

Operating Instructions



F00009y

Series EXR5C Discharge Bars for AC Operation



BA-en-2019-1504



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Dear customer,

The EXR5C discharge bars are designed for the active discharging of disruptive static charges which develop in production processes in explosion hazard area.

The discharge 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 bars are operated with an alternating voltage of 5 kV at 50...60 Hz and are approved for use in explosive atmosphere of the group IIG and IID and comply with the device category 2 (Category 2 apparatus, zone 1).

The advantages of the EXR5C discharge bar:

- ultimate discharge range and hence enhanced depth effect
- high active discharge power through patented, isolated ground conductors
- high safety standards through passive discharging power with deactivated power supplies
- safety through function and malfunction monitoring
- continuous assembly slotting guarantees flexible installation

no health hazards in case of electric shocks when making contact with individual tips (≤ 10 tips).

Due to differences in the surface charge profiles on different materials, charges with both polarities are provided by the discharge bars. The corona section with its optimized geometrical configuration ensures ultimate discharging efficiency.

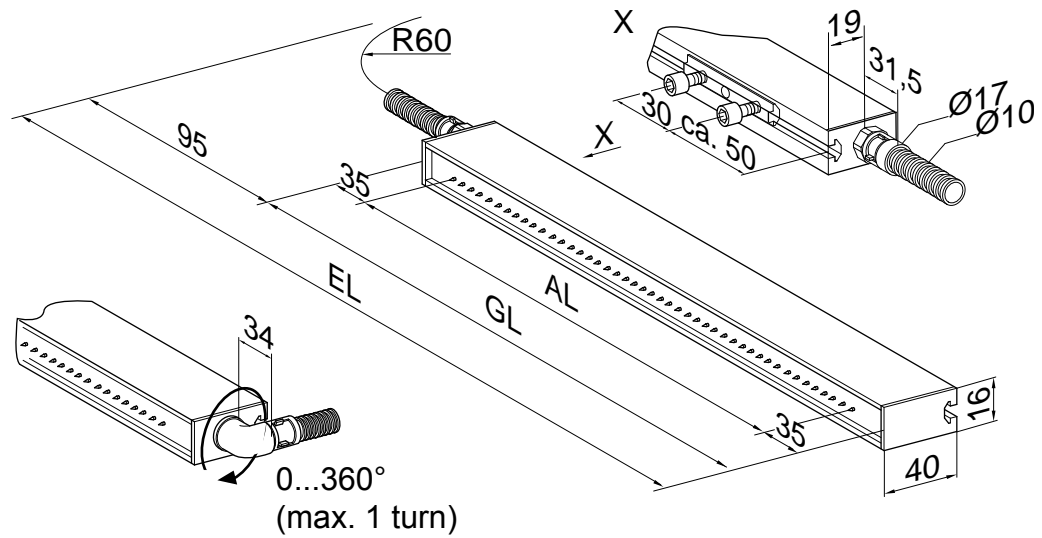
The optimum discharge effect is guaranteed in conjunction with the ES53/G.. resp. ES53/H.. resp. ES53/I.. Eltex high voltage power supplies.

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 EXR5C

Fig. 1:
Overview and
dimensions of the
EXR5C discharge
bar



Maximum active length = 5910 mm

Grid width = 15 mm

EL = Installation length

AL = Active length

GL = Total length

The high voltage cable leads out from the bar in either an axial or radial direction and is firmly encapsulated with the bar. The radial connection can be rotated by 360° and is locked in the desired position by means of a lock nut.

2. Safety

The Series EXR5C discharge bars 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 bars may nevertheless be hazardous to personnel and may cause injury or damage.

Read the operating instructions carefully and observe the safety notices.

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



Warning!

Do not touch the emission tips of the discharge bars when the supply voltage from the power supply is switched on. Always disconnect the supply voltage to the power supply before carrying out any cleaning or maintenance work.

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

2.1 Proper use

The Series EXR5C discharge bars must be used only for discharging static charges from material surfaces. Other uses are not permitted.

