No Static Long Range System

Installation Manual CCU/LR01/HVLE

A621A96 NSLR CCU/LR01HVLE manual 20070920.CDR

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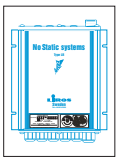

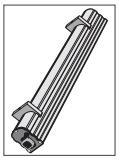

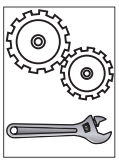

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1. Overview

No Static Long Range System

The No Static Long Range System is a set of components used to neutralize electro static charges, without air assistance, over a relatively long range. In comparison with conventional electro static dischargers, based on low frequency transformer designs, which have an effective range of a couple of centimeters at most, the No Static Long Range System has an effective range of approximately 1 meter.

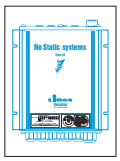
In many of today's manufacturing processes, electrostatic charges are an increasing problem due to high processing speed, low weight of the processed material and the use of compounds that is more susceptible to static charge buildup. Many times it is not practical or even possible to remedy these problems with conventional electrostatic discharge equipment because of their low operating range and the limited space within the processing environment. In these cases Liros No Static Long Range System is the ideal safe and simple solution. The long operating range allows it to be placed at some distance away from the problematic area where it doesn't interfere with the actual manufacturing processes in the machine. The No Static Long Range System is also very well suited for applications where the distance between the discharger and the static buildup varies, for instance where large reels are being wound or unwound.

A complete system consists in one Central Control Unit and up to four high voltage Electrostatic Discharger Units. The Central Control Unit is mains powered and provides distributed low power to each Electrostatic Discharger Unit.

The only control on the front panel is a power switch which makes it very easy to operate. No complicated settings to adjust - simply power it on and leave it alone.

The Electrostatic Discharger Units are supplied with low voltage power from the Central Control Unit. The high voltage is produced entirely within the Discharger Units which means that the connecting cables can be relatively long and of a common type, making the installation easy. This is in contrast to many other high voltage electrostatic discharger equipments which require high voltage cables that can be of very limited lengths and is difficult to install.

The high voltage generated in the Electrostatic Discharger Units is of such low power that it is totally shock proof according to prevalent safety standards and regulations. In addition, the high voltage emitters are shaped in a way that reduces the natural wear and breakdown caused by the high voltage. The shape also makes it easy to clean and sharpen the emitters on site. The Electrostatic Discharger Unit design and technology is Patent Pending.



2. Central Control Unit CCU/LR01

2.1. General Description

The main purpose of the Central Control Unit is to provide power for up to four Electrostatic Discharger Units.

It has a front panel with control and indicator for power.

Behind the rear panel there are connection terminals for mains power and four Electrostatic Discharger Units.

2.2. Marking

CE mark

Type CCU/LR01
Serial No: 2007 45020
CE
IN: 230VAC 50Hz 40VA
OUT: 24VDC max 4x150mA
IP 54 0°C ≤ Ta ≤ +50°C
AB Liros Electronic,
Box 9124, S-200 39 Malmö, SWEDEN

The marking on the Central Control Unit shows the CE mark, the product model number and name, the name and contact information of the manufacturer, the manufacturing year and serial number and some of the rated data.

The manufactured year is identified by the serial number, which is in the form YYYY WWNNN, where YYYY is the year, WW is the week number and NNN is the batch serial number. Serial No. 2007 45020 means that the unit is No. 20 of the batch manufactured in week 45, year 2007.

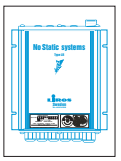
The marking also shows that the No Static Long Range System is to be powered with 230VAC, 50Hz, has a power consumption of max 40VA, has 4 outputs of 24VDC, 150mA each, is sealed to an ingress protection of IP54 and can operate in an environment with temperatures between 0°C to 50°C.

The CE mark means that the No Static Long Range System complies with all relevant directives of the European Council. The following Council Directives are met:

Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) with the amendments 92/31/EC and 93/68/EEC, by applying the following standards:

- EN 61000-6-2:2001, Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments.

- EN 61000-6-3:2001, Electromagnetic Compatibility (EMC) – Part 6-3: Generic Standards – Emission standard for residential, commercial and light-industrial environments.



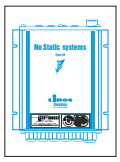
Council Directive 73/23/EC Low Voltage Directive (LVD), by applying the following standard:

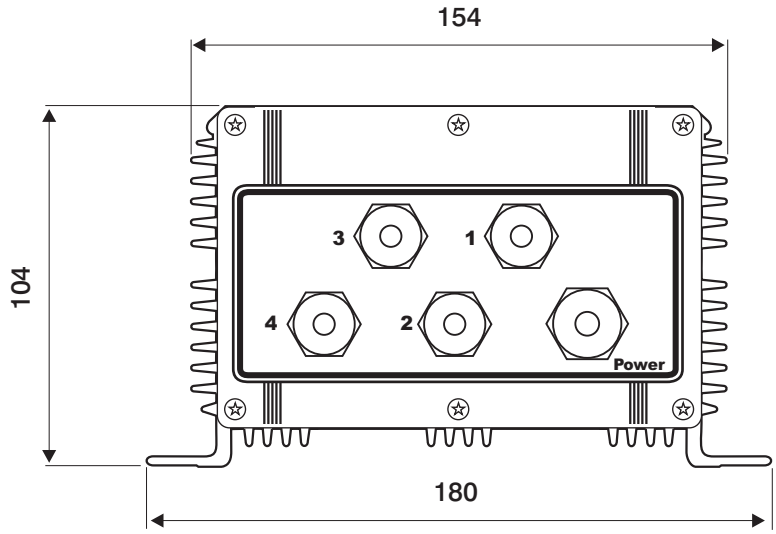
- EN 61010-1:2001, Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements.

