


Operating Instructions



F01061y



IONIZER ES53

Series ES53 and ES53US Power Supplies
for supplying -discharging bars

BA-en-2018-2307



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Dear Customer,

The ES53 high voltage power supplies and the EX discharging bars are designed for the active discharging of disruptive static charges which develop in production processes in explosion hazard area.

The discharging bars and the power supply are used mainly in cases where disruptive static charges on fast-moving material webs impair production processes and need to be eliminated. The power supply delivers an alternating voltage of 5 kV at 50...60 Hz.

The ES53 power supply complies with the requirements of the EX discharging bar approval (details in Operating Instructions of discharging bar) and features the following characteristics:

- 5 plug-type high voltage outputs
- stable 5 kV AC output voltage
- small dimensions
- easy installation
- protection class IP54 design
- function and pollution monitoring of the bars with floating signal contacts (optional)
- complies with the approval specifications for Eltex EX bars.

Please read the operating instructions carefully before starting the instrument. This will help you prevent personal injuries and damage to property.

Please give us a call if you have any suggestions, proposals or ideas for improvements. We greatly appreciate feedback from the users of our appliances.

1. Outline of appliance

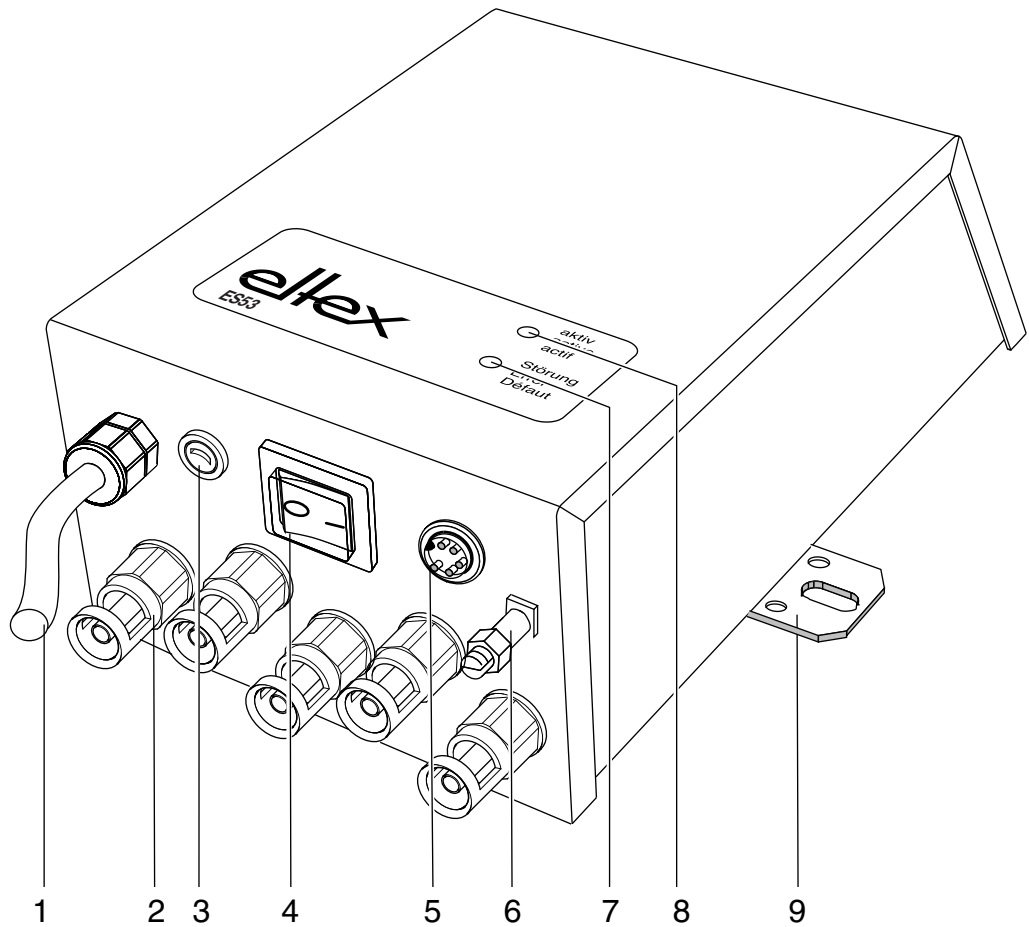


Fig. 1:
ES53 high voltage
power supply for
AC operation

- 1 Power supply lead
- 2 High voltage terminals (5 terminals)
- 3 Fuse (type: see name plate)
- 4 ON/OFF switch (ON = illuminated)
- 5 Plug for function and fault signals
(only with function and pollution monitoring, optional)
- 6 Grounding terminal
- 7 LED red, fault signal
(only with function and pollution monitoring, optional)
- 8 LED green, high voltage active
(only with function and pollution monitoring, optional)
- 9 Mounting bracket

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2. Safety

The ES53 Power Supplies have been designed, built and tested using state-of-the-art engineering, and have left the factory in a technically and operationally safe condition. If used improperly, the units may nevertheless be hazardous to personnel and may cause injury or damage. Read the operating instructions carefully and observe the safety instructions.

Always observe the rules and regulations applying in your country with reference to opening and repairing electrical appliances in explosion hazard area.

The manufacturers will not assume any liability and warranty if the units are used improperly or outside the intended purpose.

For warranty conditions, please refer to the General Terms and Conditions (GTC), see www.eltex.de.

2.1 Proper use

The ES53 Power Supplies may be operated only in connection with the appropriate Eltex discharging bars for AC operation (see Technical Specifications).

Modifications or changes made to the power supplies or discharging bars are not permitted.