The discharge bars EXR5C must be operated only together with the dedicated ES53/G.. resp. ES53/H.. resp. ES53/I.. Eltex power supplies. These power supplies guarantee the optimum adaptation to the required operational data for the different active bar lengths. Safe operation of the bars is ensured only by using the Eltex power supplies.

Modifications or changes to the discharge 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 units are referred to in these operating instructions with 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!

- Before carrying out repairs, cleaning or maintenance work and before resetting the unit after malfunctions, switch off the power supply and disconnect the supply voltage.
- Any work involving the units and the discharge bars must be carried out by qualified personnel.
- Check the discharge bars and the high voltage cables at regular intervals for any damage. Damaged components must be repaired or replaced before continuing to operate the unit, or the bar or cable must be disabled.
- Keep the bars clean at all times.
- Do not touch the emission tips if the high voltage supply is connected. Reflex responses to electrical irritation may increase the risk of secondary accidents, especially in the vicinity of unguarded rotating assemblies.
- Potential risk for wearers of cardiac pacemakers:
Moving the chest closer than 3.5 cm to the emission tips of the discharge 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 discharge bar, or if several emission tips are touched at the same time, the appropriate warning notices must be displayed.

- Mechanical or electrical modifications of the discharge bars are not permitted. Shortening the shielded high voltage cable on the connecting side of the power supply is permitted. Extending the cable is permitted only when using the Eltex distributor as well as original high voltage cables and glands.
- 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 stream 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/m³ (0.12 mg/m³).
- Please note the maximum total lengths of the bars and the high voltage cables in chapter 3.2.
- In explosion hazard areas Group II Gas subdivision B it must be ensured that the possibility of the discharge pins being effectively connected together, e.g. by dirt or contamination, is avoided.
- In explosion dust hazard areas provide that the tips of the bar point are downwards and that the flash power of the dust is >0.4 mJ.



2.4 Contact protection

As the site of installation and/or use of the units is outside the control of Eltex, contact protection against inadvertent contact by personnel as specified by the employers' liability insurance association have to be provided (e.g. BGV A3 in Germany). Contact protection made of conductive material must be grounded.

2.5 Inspection

The protective resistors must be inspected at regular intervals. The inspection intervals are specified in the accident prevention regulations, as amended (e.g. in Germany BGV A3). Eltex recommend inspection intervals of 6 months.

Use a suitable resistance meter to check the volume resistance between the high-voltage connection and ionization tip(s). The test voltage must be 1,000 V. The resistance must not fall below 120 MOhm.

2.6 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 Assembling the discharge bar

Attach the Series EXR5C discharge bars to the machine wall, using flame-retardant GRP assembly material. For easier installation we recommend using the assembly material offered by Eltex. Fig. 2 shows the installation principle.