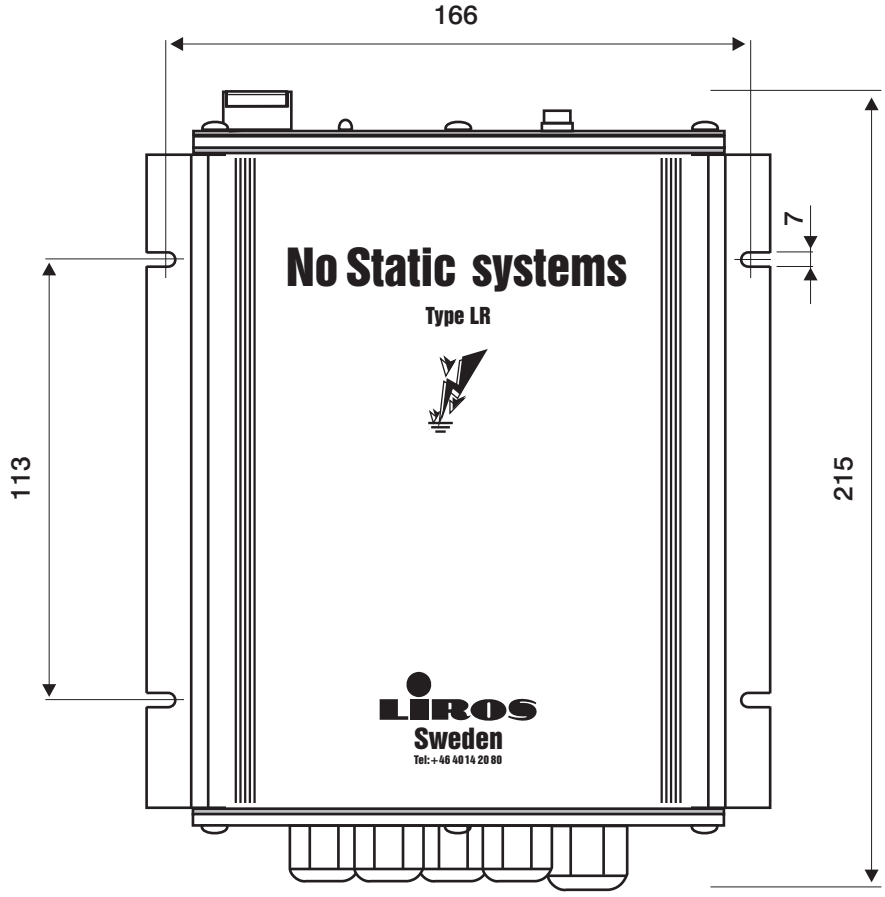
The product is exempt from the RoHS and WEEE directives since its intended use is as a fixed part of a large scale stationary industrial tool.

2.3. Mounting

The Central Control Unit has facilities for mounting on a machine or a wall. The ambient temperature in the area where the Control Unit is to be mounted must not exceed 50°C.







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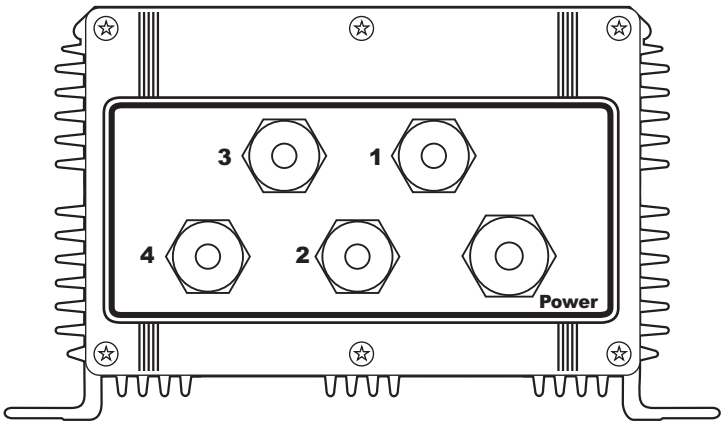
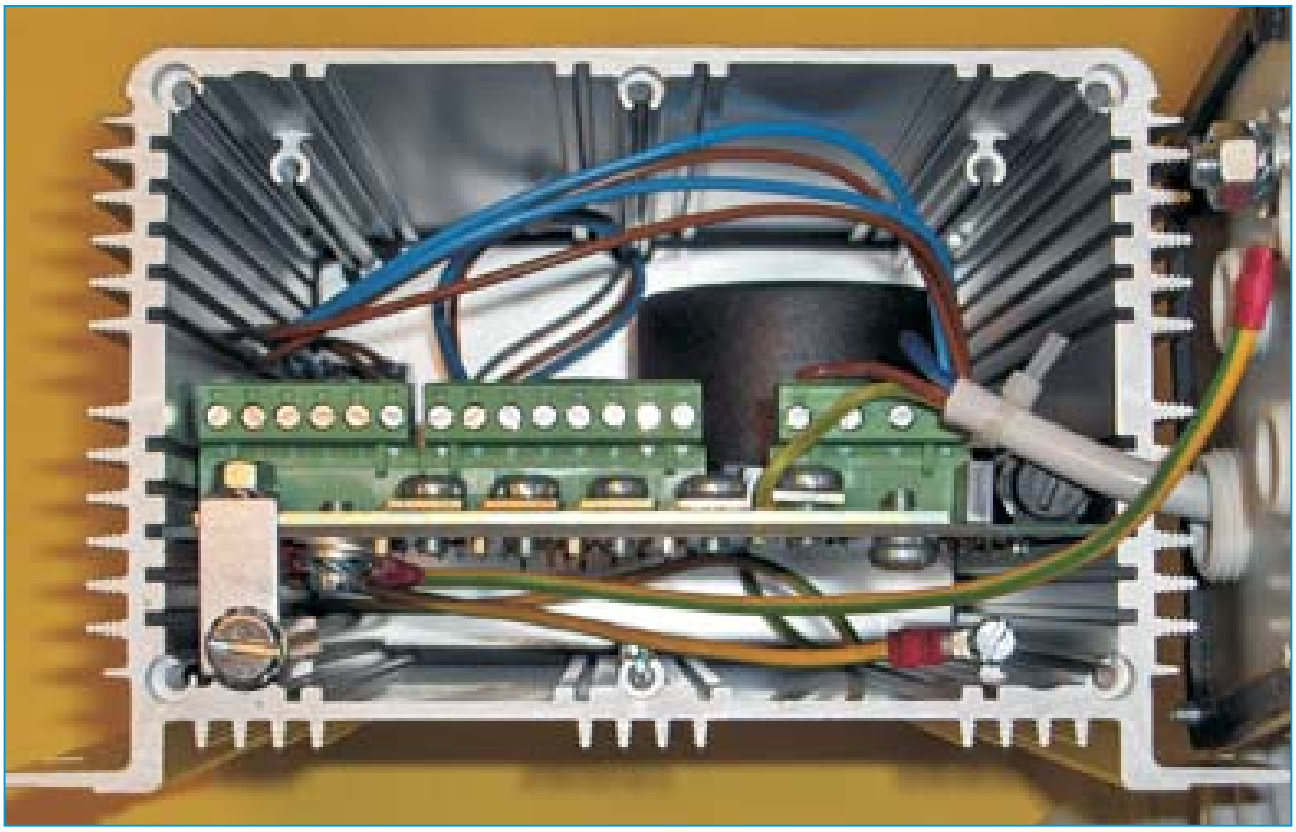
2.4. Electrical installation

All external connections are done through cable glands in the rear panel.