Use only original Eltex spare parts and equipment.

2.2 Identification of risks and hazards

Possible risks and hazards resulting from the use of the power supplies are referred to in these operating instructions by the following symbols:



Warning!

This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in serious personal injury.



Caution!

This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in damage to property.



Ex Warning!

This symbol denotes the special conditions which must be observed when operating the system in explosion hazard areas as specified in the EX approvals.

2.3 Work and operational safety



Warning!

Carefully observe the following notes and the complete [chapter 2 "Safety", page 7!](#)

- Before carrying out repairs, cleaning or maintenance work involving the power supplies and the discharging bars, switch off the power supply and disconnect the mains power supply (see [chapter 5 "Maintenance", page 16](#), [chapter 6 "Trouble-shooting", page 17](#)).
- Before carrying out any work involving the units, the machine which has the units fitted must not be in operation (see [chapter 5 "Maintenance", page 16](#), [chapter 6 "Trouble-shooting", page 17](#)).
- Any work involving the units must be carried out by qualified electricians (see [chapter 5 "Maintenance", page 16](#), [chapter 6 "Trouble-shooting", page 17](#)).
- The unit may only be used by qualified personnel trained for explosion hazard areas.
- The power supply must be installed outside the explosion hazard area (see [chapter 3.1 "Assembly the power supply", page 11](#)).
- Before starting the unit make sure that the appliance is permanently grounded via the grounding terminal (6, Fig. 1). The ground cable should have a minimum cross section of 1.5 mm² (see [chapter 3.2 "Ground connection", page 11](#)).
- Check the power supplies and the discharging bars at regular intervals for any damage to the electrical wiring and the high voltage cables. Any damaged components must be repaired or replaced before continuing to operate the units.
- If the housing cover is removed and the supply voltage is switched on at the same time, contact protection is no longer effective. Always disconnect the power before opening the power supply units.
- The protection class IP54 only applies if the housing cover is closed and the cable connections are shrouded.
- Connect/disconnect the discharging bars only if the power supply unit is switched off (see [chapter 3.4 "Connecting the high voltage cable", page 12](#)).
- In applications involving moving bars (e.g. film draw strips), the high voltage cable must be attached such that there is no cable movement near the connection zone of the power supply unit (see [chapter 3.4 "Connecting the high voltage cable", page 12](#)).
- Both the lengths of the high voltage cable and of the active bars are limited, observe maximum lengths (see [chapter 3.5 "Maximum active bar length and length of the high voltage cable", page 13](#)).