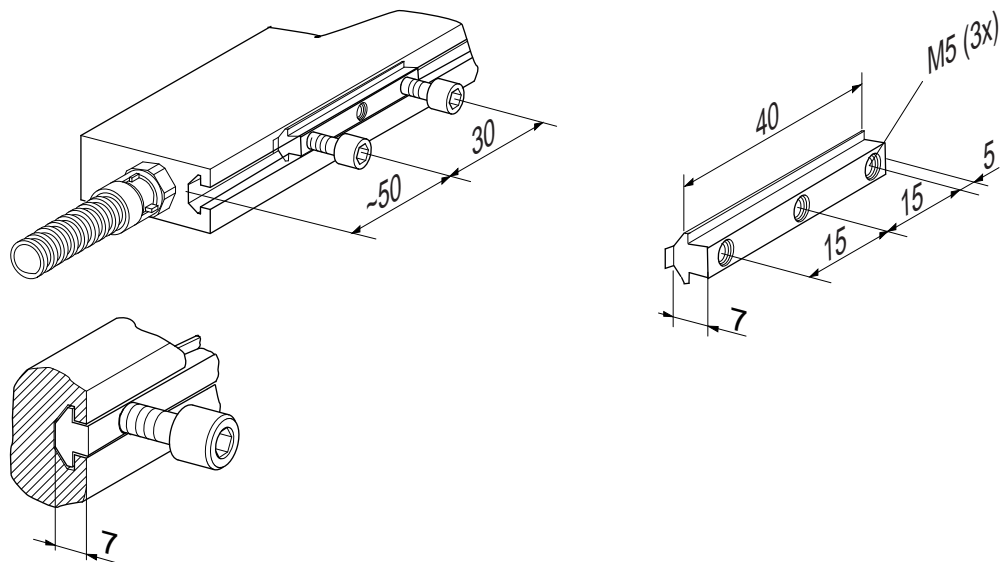


Fig. 2:
Assembling the
discharge bar

The profiled assembly section of the discharge bar is grooved. The sliding nuts pushed into this groove serve as bolt attachments for the GRP material, allowing the discharge bars to be installed.

Max. bolt depth 6.5 mm

Torque 0.4 Nm

Secure bolts (e.g. Loctite 243)



Caution!

Use only sliding nuts and bolts made of plastic!

below 1 meter total length: 2 per bar

below 2 meters total length: 3 per bar

below 3 meters total length: 4 per bar

below 4 meters total length: 5 per bar

below 5 meters total length: 6 per bar

below 6 meters total length: 7 per bar

An optional alternative is attaching the bars using a round GRP rod. Fig. 4 shows an assembly example. The bar is attached to the GRP rod via plastic holders plugged into the installation groove. Longer bars require an additional angle bracket bolted to the GRP rod to prevent the bar from sagging.

