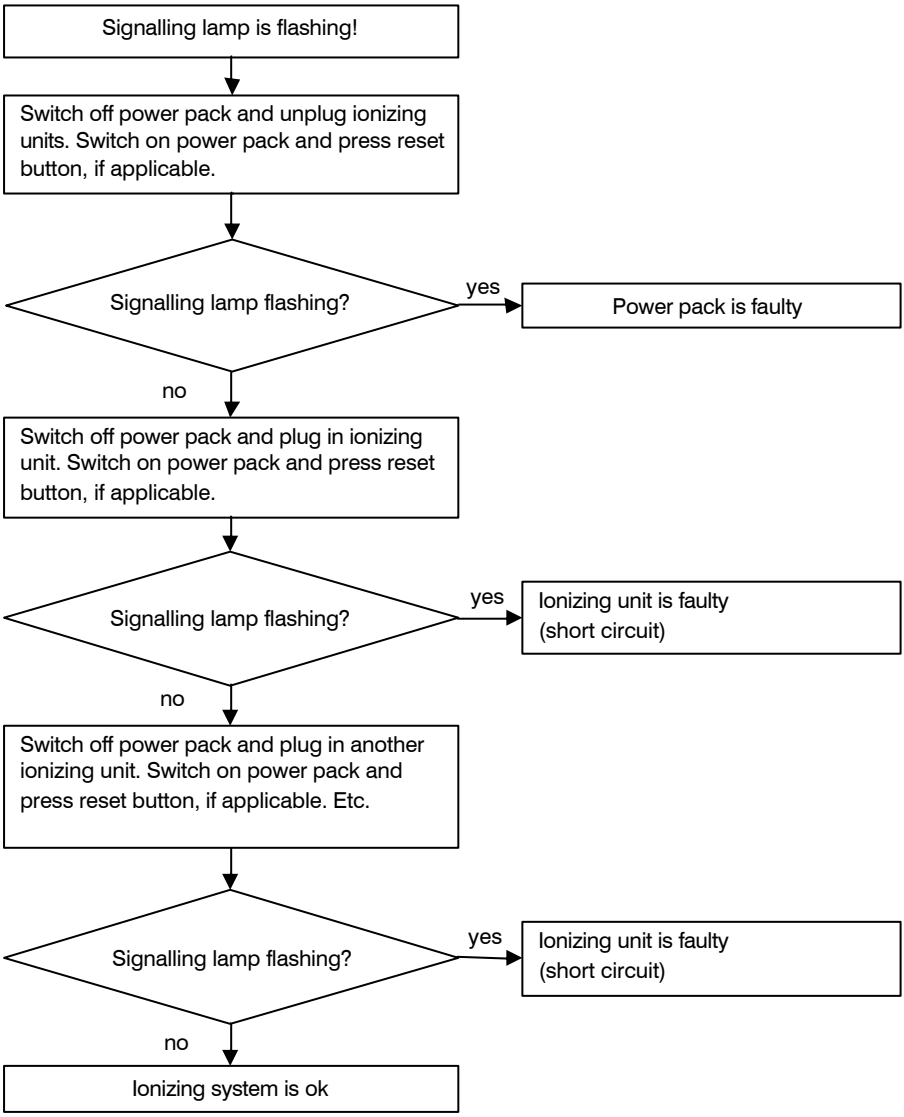
In case of defects regarding the power pack and the ionizing unit, please check for correct installation and fusing first (for replacement, refer to Chapter 7.1 page 23).

6.2.1 Troubleshooting

Faults	Measures
No ionization	Check mains voltage
	Check fuse (for replacement, refer to Chapter 7.1, page 23)
	Check connection
	Clean ionizing unit
	Check ionizing unit for damages. If damaged, immediately shut down and secure against restarting.
Signalling lamp is flashing	Follow work sequence according to the flow chart below.

If this does not remedy the defect, please return the unit and the ionizing unit to HAUG GmbH & Co. KG (see address on back page) for examination.

6.2.2 Flow chart



7 Maintenance and repairs

WARNING!
High voltage!
Danger of fatal accidents!
Do not open unit!

WARNING!
Only plug in/unplug coaxial connector
when the unit is switched off!

This unit does not include any parts which can be maintained or repaired by the operator. HAUG GmbH & Co. KG only is authorized to repair or calibrate the unit.

Should the unit prove defective or if a defect is suspected, switch off unit immediately and secure against subsequent reuse.

7.1 Replacing fuse

1. Switch off unit.
2. Determine and remove the cause for the blown fuse.
3. Detach the fuse holder using a screwdriver and lift out.
4. Replace fuse and reattach fuse holder.