- An overcurrent protection device with a nominal current rating ≤ 16 A and breaking capacity ≥ 4 kA must be installed in the mains power supply circuit. To ensure that no voltage is supplied to the bars when the material web is at rest, enabling the supply voltage to the power supply via machine contact is recommended. If the material web is at rest, or if the machine is not in operation, no high voltage is supplied to the bars in this case (see [chapter 3.6 "Connecting supply voltage", page 13](#)).
- Before starting up the power supply the user must make sure that the power supply and the bars have been installed and assembled correctly. The supply voltage can then be switched on (see [chapter 4.1 "Startup", page 15](#)).
- The power supply must be checked regularly to ensure its proper functioning. The connections of the high voltage cables must be free of dirt and other foreign matter (see [chapter 5.1 "Power supply", page 16](#)).
- Make sure that the bars are clean at all times. Dirt results in malfunctions and in premature wear of the units.
- When cleaning do not soak the bars and the high voltage cable in solvent and do not damage the emission tips; allow the solvent to evaporate completely before restarting the unit (see [chapter 5.2 "Discharging bars", page 16](#), [chapter 6 "Trouble-shooting", page 17](#)).



- **Ex-Warning:** Only fuses specified in the spare parts list and complying with Standard IEC 60127-2/5 may be used; failure to observe this specification will void the Ex approval (see [chapter 6 "Trouble-shooting", page 17](#)).
- Potential risk for wearers of cardiac pacemakers:
Moving the chest closer than 3.5 cm to the emission tips of the discharging bars or making surface contact with several emission tips (touching a single tip is not critical) can result in a temporary switchover of the cardiac pacemaker into the fault mode. Permanent proximity or contact can therefore cause severe problems.
If it is likely that the chest of such a person comes closer than 3.5 cm to the emission tips of the discharging bar, or if several emission tips are touched at the same time, the appropriate warning notices must be displayed.
- The operation of the bars can generate ozone. The ozone concentration levels developing near the bars depend on many different factors such as site of installation, bar current and voltage, air circulation, etc. and can therefore not be specified in general terms.
If the maximum allowable concentration of ozone must be observed at the site of installation of the bar, the concentration must be measured on site.
The AGW value (maximum admissible concentration) serves to assess the ozone concentration at the workplace. The user must make sure

that the appropriate national AGW value is at no times exceeded, e.g. in Germany the ozone concentration occurring during the operation of the system must not exceed the recommended value based on international limits of 0.06 ml/m^3 (0.12 mg/m^3).

2.4 Technical advance

The manufacturer reserves the right to make changes to the technical specifications without prior notice in order to adapt the units to state-of-the-art engineering. Eltex will provide the latest information on any changes or modifications in the operating instructions on request.

3. Installation and assembly

3.1 Assembly the power supply



The power supply must be installed outside the explosion hazard area.

The power supply is designed for wall mounting. Attach using the brackets provided (installation dimensions, see Fig. 2). The operating elements of the power supply and the terminals must be freely accessible at all times and the display LEDs must be visible.