Plastic holder

below 1 meter total length: 3 per bar

below 2 meters total length: 5 per bar

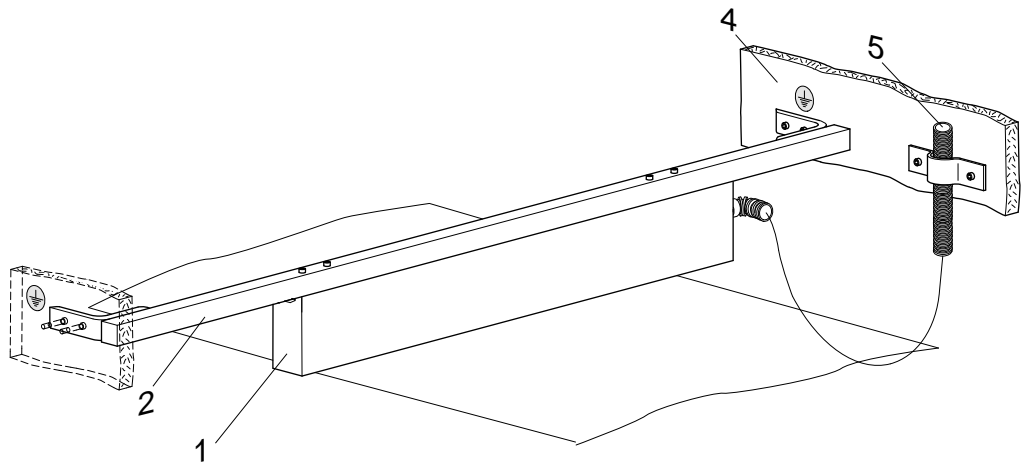
below 3 meters total length: 7 per bar

below 4 meters total length: 9 per bar

below 5 meters total length: 11 per bar

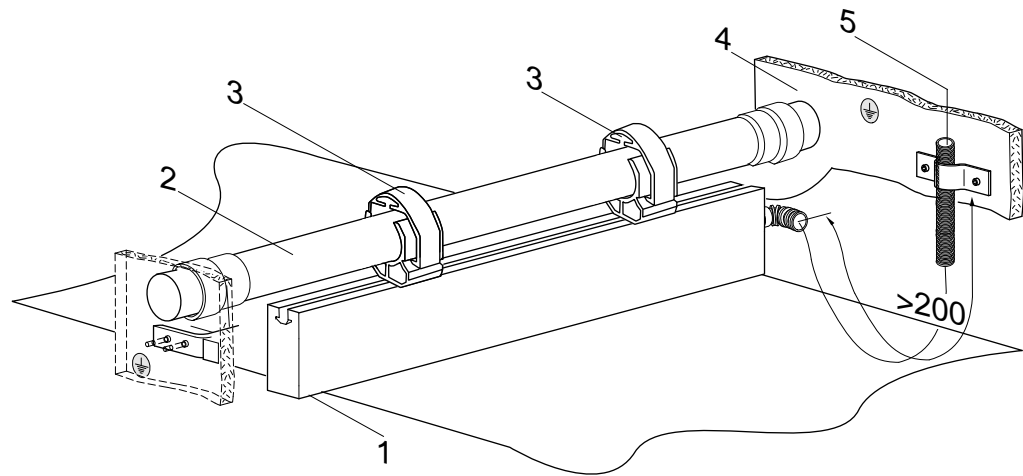
below 6 meters total length: 13 per bar

*Fig. 3:
Assembly example
EXR5C with GRP
rod and steel
brackets for
attachment to the
machine wall*



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*Fig. 4:
Assembly example
EXR5C with GRP
rod*



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- 1 bar
- 2 GRP rod
- 3 plastic holder
- 4 machine wall
- 5 high voltage cable with flexible tube



Warning !

For safety in operation, please note the following:

- The bar must be mounted such that mechanical damage to the bar tips is ruled out.
- When routing the cable, select the attachment points such that mechanical damage to the cable (e.g. chafing against rotating machine parts) is ruled out.
- To attach the cables, use only sliding nuts and bolts made of plastic.
- 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.
- Switch off the bar when working with metal film or metal composites!

Locating the discharge bar

The best possible discharge results are achieved if the bar is located in areas with minimum web capacities. In practical terms this means placing the bar with maximum distances from the machine environment, i.e. no installation of the discharge bar at idler rollers.

A rough guideline:

A space with the radius R of the bar distance from the web ought to be kept free of any conductive material (Fig. 5). The distance of the emission points to the conductive, earthed printing press area should be greater than to the substrate to be discharged.

Depending on application, the distance between discharge bar and substrate ought to be 15...100 mm.