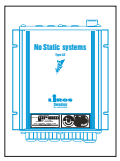
There is one cable gland for each Electrostatic Discharger Unit and one for mains power. Remove the panel by unscrewing the 6 screws with a 2.5mm hexagon key. The screws are held in place by the rubber gasket and completely loosened from the main frame when they are unscrewed 6-7mm.



Make sure that the mains power is switched off before the panel is removed.

With the rear panel removed, all electrical connections are exposed on one circuit board. There are terminals for the Electrostatic Discharger Units.

All terminal blocks are removable for easier access.



When all electrical connections are done, the rear panel has to be remounted before power is switched on. Also make sure that all unused cable glands have been properly sealed with the enclosed cable gland plugs.

2.4.1. Mains power

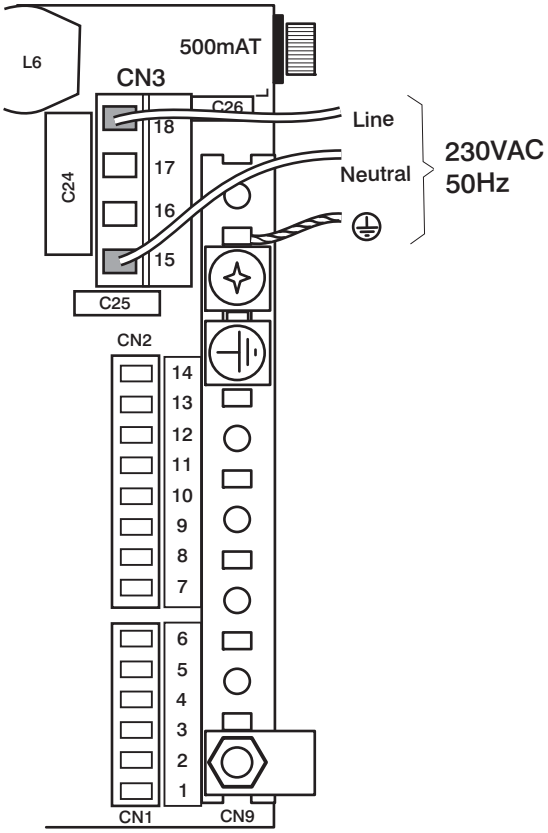
Mains power and protective ground is connected to CN3 and the earth bar.

The power inlet is protected with a single 500mA slow 5*20mm replaceable glass tube fuse, close to the power inlet. The Control Unit can be connected to mains either with the supplied detachable power cord or with a fixed, non-detachable cord.

The Central Control Unit is a Class I type equipment which relies on the protective ground for electrical safety. In case of a detachable mains connection, make sure that the unit is connected to a grounded outlet. For both detachable and non-detachable mains connections, make sure that the protective ground wire is firmly connected to the earth bar.

The Control Unit has to be provided with means to disconnect it from all current carrying conductors to the mains power. If a detachable power cord is used this requirement is fulfilled with a mains socket outlet and the mains plug. For a non-detachable connection, an external circuit breaker in close proximity to the Central Control Unit within easy reach of the operator has to be used. The circuit breaker has to meat the relevant requirements of IEC 60947-1 and IEC 60947-3 and should be marked as the disconnecting device for the equipment.

The mains supply cord shall be rated for 230VAC, have an area of at least 0.75mm2 and meet the requirements of IEC 60227 or IEC 60245.



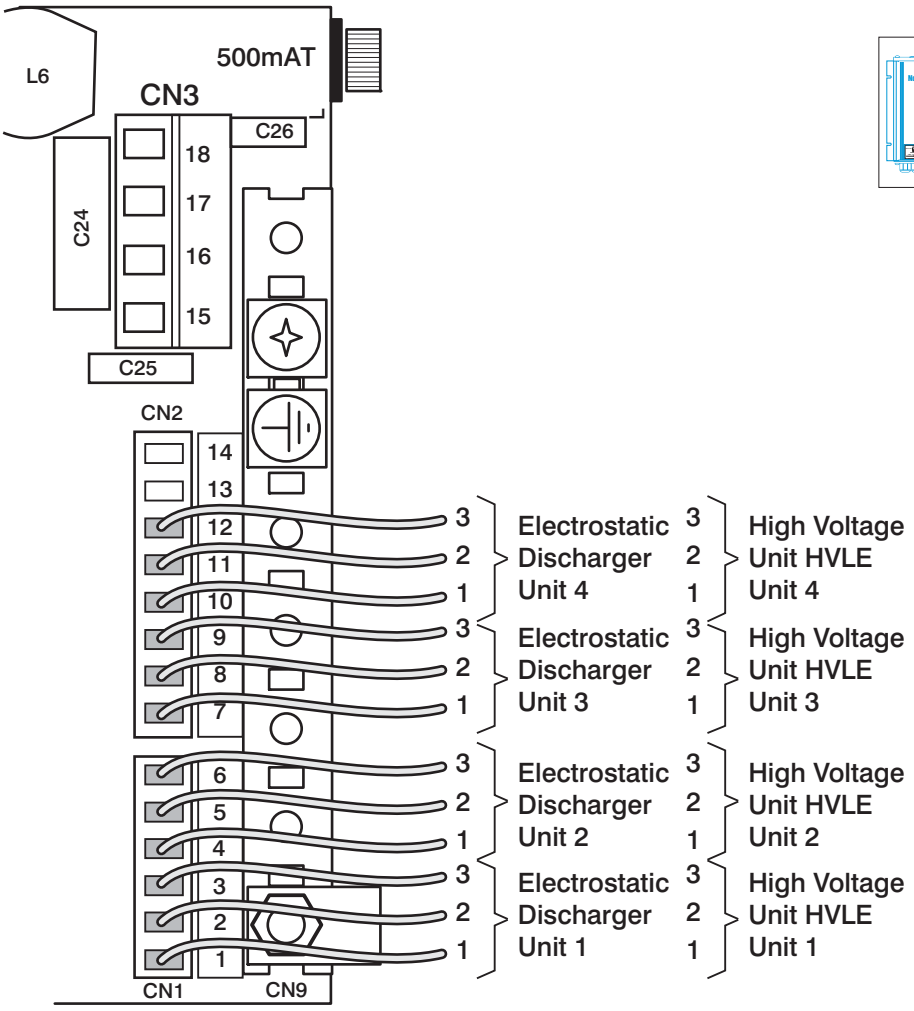
2.4.2. Connections to the Electrostatic Discharger Units / High Voltage Units

The Electrostatic Discharger Units/High voltage units are connected to CN1 and CN2.