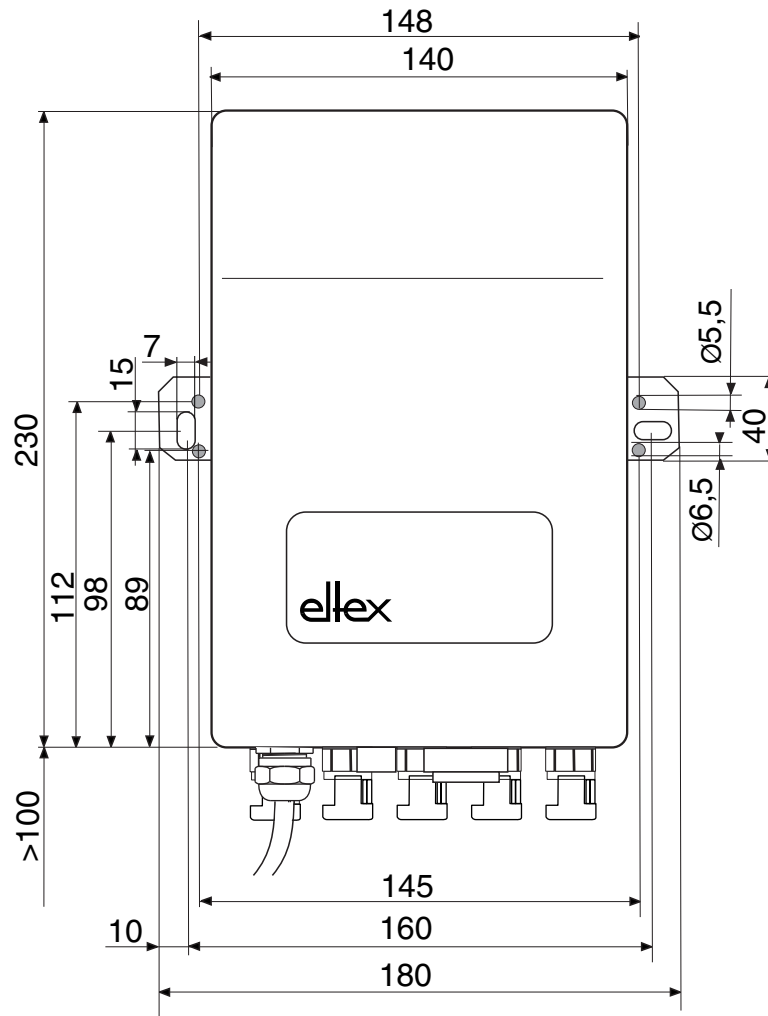


Fig. 2:
Installation
dimensions ES53

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3.2 Ground connection

A permanent ground connection must be made via the grounding terminal (6, Fig. 1). The ground cable should have a minimum cross section of 1.5 mm².

3.3 Selecting the discharging bar

Only Eltex discharging bars for AC operation can be connected to the ES53 power supplies.

3.4 Connecting the high voltage cable



Warning!

Electric shock hazard!

Always disable the supply voltage to the high voltage generator before disconnecting or connecting the high voltage cables.

Connect the bars via the prefabricated high voltage cable. Push the high voltage cables up to the stop into the connecting socket. Then secure the adapter in the socket with the clip provided (see Fig. 3). Cables without adapter carry a coloured marking on the flexible tubing. This marking must lie flush with the outside edge of the coupling. Cables without flexible tube and cables with plug-type adapters are plugged in flush and secured with the clip.

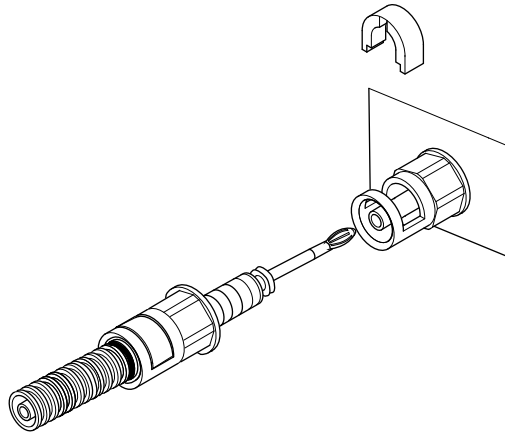


Fig. 3:
Connecting the
high voltage cable



Warning!

In applications involving moving bars (e.g. film draw strips), the high voltage cable must be attached such that there is no cable movement near the connection zone of the power supply unit.

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3.5 Maximum active bar length and length of the high voltage cable



Both the lengths of the high voltage cable and the active bars are limited. The shielded high voltage cables cause a capacitive load on the transformer inside the power supply. The maximum loading capacity is a result of the function of the total active bar length and the total length of all high voltage cables. Fig. 4 demonstrates this principle for EXR50 / EXR5C bars.