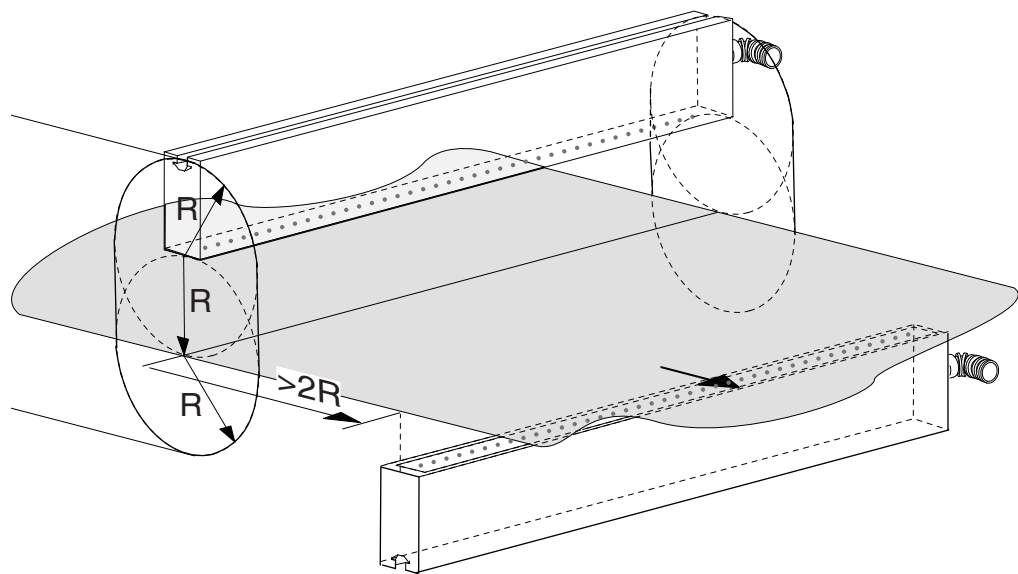


Fig. 5:
Zone free of conductive material with the dimensions R

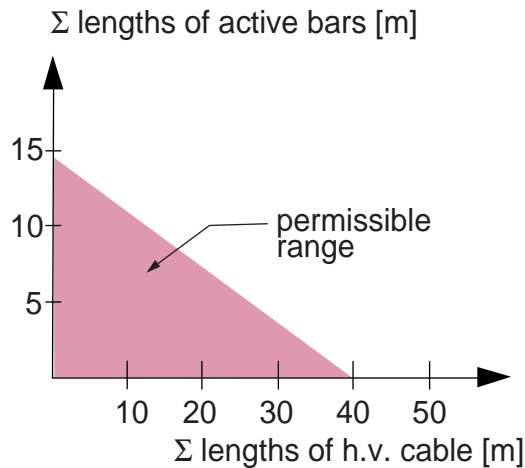
The bars are not allowed to be arranged oppositely during bilateral discharge. The distance between the bars should be larger than the twofold distance of the bar to the web.

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3.2 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. 6 demonstrates this principle for the supplies ES53.

Fig. 6:
Loading capacity
of the power
supplies ES53 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.

Connecting the ES53/G.. resp. ES53/H.. resp. ES53/L.. power supply see Operating Instructions of the power supply.

3.3 Adjust the angle coupling

If the bar has a angle coupling, then it is aligned towards the tips during ex factory delivery.

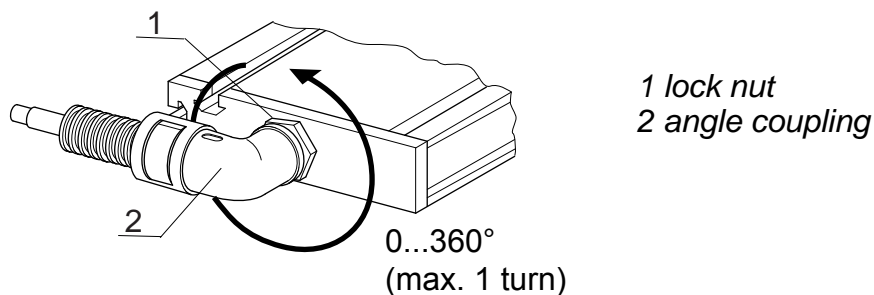


Fig. 7:
Angle coupling

To turn the angle connection, proceed as follows:

- loosen the lock nut
- align the angle coupling in its desired position
- re-tighten the lock nut

The maximum permissible angle of turn of the angle coupling is 360°.

4. Operation

The discharge bars must be operated only in connection with the ES53/G.. resp. ES53/H.. resp. ES53/I.. Eltex power supplies with 5 kV AC output.

These power supplies guarantee the optimum adaptation to the specified operating conditions and are approved for use in explosive atmosphere.

4.1 Startup

Once all the connections and the installation have been correctly made, the system is operational and the supply voltage can be switched on at the power supply.

4.2 Function control

Use the Eltex Volt Stick or a glow-lamp voltage tester to check the proper function of the discharge bar. Quote Article No. 109136 when ordering the Volt Stick from Eltex.



Warning!

The control has to be done outside of the explosion hazard area.

5. Maintenance



Warning!

Switch off the power supply unit and disconnect the supply voltage before carrying out any maintenance or repair work. The machine in which the discharge bars are installed must not be running.

Repairs and maintenance work must be carried out by qualified personnel.

To ensure the trouble-free function of the discharge bars, clean the bars at least once a week with compressed air free of oil and water (6 bar and standard compressed air pistol) and a brush with plastic or soft copper bristles.



In explosion hazard areas Group II Gas subdivision B it must be ensured that the possibility of the discharge pins being effectively connected together, e.g. by dirt or contamination, is avoided.

Clean grease, ink, glue, paper dust, etc. off the discharge bar using a suitable solvent (Cleaning gasoline). Do not soak the bars and the high voltage cable in solvent!



Warning!

Risk of deflagration!

Allow the solvent to evaporate before restarting the unit.



Caution!

Do not damage the emission tips when cleaning. Brush only in longitudinal direction.

Inspection of the protective resistors

The protective resistors must be inspected at regular intervals. The inspection intervals are specified in the accident prevention regulations, as amended (e.g. in Germany BGV A3). Eltex recommend inspection intervals of 6 months.