Electrostatic Discharger Unit/High Voltage Unit no. 1 is connected to terminals 1, 2 and 3 in CN1, unit no. 2 is connected to terminals 4, 5 and 6 in CN1, unit no. 3 is connected to terminals 7, 8 and 9 in CN2 and unit no. 4 to terminals 12, 13 and 14 in CN2.

Each separate wire in the SKHE/LR cable is marked with numbers 1 to 3 or 4. These correspond directly to the order in which they are to be connected in the Control Unit and the numbering of the poles in the plug/socket connection in the Discharger unit.

The plug connected to the Discharger Unit/High voltage unit is manufactured by Hirschman and has type name G4W1F. The connecting wires should have an area of at least 0.5mm2.



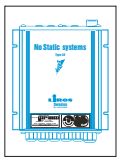
Note that the wire marked 4 is not going to be connected in the CCU/LR01 and has to be cut and insolated.

Denomination	Length	Order no.
SKHE/LR	5m	LI 04 04 05
SKHE/LR	10m	LI 04 04 10
SKHE/LR	15m	LI 04 04 15
SKHE/LR	20m	LI 04 04 20
SKHE/LR	25m	LI 04 04 25

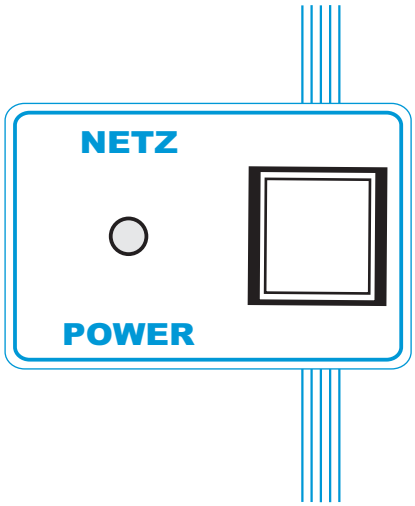
The Electrostatic Discharger Units are connected to the Central Control Unit with a 4 part signal cable. Liros supplies these in 5 standard lengths between 5m and 25m. Other lengths can be manufactured on request.

2.5. Control and indicators on the front panel

The front panel has control and indicator for power.



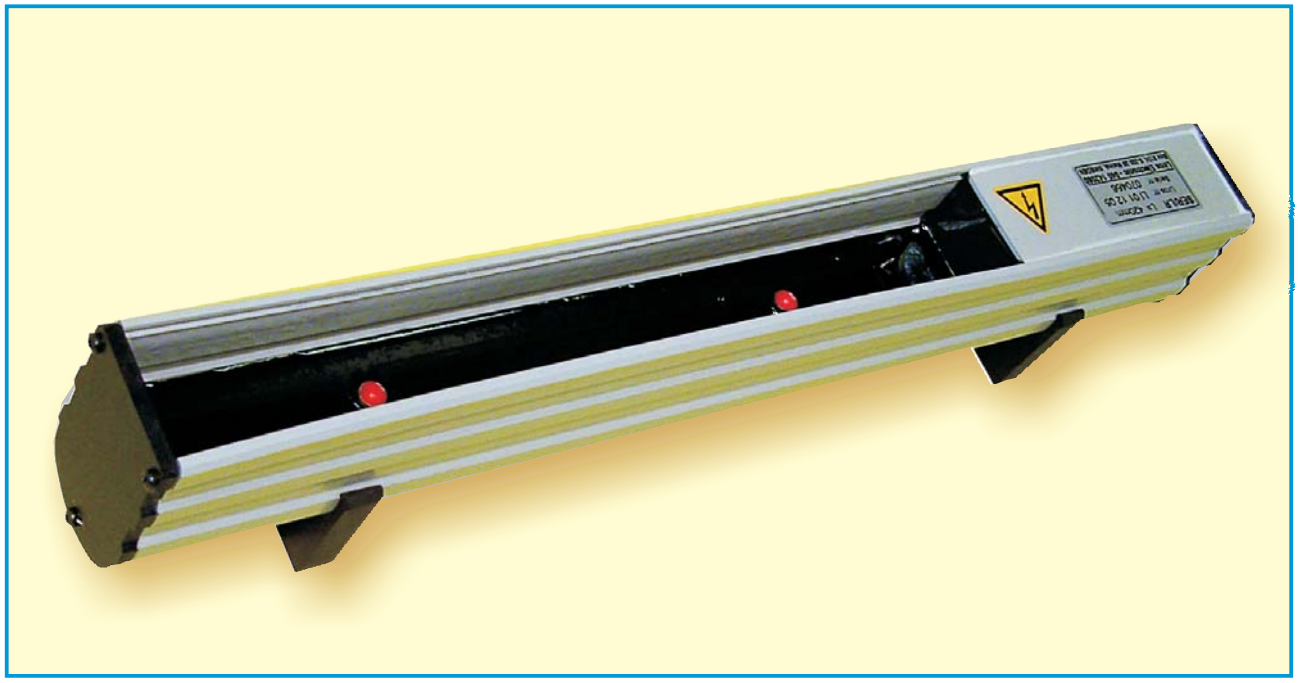
2.5.1. Power

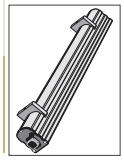


The power switch is used to switch the mains power to the Central Control Unit on and off. When power is switched on the power indicator immediately lights with a steady green state..