Use the following fuses only:

Unit type	Fuse charging generator	Fuse power pack
09.7661.200, 09.7663.200	2,50 A slow, 5 x 20 mm	0,50 A slow, 5 x 20 mm
09.7660.200, 09.7662.200	1,25 A slow, 5 x 20 mm	0,25 A slow, 5 x 20 mm

The unit type and the rated voltage are indicated on the nameplate.
Only use fuses of the type indicated.

7.2 Accessories

Article	Order number
Circular plug	X – 0616
Right-angle plug	X – 5718
Signalling line K1 (incl. plug, assembled) 5 m shielded	06.8941.000
Signalling line K1 (incl. plug, assembled) 10 m shielded	06.8941.001
Signalling line K1 (incl. plug, assembled) 20 m shielded	06.8941.002

8 Technical data

8.1 Characteristics and specification

Reference temperature 23 °C

8.1.1 Charging generator

High-voltage terminals	2 HAUG High-voltage terminals (standard)
High voltage	U = approx. 40 kV_{DC} (no load), positive/nagative
Short-circuit current	$I_k \leq 4{,}5$ mA
Pulse / Signal terminal	Contact load max. 24 V_{AC}/35 V_{DC}, max. 50 mA

8.1.2 Power Pack

High-voltage terminals	4 HAUG High-voltage terminals
High voltage	U = approx. 7 - 8 kV_{AC}
Short-circuit current	$I_k < 5$ mA
Signalling terminal	Contact load max. 24 V_{AC}/35 V_{DC}, max. 50 mA
Operating points:	
High voltage	Relay contact at U < 4,2 kV ±10 %
Mains failure	Relay contact at mains voltage < 50 V

8.2 Supply voltage

ATTENTION!
Always connect the PE conductor (green/yellow conductor) to the protective earth of the mains!

Unit type	Nominal value	Operating range	Frequency range	Power input
01.7661.200, 01.7663.200	115 V_{AC}	±10 %	50 - 60 Hz	P_{max} = 140 VA
01.7660.200, 01.7662.200	230 V_{AC}	±10 %	50 - 60 Hz	P_{max} = 140 VA

8.3 Connectable charging units

Charging bars	ALS, AS SL
Charging electrodes	AE, AE SL, SA, PAE

8.4 Connectable ionizing units

Ionizing bars	RN, RNE, RA, RAE, RNOF, RAOF, HRN, HRA, HRE, HRAE, PS, PRX, PRV, SL, EIW, VS, VSE, VSA, VSAE, VC, VCE, VCA, VCAE, VAC
Ionizing units	RE, OPI, RI, DATR, PLE, PLV, NI, IG, RIF, FD

8.4.1 Connected length

ATTENTION!
Make sure that the permitted connected length on the power pack is not exceeded!

Power Pack	Permissible connected length	Maximum ionizing bar length Type A	Maximum ionizing bar length Type B
09.7660.200, 09.7661.200, 09.7662.200, 09.7663.200	18 m	18 m	6 m

	Ionizing bar
Type A	RN, RNE, RA, RAE, RNOF, RAOF, HRN, HRA, HRE, HRAE, PS, PRX, PRV, SL, EIW, VS, VSE, VSA, VSAE, VC, VCE, VCA, VCAE, VAC
Type B	VS, VSE, VSA, VSAE

Ionizing bar Type A:
The maximum cable length (KL) is the permissible connected length (AL) minus the maximum ionizing bar length (SL).
KL = AL – SL

Ionizing bar Type B:
The maximum cable length (KL) is the permissible connected length (AL) minus 3 x the maximum ionizing bar length (SL).
KL = AL – (3*SL)

8.5 Ambient conditions

Ambient temperature:	
Rated application range	+5 °C to +45 °C
Extreme range for storage and transport	-15 °C to +60 °C
Humidity:	
Rated application range	20 % to 65 % RH
Extreme range for storage and transport	0 % to 85 % RH
Air pressure:	
Rated application range	800 mbar to 1060 mbar
Vibrations:	
Extreme range for storage and transport	max. 1.5 g (10 to 55 Hz), 1 h
Shock	max. 15 g in each direction
Recommended service position:	vertical, supply cable downwards

8.6 Housing

Protection type	IP 54
Protection class	I
Mains supply	approx. 2,6 m fixed on unit
Dimensions:	
Height	approx. 390 mm
Width	approx. 280 mm
Depth	approx. 210 mm
Weight:	approx. 16 kg

9 Disposal

Observe and maintain national and regional waste disposal regulations for the disposal of the unit!

NOTES:

made by

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