Use a suitable resistance meter to check the volume resistance between the high-voltage connection and ionization tip(s). The test voltage must be 1,000 V. The resistance must not fall below 120 MOhm.

6. Troubleshooting



Warning!

Electric shock hazard!

Switch off the supply voltage to the power supply before carrying out any repair or maintenance work. No voltage must apply at the discharge bars.

Repairs must be carried out by qualified personnel.

Malfunction:

Effectiveness of the application declining.

Cause:

Dirty discharge bars.

Measure:

Clean bar with compressed air and a brush. Clean grease, ink, oil, etc. off the bar with a suitable solvent (Cleaning gasoline).

For further malfunctions, refer to the operating instructions for the power supplies.



Caution!

Do not leave the discharge bar to soak in the solvent!



Warning!

Risk of deflagration!

Allow the solvent to evaporate before restarting the unit.

7. Warranty

The units are warranted for a period of 12 months provided that the operating conditions have been maintained, that the units have not been tampered with and that the units show no mechanical damage.

The warranty applies only if the operating and assembly instructions specified by Eltex have been observed. The warranty period begins on the date of delivery.

In the event of defects occurring during the warranty period, the units or defective components will be repaired at Eltex. Defective components will be replaced and installed free of charge.

If repairs are required at the customer's premises, the costs for sending a technician (travel, travel time, expenses) will be charged to the customer.

8. Technical specifications EXR5C

as shown on
appliance
marking:



Bar element	glass-fibre-reinforced plastic GRP
Encapsulation material	polyurethane, UL-94 V-0
Emission tips	stainless steel
Installation material	plastic sliding nuts
Operating Ambient temperature	0...+40 °C (+32...+104 °F)
Ambient humidity	max. 70% RH, non-dewing
Dimensions	profile: 16 x 40 mm, max. length 5,980 mm, see Fig. 8
Weight	approx. 0.8 kg/m
Operating voltage	max. 5 kV AC, 50/60 Hz
High voltage supply	via ES53/G.. resp. ES53/H.. resp. ES53/I.. Eltex power supplies
High voltage connection	high voltage cable encapsulated, axial or radial (rotatable by 360°) lead-out
Short-circuit current/tip	max. 0.046 mA
Contact protection	according EN 61140
EX Approval	BAS98ATEX2179X <div> <div>Ex</div> <div>II 2 G IIA T6 or</div> </div> <div> <div>Ex</div> <div>II 2 G IIB T6 if it is ensured that the possibility of the discharge pins being effectively connected together is avoided.</div> </div> <div> <div>Ex</div> <div>III 3 D T100 °C provided that the tips of the bar point downwards and that the flash power of the dust is >0.4 mJ.</div> </div>
UL Approval (EXR50US)	Class I, Group D; Class II, Group G; Class III; File No. E81984

The current approvals with their supplements can be found at:
<http://service.eltex.de>.