3. Electrostatic Discharger Unit EDU/LR01

3.1. General Description





The Electrostatic Discharger Unit is supplied with a low power voltage from the Central Control Unit. This low voltage is internally converted to high voltages used to neutralize the electrostatic charges. It has no operating controls or indicators and the only connections are to the Central Control Unit and a functional earth connection.

Although the Discharger Unit generates a high voltage of both positive and negative polarity, the maximum output current is low enough to make it totally shock proof according to prevalent safety standards and regulations.

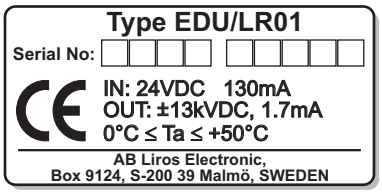
The Discharger Unit contains supervisory circuits that continuously monitor the output voltage. If, for any reason, the output voltage isn't present, the Central Control Unit can notify external circuits via relay outputs or other types of industrial communication.

Liros manufactures several types of Electrostatic Discharger Units. The one described here is the EDU/LR01 which is the most commonly used. Consult the individual installation manuals regarding specific data and installation instructions for the other types of Electrostatic Discharger Units.

3.2. Marking

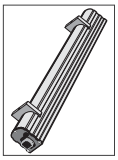
The marking on the Electrostatic Discharger Unit/High Voltage Unit shows the CE mark, the GS mark, the product model number and name, the name and contact information of the manufacturer, the manufacturing year and serial number and some of the rated data.

The marking shows that the Electrostatic Discharger Unit/High Voltage Unit is to be powered with



24VDC, has a current consumption of max 130mA, is sealed to an ingress protection of IP54 and can operate in an environment with temperatures between 0°C to 50°C. It also shows that the output voltage is max ±13kV DC with a maximum output current of 1.7mA.

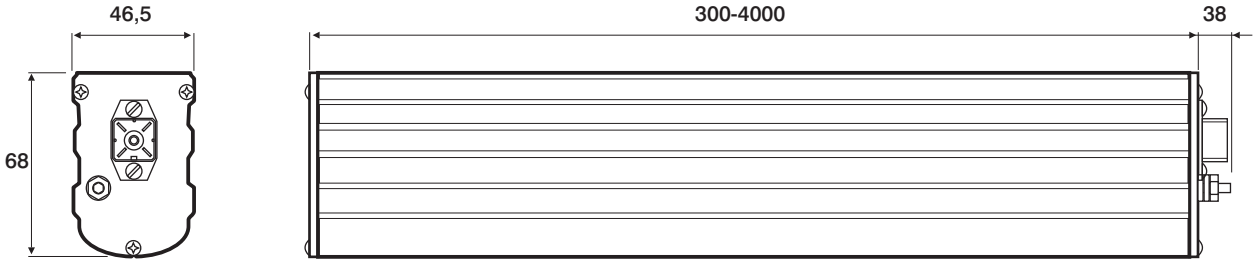
The same standards and directives, regarding the CE and GS mark, as for the Central Control Unit applies for the Electrostatic Discharger Unit, see 2.2.



3.3. Mounting

3.3.1. Mechanical fastening

The Electrostatic Discharge Unit EDU/LR01 is manufactured in lengths between 300mm and 4000mm.



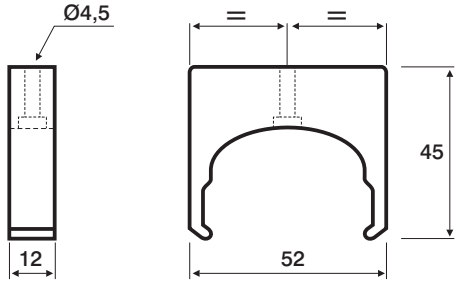
Liros supplies two different types of holders used to mount the EDU/LR01 Electrostatic Discharger Units in a processing environment. The holders are mounted on a machine or a fixture and the Electrostatic Discharger Unit is snapped onto the holder. It is recommended to use approximately one holder per meter and at least two for Discharger Units of shorter lengths.

SEH/LR

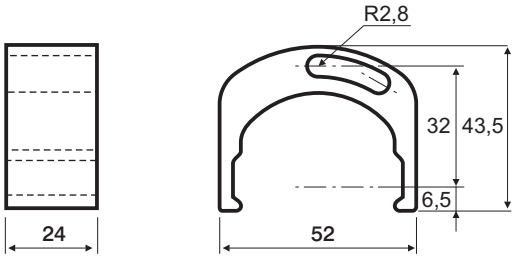
SEH/LRA

Both types of the holders and the Discharger Units are made of PVC. Never put screws directly into the Discharger Unit and don't use any other type of holders than those supplied by Liros.
The ambient temperature in the area where the Discharger Unit is to be mounted must not exceed 50°C.

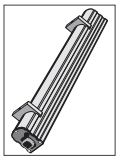
SEH/LR



SEH/LRA



3.3.2. Placement in a machine or process



Even though the Electrostatic Discharger Unit it is totally shock proof, it can still be very unpleasant to directly come in contact with the high voltage emitters. This could in turn lead to secondary injuries, when somebody by reflex movement, quickly withdraws an arm for instance. Therefore it is preferred to mount the Electrostatic Discharger Units in such a way that its high voltage emitters are protected from direct contact with the machine operators.