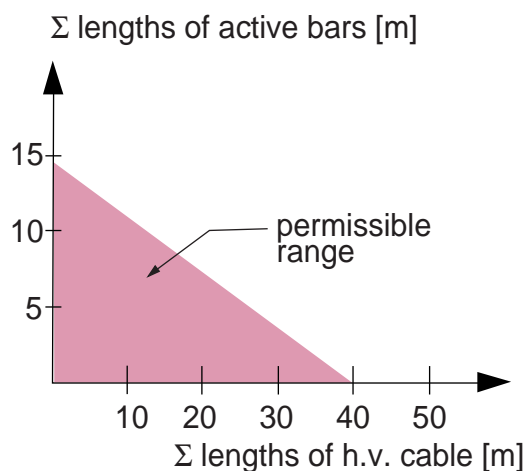


Fig. 4: Loading capacity of the power supply as factor of bar length and length of high voltage cable.

Example: The maximum permissible total cable length with a 3 meter active bar length is 32 meters.

3.6 Connecting supply voltage

Depending on the design of the power supply, connect the supply voltage via the power supply lead (1, Fig. 1) using an earthing pin plug (depending on device version); overvoltage category II.



Caution!

An overcurrent protection device with a nominal current rating ≤ 16 A and breaking capacity ≥ 4 kA must be installed in the mains power supply circuit. To ensure that no voltage is supplied to the bars when the material web is at rest, enabling the supply voltage to the power supply via machine contact is recommended. If the material web is at rest, or if the machine is not in operation, no high voltage is supplied to the bars in this case.

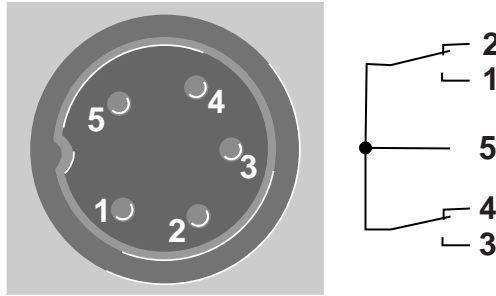
For external security of the power supply the following circuit breaker is recommended: Tripping Characteristic 2A/K according to DIN EN 60947-2.

3.7 Connection for function and fault signals

The 5-pin connecting plug (Fig. 5) is only provided in units equipped with function and pollution monitoring. Depending on requirements, the following signals can be picked up at this plug:

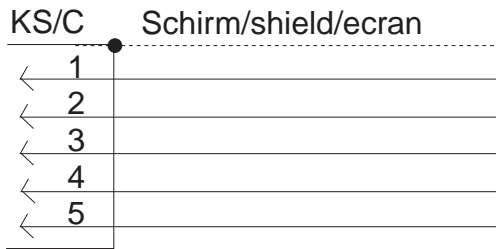
- Output voltage active: contact 1, 2, 5
(contact 1 and 5 closed)
- fault/pollution: contact 3, 4, 5
(contact 3 and 5 closed).

Fig. 5:
Assignment of the
plug for function
and fault signals
(contacts at rest)



Cables prefabricated at one end are available for connection to this plug (see spare parts).

Fig. 6:
Connecting cable
interface, fault
signal contact



Wire colours:

1 = white, 2 = brown, 3 = green, 4 = yellow, 5 = grey

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4. Operation

4.1 Startup



Before starting up the power supply the user must make sure that the ES53 power supply and the bars have been installed and assembled correctly. The supply voltage can then be switched on.

Use the toggle switch (4, Fig. 1) to switch on the power supply. In the ON position the switch lights up green. High voltage is now supplied to the discharging bars.

The output voltage is now a constant 5 kV AC.

If the fuse is defective, the switch will not light up.

4.2 Function and pollution monitoring (optional)

In general, proper operation is indicated by the illuminated switch in all units.

The optional function and pollution monitoring analyses the high voltage signal at the output.

- High voltage is indicated by a green LED in the front panel (active). A floating changeover contact is available for transmitting this signal.
- If a defect or fault is detected (e.g. sparking, dirt or arcing at defective cable), the fault signal will be activated and displayed via a red LED in the front panel (fault). The signal is available at a second floating changeover contact.

Note!

The fault will not be stored. Once the cause of the fault has been remedied, the fault signal goes off.

Dirt beginning to settle on a discharging bar is initially indicated by an irregular response of the fault signal. This must be kept in mind when processing the fault signal further.

5. Maintenance



Warning!

Electric shock hazard!