9. Dimensions

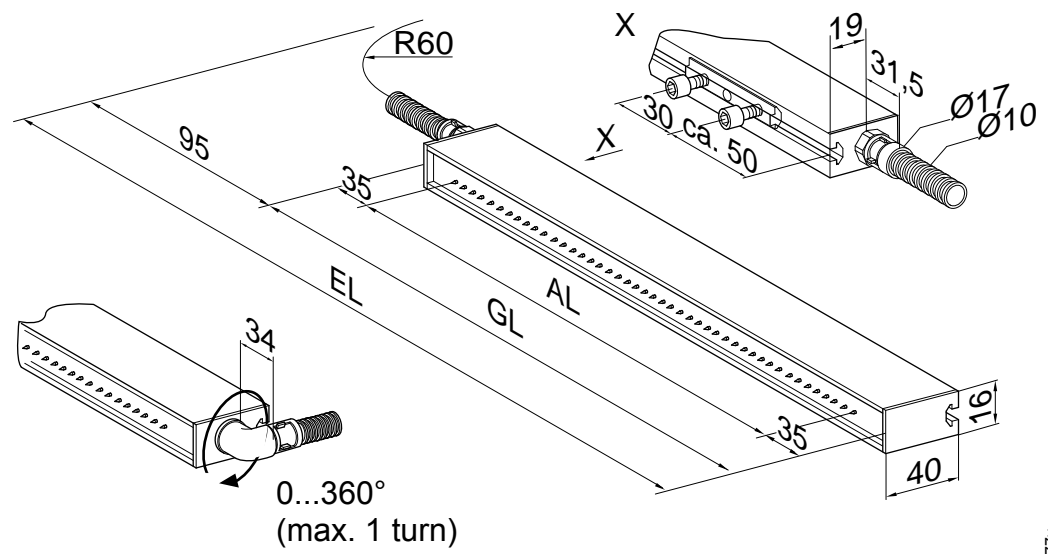


Fig. 8:
Dimensions,
discharging bar
EXR5C

EL = Installation length
AL = Active length
GL = Total length

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10. Spare parts and accessories

Article	Article No.
Power supply 5 kV, max. 6,2 mA	ES53/G.. resp. ES53/H.. resp. ES53/L..
High voltage distributor, discharge, 5 terminals (1 input, 4 outputs) (assembly outside of explosion hazardous area)	ESV
High voltage cable between EXR5C and distributor ESV (assembly outside of explosion hazardous area)	KE/LI____ (specify length)
Plug "L" Kit for cutting high voltage cable to size with flexible tube for power supply ES53 and distributor ESV	103289
Mounting material for bars: slide nut with screws and washers	105826
Plastic countersunk screw, M5x8	101020
Plastic countersunk screw, M5x10	KSR00030
Plastic countersunk screw, M5x30	108525
Plastic cheese-head screw, M5x10	KSR00012
Plastic cheese-head screw, M5x16	KSR00013
Plastic cheese-head screw, M5x25	KSR00015
Plastic cheese-head screw, M5x35	KSR00016
Plastic cheese-head screw, M5x50	KSR00017
Adapter plate, with screws 2 x M5 by 1 x M8	101807
Adapter plate for version S01, with screws 2 x M5 by 1 x M8	101824
GRP round rod Ø 20 mm	100864
Bar holder for round rod	101075
Attachment clip for round rod	MCH02434
GRP reinforcement angle bracket	102568
Flexible conduit tubing for high voltage cable	MCH02438
Kit - Bar holder Bar holder with clamps	HA01/____
Bar holder with perforated plate	HA02/____
Bar holder for frame attachment	HA03/____
Bar holder for shaft attachment	HA04/____
Bar holder with assembly angle bracket	HA50/____
Volt Stick	109136
Operating Instructions (specify language)	BA-xx-2019

Please specify the article number when ordering.

Declaration of Conformity

C-2019-en-1306




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



The above company deposes and declares in its sole responsibility that the product

Discharging Bar EXR50 / EXR50K / EXR5C / EXR5CK (according to Eltex reference code)

Identification:  II 2 G IIB T6; III 3 D T 100°C
Certification-no.: BAS 98 ATEX 2179 X, latest supplement no. 9 issued 14th June 2013
Notified body: Baseefa 1180 Buxton UK, No. Baseefa ATEX 0350

to which this declaration refers, conforms with the following norms or standards

Relevant EC-Directives:

94/9/EG

Directive: Equipment or Protective System intended for use in potentially explosive Atmospheres

Relevant EC-Directives:

2006/95/ EG

Low Voltage Directive

Harmonized standards applied:

EN 60204-1:2006

Safety of machinery – Electrical equipment of machines – General requirements

Relevant EC-Directives:

2004/108/EG

EMC Directive

Harmonized standards applied:

EN 55011: 2009+A1:2010

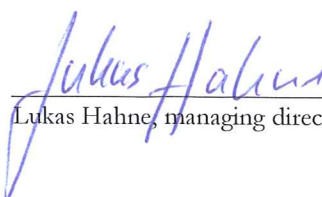
Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – limits and methods of measurement

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, 25.06.2013
Place/Date


Lukas Hahne, managing director

Eltex offices and agencies

The addresses of all
Eltex agencies can be
found on our website at
www.eltex.com



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