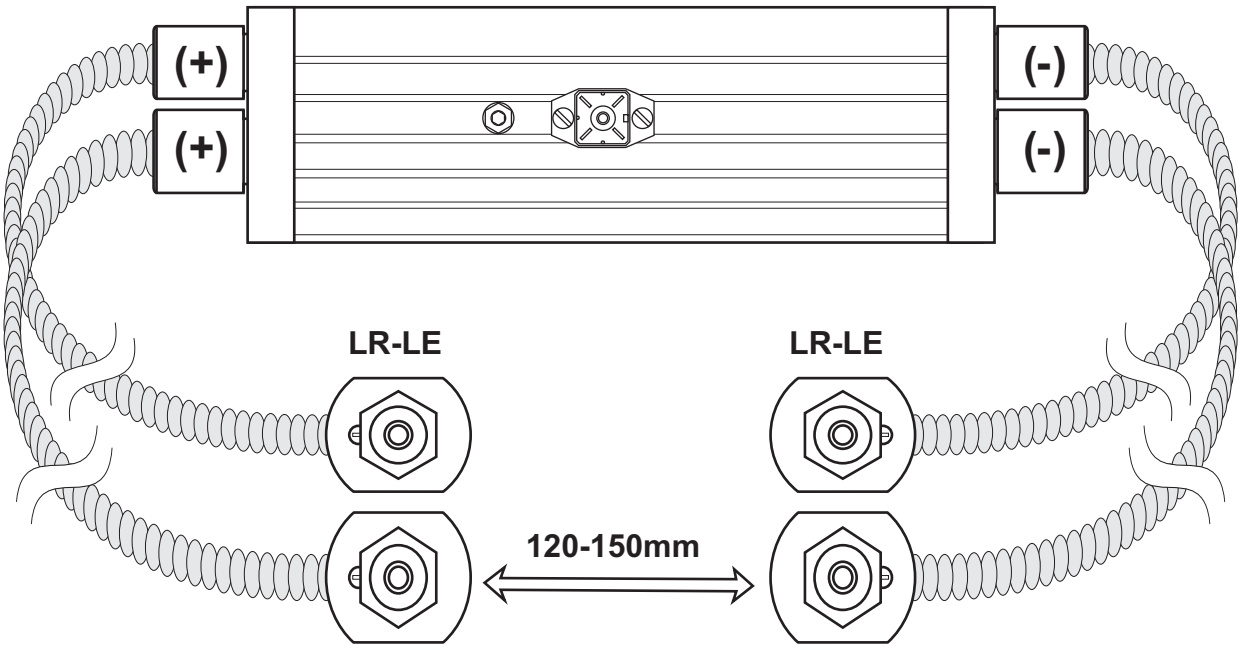
Also make sure to not mount the Discharger Unit in a location or position where objects, both metal and of other materials, can fall into the space in the Discharger Unit where the high voltage emitters are located.

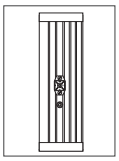
The shortest distance between the high voltage emitters and any surrounding objects where the discharger is mounted must be at least 50mm.

The EDU/LR01 is a long range electrostatic discharger which works most effectively with a distance of 150mm or more between the object to be neutralized and the Discharger Unit. For shorter distances, either one of Liros standard short range Discharger Units or a Discharger Unit in the Long Range program specifically designed for shorter minimum distance should be used.

3.3.3 High Voltage Unit

LR-HVLE with connected electodes LR-LE





The high voltage unit HVLE provides for 4 electrodes, 2 of the polarity (+) and 2 of polarity (-).
You have to use one electrode (+) and one electrode (-) in each station, with a distance between them of 120-150mm.

The cable that connects the electrodes to the High Voltage Unit are high voltage cables and they have to be mounted with a distance to the machine.
The cable that conncets the High Voltage Unit to the Central Unit is a low power voltage supply.

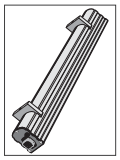
3.3.4. Ozone concentration

The process of electrostatic discharging with high voltage can increase the level of ozone concentration in the surrounding air. Long term and repeated exposure to elevated levels of ozone concentration in the air is harmful to the human body. The ozone concentration a worker will be exposed to around a machine or process is partly dependent on how many discharger units are used, how close together they are, how long they are

continuously running and how far they are located from the worker and partly by how large the premises is where the machine or process is located and how quick the air is exchanged by ventilation.

In most countries laws and regulations dictates the maximum limits for various toxic substances, including ozone, that a worker can be exposed to (MAK-Wert in Germany for instance). Here it is the responsibility of the employer to keep the working environment within the given limits for the toxic substances. The ozone concentration can be reduced by changing the contributing factors. Using the remote control function to only have the discharger unit on when it is needed is one way to do this. Another way is to increase the ventilated air volume.

Make sure that the ozone concentration in the working environment is kept below permissible limits according to local laws and regulations.



3.4. Electrical installation

3.4.1. Signal connection cable

The connection between the Central Control Unit and the Electrostatic Discharger Unit is done with the SKHE/LR signal cable. Its plug is simply plugged into the mating socket in the Discharger Unit and secured with the fastening screw.

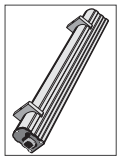
Always make sure to switch the Central Control Unit off before an Electrostatic Discharger Unit is connected or disconnected and never operate the Discharger Unit without a local earth connection – See also paragraph 3.4.2. below.

The high voltage is generated entirely inside the Discharger Unit and the connection cable only contains voltages below 30VDC. This means that there are no special restrictions for how the cable is mounted or fixed in the application. Compared to many other high voltage electrostatic dischargers who generate the high voltage in a Central Unit and run this in special high voltage cables to the discharger elements, this is a huge advantage for the way it is done in Liros Electrostatic Discharger Unit.

See also paragraph 2.4.2. above for more information about the signal cable.

3.4.2. Local earth connection

The high voltage in the Electrostatic Discharger Units/High Voltage Unit needs a current path to a local earth point in order to function correctly and with high performance. The Electrostatic Discharger Unit/High Voltage Unit has a facility for an earth connection in the same end as the socket for the signal cable. In order to get a good electrostatic neutralization effect it is of high importance that this cable is connected correctly. It should be as short as possible, preferably less than 2 meters, and it has to be firmly connected in both ends. This is a functional earth connection, not a protective earth connection, which should not use cables with the same colour and marking as a cables used for the protective earth.



Not only does this means bad electrostatic neutralization performance but it can also create high EMF that disturbs sensitive electronic equipment. It can also damage the Central Control Unit and the Discharger Units/High Voltage Unit since current may instead flow from the mains earth connection, capacitively coupled through the Control Unit and the Discharge Unit/High Voltage Unit.

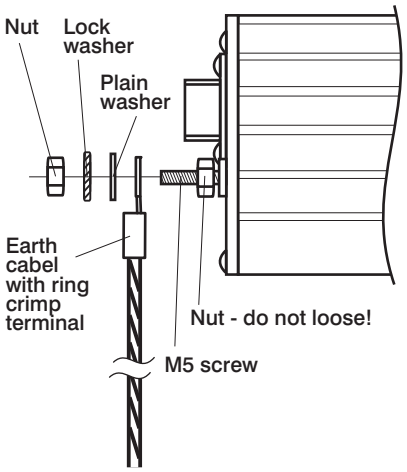
Never operate the No Static Long Range System without a local earth point connected to each Electrostatic Discharger Unit/High Voltage Unit.