- Switch the power supply off and disconnect the supply voltage before carrying out any maintenance or repair work.
- The machine in which the discharging bars are installed must not be in operation.
- Maintenance work must be carried out by qualified electricians.

5.1 Power supply



The power supply must be checked regularly to ensure its proper functioning. The connections of the high voltage cables must be free of dirt and other foreign matter. The intervals for the check depend on the application and must hence be defined by the user according to the operating conditions. The power supply itself does not require any maintenance. Check for correct ground connection!

5.2 Discharging bars

To ensure the trouble-free function of the discharging bars, clean the bars regularly depending on pollution with compressed air free of oil and water (max. 6×10^5 Pa and standard compressed air pistol) and a brush with soft plastic bristles (see [chapter 9 "Spare parts and accessories", page 21](#)). Refer to the operating instructions for the bar used.

Dirt deposits settling on the bars (e.g. grease) must be cleaned off using a suitable solvent (benzine). Do not soak the bars and the high voltage cable in solvent!



Caution!

Risk of deflagration!

Allow the solvent to evaporate completely before restarting the unit. Do not damage the emission tips of the bars.

6. Trouble-shooting



Warning!

Electric shock hazard!

- Switch the power supply off and disconnect the supply voltage before carrying out any maintenance or repair work.
- Any work involving the units must be carried out by qualified electricians.

Fault with F + V*	Cause	Measure
red LED (fault) lights up	<ul style="list-style-type: none"> • Dirty bars. • Sparking on cables and bars. • Defective plug connection. • Serious source of EMC interference in the vicinity of the bar or the power supply units 	<ul style="list-style-type: none"> • Clean bars (see Maintenance). • Replace defective cables and bars. • Insert plug properly. • Locate and rectify the source of interference. If this is not possible, take measures to suppress interference.
green LED (active) fails to light up, no high voltage	<ul style="list-style-type: none"> • Lamp in mains power switch lit: defective transformer. • Lamp in mains power switch fails to light: supply voltage not enabled or not connected. • Defective fuse. 	<ul style="list-style-type: none"> • Inform Eltex Service. • Check supply voltage and connections. Check connected cables, cable connections and bars. • Replace fuse.
no high voltage	<ul style="list-style-type: none"> • Lamp in mains power switch lit: transformer defective. • Lamp in mains power switch fails to light: enabled or not connected. • Defective fuse. 	<ul style="list-style-type: none"> • Inform Eltex Service. • Check supply voltage and connections. Check connected cables, cable connections and bars. • Replace fuse.

(* F + V = Function and pollution monitoring)



Ex-Warning:

Only fuses specified in the spare parts list and complying with Standard IEC 60127-2/5 may be used; failure to observe this specification will void the Ex approval.

7. Technical specifications ES53 / ES53US

Input	
Supply voltage	115 or 230 V AC, 50/60 Hz
Power input	max. 80 VA
Fuse (primary circuit)	see name plate
Recommended protection	Tripping Characteristic 2A/K according to DIN EN 60947-2
Overvoltage category II	according to IEC standard 60664-1
Mains power cable	depending on the unit variant, either with grounding contact plug (approx. 2.5 m) or with free end (cable length max. 99 m)
Connectivity	
Operation	illuminated ON / OFF switch
Interfaces	optional
Output	
Voltage	5 kV AC
Current	max. 6,2 mA at 5 kV
Frequency	50/60 Hz
pluggable connections	5
Load capacity	depending on bar type and length and high voltage cable length (see chapter 3.5)
Features	
Ion balance	with and without parameter diode
Function monitoring and fault signals (optional)	2 floating contacts, max 250 V AC /1 A or 24 V DC / 0.5 A loading capacity green (high voltage active) resp. red (fault) LED in the front panel
passive operating mode	with the power supply unit switched off