The connection to a local earth point is done with a ring crimp terminal fitting an M5 screw (hole diameter = 5.1mm

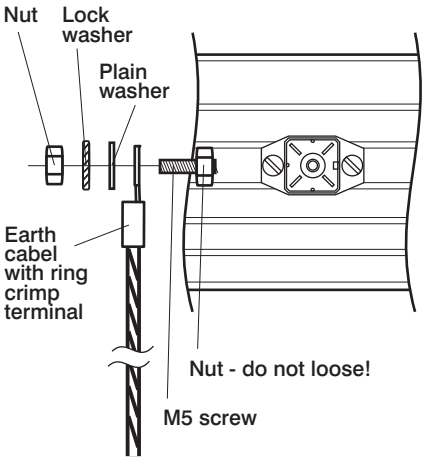
Make sure to assemble the nut, washers and ring crimp terminal as shown in order to ensure a good and reliable connection. Also make sure to not loosen the innermost nut. Use a cable with an area of at least 2.5mm2.

The local earth should preferably be connected to the grounded metal body of the machine in which the Electrostatic Discharger Unit/High Voltage Unit is used and as close to it as possible.

Electrostatic Discharger



High Voltage Unit



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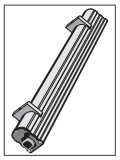
3.5. Operating status

The Electrostatic Discharger Unit/High Voltage Unit contains circuits that continuously monitor the high voltage outputs. In case there are any faults that cause one or both polarity of the high voltage to disappear, for instance emitters short circuited by foreign objects, this is communicated to the Central Controller Unit which in turn can notify a supervisory machine controller via relay outputs or other type of communication.

The Electrostatic Discharger Unit actually sends an OK signal periodically to the Central Controller Unit instead of an error signal. This means that if the Electrostatic Discharger Unit/High Voltage Unit stops working in any way, even by a disconnected or short circuited connection cable, the Central Control Unit will know.



3.6. High voltage emitters

The high voltage emitters in Liros Electrostatic Discharger Unit/and the loose electrodes differ in shape compared to many conventional electro static neutralizers. The conventional method is to use needle shaped emitters. The sharper an emitter is, the easier it is for the electrons to move between the emitter and the molecules to be ionized in the air. However, this electron migration also deteriorates the tip of the needle, making it less sharp over time. Instead, Liros Electrostatic Discharger Unit uses a circular, tube like emitter, where the free end is sharpened. This way, a much larger surface than a single needle point is used which takes longer to deteriorate. It is also very easy to sharpen with a standard countersinker tool.

4. Operation and maintenance

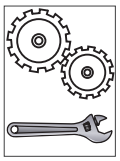
4.1. Operation

Once the Central Controller Unit and the Electrostatic Discharger Units are mounted and set according to the instructions in this installation guide, there are no other adjustments or settings to be made during normal operation. Just power it on and let it run.

There are no restrictions in the operating time; the No Static Long Range System is designed to operate continuously under normal conditions.

4.1.1. Checklist before applying power

Before power is applied for the first time make sure to check:



- ❑ The Central Control Unit is properly fastened in its mounting location.
- ❑ The Central Control Unit is properly earthed.
- ❑ All wiring is done in accordance with this installation guide and that all local legislative requirements regarding electrical installation are met.
- ❑ All unused cable glands in the Central Control Unit are sealed with the enclosed cable gland plugs.
- ❑ The Electrostatic Discharger Units are properly mounted and fixed with Liros manufactured and supplied holders.
- ❑ The Electrostatic Discharger Units are connected to a local earth point.
- ❑ The space for the high voltage emitters in the Discharger Units is free from any foreign objects.
- ❑ The high voltage emitters are located at least 50mm away from the nearest surrounding objects.

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4.2. Maintenance

The No Static Long Range System contains no parts that are worn out and have to be replaced under normal operation.

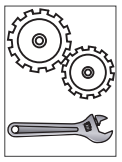
If the following simple maintenance procedures are performed, it will guarantee a long and trouble free use of the No Static Long Range System.

4.2.1. Cleaning

Always make sure to switch the power off with the mains power switch before cleaning the system.

Use a soft cotton cloth lightly moistened with a mild solution of detergent and water to clean the surface of the Central Control Unit and the Electrostatic Discharger Units. Any strong solvents, such as thinner and acetone may not be used since it can dissolve the PVC and rubber materials used in the system. PVC is mainly used within the Electrostatic Discharger Unit, but also in the power switch and the front panel of the Central Control Unit. Rubber is used in various gaskets to keep the ingress protection at IP54. Strong solvents can also dissolve the print on the Central Control Unit. Make sure to dry the Electrostatic Discharger Units thoroughly before power is applied again.

It is especially important to keep the space in the Electrostatic Discharger Unit where the high voltage emitters are located clean. Any foreign material or substance within this space can seriously degrade the performance of the unit. Even though the Electrostatic Discharger Unit can temporarily operate short circuited or arching, this condition may permanently deteriorate the high voltage outputs if sustained for a long period of time. Note that even materials that are not normally conductive can contribute to creeping of the high voltage between the emitters, due to its surface properties regarding high voltages.



4.2.2. High voltage emitters

In order to keep the electrostatic neutralization effect at an optimum level the high voltage emitters may need to be sharpened. To do this, a standard countersinker tool may be used. It has to be for 90° countersinking and have a diameter of at least 10mm. Always make sure to switch the power off with the mains power switch before sharpening the emitters.

Also remove all residue metal chips from the Electrostatic Discharger Unit when done with the sharpening.

4.2.3. Local earth connection

Periodically check that the earth connections in all Electrostatic Discharger Units are properly connected to a local earth point. A bad connection may lead to degraded performance of the Discharger Units.

4.2.4. Repair

Neither the Central Control Unit nor the Electrostatic Discharger Unit is field repairable and contains no replaceable parts except for the mains fuse. Any attempt to modify or repair these units will void the warranty and the conformity regarding safety and EMC. If repair is necessary, return the units to the manufacturer.

4.2.5. Ozone concentration

Make sure that the ozone concentration in the working environment is kept below permissible limits according to local laws and regulations.

4.3. Troubleshooting

Before contacting Liros or any of its partners for support, consult the following symptoms and cause table for trouble shooting.