Key date	
Housing type	sheet metal steel with wall bracket
Ground link	grounding terminal on housing
Operating ambient temperature	ES53: 0 °C...+60 °C (+32 °F...+140 °F) ES53US: 0 °C...+40 °C (+32 °F...+104 °F)
Storage temperature	-20...+80 °C (-4... +176 °F)
Ambient humidity	max. 80 % r.h., non-dewing
Protection class	IP54 according to EN 60529
Housing dimensions	230 x 180 x 82 mm [HxWxD], see Fig. 7
Weight	approx. 4 kg
Ex Approval	<p>complying with the requirements of the power supplies for Ex discharging bar approval EXR50 / EXR5C: BAS98ATEX2179X and for the Protective resistor EXRV55 for the Ion Blower Head EXR55 and for the Ion Blower Pistol EXPR55: PTB00ATEX2071X</p> <p>complying with the requirements of the power supplies for Ex discharging bar approval EXR5N: TÜV10ATEX7872X / TÜV10ATEX7937X in connection with the ES53/G..., ES53/H... resp. ES53/I... power supplies and the ion power pistol EXPR50: TÜV10ATEX7873X</p>
UL Approval	ES51US: File No. E227156

as shown on
appliance
marking:



8. Dimensions

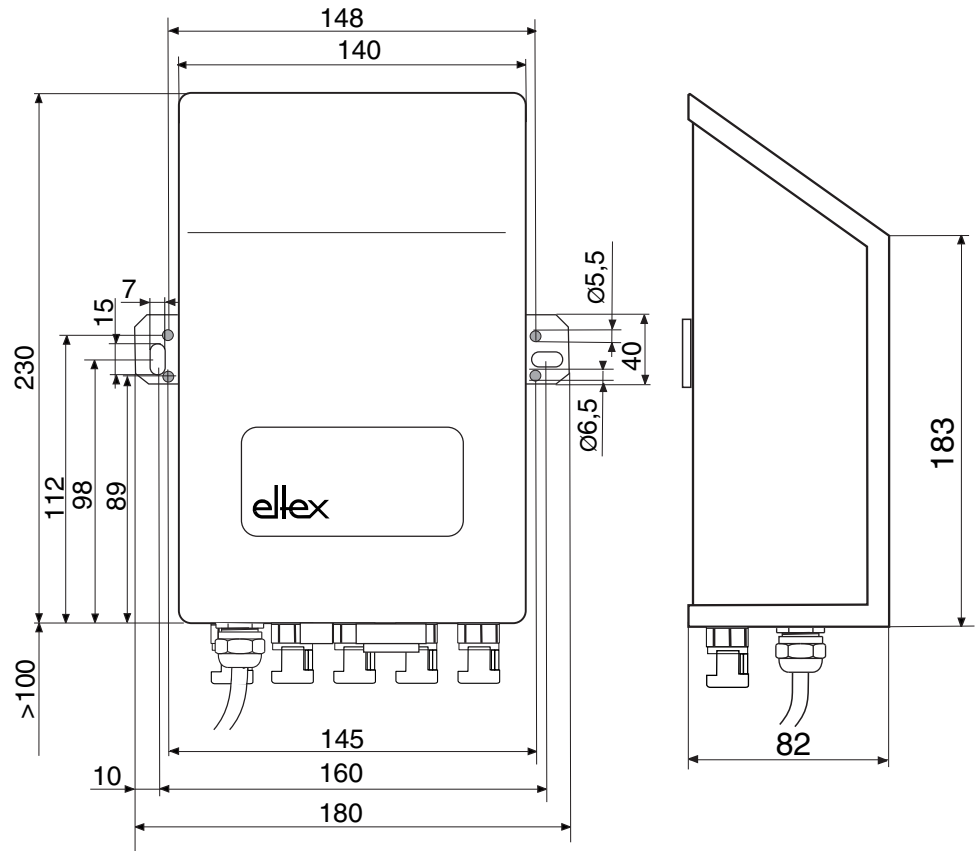


Fig. 7:
Dimensions,
ES53
power supply

Z00040y+Z00042y

9. Spare parts and accessories

Article	Article No.
Connecting cable for function and fault signals	KS/C___(specify length)
High voltage distributor discharging 5 terminals (1 input, 4 outputs) (assembly outside of explosion hazardous area)	ESV
High voltage cable between ES53 and distributor ESV (assembly outside of explosion hazardous area)	KE/LL___(specify length)
Extension cable	KE/LB
Plug "L"	
Kit for cutting high voltage cable to size with flexible tube for bar R50 and bar EXR50 / EXR5C	103289
Plug "B"	
Kit for cutting high voltage cable to size with flexible tube for bar EXR5N/_0015B and blower pistol EXPR50	111750
Blanking plug for high voltage connection	100597
Circular connector 5-pin for function and fault signals	ELM01144
Blanking plug for function and fault signal plug	ELM01115
Mains cable gland	MCH02176
Grounding terminal	ELM00202
ES53:	
Fuse F1 (115 V) 1.25 A T (IEC 60127-2/5)	113522
Fuse F1 (230 V) 0.63 A T (IEC 60127-2/5)	113211
ES53US:	
Fuse F1 (115 V) 0.63 A T (IEC 60127-2/3)	105659
Fuse F1 (230 V) 0.315 A T (IEC 60127-2/3)	ELM00722
Cleaning brush with handle	RBR22
Operating Instructions (specify language)	BA-xx-2018

Please specify the article number when ordering.

EU-Declaration of Conformity

CE-2088-en-2205

Eltex-Elektrostatik-Gesellschaft mbH
Blauenstraße 67 - 69
D-79576 Weil am Rhein



declares in its sole responsibility that the product

Power Supply Type **ES50 / ES51 / ES53 / ES60** (according to Eltex reference code)

complies with the following directives and standards.

Relevant EU-Directive:

2014/35/EU

Low Voltage Directive

Harmonized standard applied:

EN 60204-1:2018

Safety of machinery – Electrical equipment of machines –
General requirements

Relevant EU-Directive:

2014/30/EU

EMC Directive

Harmonized standards applied:

EN 55011:2016 + A1:2017
+ A11:2020 + A2:2021

Industrial, scientific and medical equipment –
Radio-frequency disturbance characteristics – Limits and methods
of measurement

EN IEC 61000-3-2:2019

Electromagnetic compatibility (EMC) – Limits – Limit for harmonic
current emissions (equipment input current ≤ 16 A per phase)

EN 61000-3-3:2013 + A1:2019

Electromagnetic compatibility (EMC) – Limits – Limitation of voltage
changes, voltage fluctuations and flicker in public low-voltage supply
systems, for equipment with rated current ≤ 16 A per phase and not
subject to conditional connection

EN IEC 61000-6-2:2019

Electromagnetic compatibility (EMC) – Generic standards –
Immunity for industrial environments

Relevant EU-Directive:

2011/65/EU

RoHS Directive

in the version effective at the time of delivery.

Eltex-Elektrostatik-Gesellschaft mbH keep the following documents for inspection:

- proper operating instructions
- plans
- other technical documentation

Weil am Rhein, 16.05.2022
Place/Date



Lukas Hahne, Managing Director

UKCA Declaration of Conformity

CA-2088-en-2208

Eltex-Elektrostatik-Gesellschaft mbH
Blauenstraße 67 - 69
D-79576 Weil am Rhein



declares in its sole responsibility that the product

Power Supply Type ES50 / ES51 / ES53 / ES60 (according to Eltex reference code)

complies with the following directives and standards.

Applicable Regulation:

S.I. 2016 No. 1101

Electrical Equipment (Safety) Regulations

Used Designated Standard:

BS EN 60204-1:2018

Applicable Regulation:

S.I. 2016 No. 1091

Electromagnetic Compatibility Regulations

Used Designated Standard:

BS EN IEC 61000-3-2 + A1:2019

BS EN 61000-3-3 + A2:2013

BS EN IEC 61000-6-2:2019

BS EN 55011+A2:2016

Applicable Regulation:

S.I. 2012 No. 3032

RoHS Regulations

in the version effective at the time of delivery.

Eltex-Elektrostatik-Gesellschaft mbH keep the following documents for inspection:

- proper operating instructions
- plans
- other technical documentation

Weil am Rhein, 30.08.2022
Place/Date



Lukas Hahne, Managing Director

Eltex offices and agencies

The addresses of all
Eltex agencies can be
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www.eltex.de



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