ID	Symptom	Cause	Solution
1	Power indicator off when switched on and no electrostatic neutralization.	Mains fuse broken.	Replace fuse. See 2.4.1.
2A	Poor electrostatic neutralization effect.	Earth connection in Electrostatic Discharger Unit bad or not connected to local earth.	Make sure the earth connection is properly connected to a locally earthed object. See 3.4.2
2B	Poor electrostatic neutralization effect.	Dull high voltage emitters.	Sharpen high voltage emitters. See 4.4.2.
2C	Poor electrostatic neutralization effect.	Foreign objects in the Electrostatic Discharger Unit or layers of dirt or process residues covering the high voltage emitters.	Clean the Electrostatic Discharger Unit. See 4.2.1.
3	Poor or no electrostatic neutralization effect for one or more Electrostatic Discharger Units.	Fault in wiring between the Central Control Unit and the Electrostatic Discharger Units.	Check the wiring between the Central Control Unit and the Electrostatic Discharger Units. Verify that the wiring is done according to 2.4.2. and that the plugs are firmly connected in the Discharger Units.

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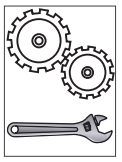
4.4. Checking the high voltage output level

In case there is any uncertainty about the function of the Electrostatic Discharger Unit and the neutralization effect, the output voltage can be measured to give a rough indication to weather the No Static Long Range System is operating as intended or not. This can be done in several ways, some of which are described here.

4.4.1. Using a Static Detector

1. Switch the static detector off (release the button).
2. Make sure the No Static Long Range System is switched on.
3. Move the static detector at least 1 meter away from any active Electrostatic Discharger Unit, including the one to be checked.
4. Switch the static detector on (push the button).
5. Move the static detector to a position about 20 cm away from the Electrostatic Discharger to be checked. Position it at an equal distance to two of the high voltage emitters.
6. Verify that the static detector is indicating full swing between positive and negative polarity at the same rate as the operating frequency of the high voltage polarity alternation.

4.4.2. Using an earthed wire



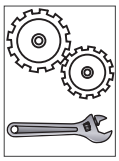
1. Switch the No Static Long Range System off.
2. Connect a wire to the earth connection of the Electrostatic Discharger to be checked. Do not disconnect the local earth wire used for normal operation.
3. Switch the No Static Long Range System on.
4. Approach the other end of the wire to one of the high voltage emitters.
5. Verify that there is a bright white or light blue spark between the emitter and the wire when the distance between them is approximately 20mm. The sparking should pulse with the same frequency as the high voltage polarity alternation frequency.
6. Move the wire to an adjacent high voltage emitter and verify that it is sparking with the same intensity and frequency at the same distance between the wire and the emitter as for the other emitter.

Note that this test method generates high radiated EMF that can disturb nearby electronic equipment. It can even disturb the Electrostatic Discharger Unit that is checked. The disturbance can be noticed as a change of the operating polarity alternation frequency. Do not run this test for longer than necessary since the arching can deteriorate the high voltage outputs if sustained for a long period of time.

4.4.3. Using a high voltage probe

1. Switch the No Static Long Range System off.
2. Connect the negative measuring clip and the earth connection of a 1000:1 high voltage probe to the local earth connection of the Electrostatic Discharger to be checked.
3. Connect the positive measuring clip of the high voltage probe to one of the high voltage emitters.
4. Connect the output of the high voltage probe either to a voltmeter or an oscilloscope. The voltmeter should have max and min detection of the input signal to reliably show the voltage at the higher polarity alternation frequencies.
5. Set the voltmeter or the oscilloscope to measure a voltage of -5 to +5V.
6. Switch on the No Static Long Range System.
7. Verify that the voltmeter or the oscilloscope is showing a voltage swing either between less than -2V and 0V for a negative high voltage emitter or above +2V and 0V for a positive emitter and that the period of the signal corresponds to the set high voltage polarity alternation frequency.

The high voltage probe has to have a maximum working voltage of at least 40kVDC and an input impedance of 1000MΩ or more to give accurate readings.



5. Technical specifications and data

5.1. Specifications for the central Control Unit CCU/LR01

Specifications	
Type name	CCU/LR01
Input voltage	230VAC/50Hz
Input power	Max 40VA
Mains fuse	5mm * 20mm glass tube, 230VAC, 500mA, slow.
Operating temperature	0°C – 50°C
Electrostatic Discharger Unit outputs	4 * 24VDC, max 150mA each
Ingress protection	IP54
Material	Aluminum
Size	180mm*215mm*105mm (including front panel controls and rear panel cable glands).
Weight	Approximately 2.7 kg
EMC immunity standard	EN 61000-6-2:2001, Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments.
EMC emission standard	EN 61000-6-3:2001, Electromagnetic Compatibility (EMC) – Part 6-3: Generic Standards – Emission standard for residential, commercial and light-industrial environments.
LVD safety standard	EN 61010-1:2001, Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements.

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5.2. Data for the Electrostatic Discharger Unit EDU/LR01

Specifications	
Type name	EDU/LR01
Input voltage	24VDC
Input current	Max 130mA
Operating temperature	0°C – 50°C
Output voltage	±10kV to ±13kV. (Positive and negative polarity) Approximately ±20kV to ±26kV peak, depending on load and length. There are separate emitters for positive and negative voltage, only one is active at any time. The output is alternating between positive and negative polarity at a rate of 1.4Hz, 5Hz or 10Hz.
Output current	1.7 mA. When the high voltage output is connected to a circuit representing the human body, according to annex A.1 in EN 61010-1, the output voltage is lowered due to high output impedance to a peak value less than 40V which is below permissible values for accessible parts.
Stored energy	Less than 5mJ per polarity.
Protection Class	None. The high voltage emitters are accessible parts.
Mating connection plug	Hirschman type G4W1F.
Material	PVC.
Size	Length vary between 300mm and 4000mm. W=46.5mm, H=68mm.
Weight	500mm=1.1 kg 1000mm=1.9 kg 1500mm=2.6kg 2000mm=3.4 kg 3000mm=4.9 kg 4000mm=6.5 kg Weight in g is approximately = (L-120mm)*1.54+500.
EMC immunity standard	EN 61000-6-2:2001, Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments.
EMC emission standard	EN 61000-6-3:2001, Electromagnetic Compatibility (EMC) – Part 6-3: Generic Standards – Emission standard for residential, commercial and light-industrial environments.
LVD safety standard	EN 61010-1:2001, Safety requirements for electrical equipment for measurement, control and laboratory use – Part 1: General requirements.