
Installation and Operating Instructions

Electrostatic discharge system

iONstream 4.0 6 kV/12 kV/18 kV



Translation of the original operating instructions

Documentation iONstream 4.0

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Introduction

General

The intelligent electrostatic IONstream 4.0 discharge systems are the most efficient, contactless way to electrostatically neutralize a substrate surface in web or sheet form. The neutralizing product line from Gema Switzerland GmbH represents the most advanced and easiest way of effectively controlling electrostatic charge. The 18 kV version is suitable for applications with distances greater than 600 mm, 12 kV version is suitable for applications with distances up to 600 mm, and the 6 kV version for distances up to 300 mm. All systems are designed for normal speed applications up to 1000 m/min. For high speed applications, the iONstream 4.0 with AUTO^{DC}® Technology is the most sophisticated efficient discharging method. In iONstream 4.0, the sensor technology is integrated in the electrode profile. The multi-function LED for the local status display is located next to the bus connector. When connected to a master display, all parameters are visualized on the display. The neutralizing bars are available in lengths from 320 mm to 4500 mm. Wider applications are realized by using additional bars.

Versions

Type	Designation	ATEX labeling	Zone
IC41	iONstream 4.0 6 kV	–	–
IC42	iONstream 4.0 6 kV	PTB 21 ATEX 5003 X  II 2D IIIB T85 °C	Zone 21 / 22
		 II 2G IIB T6	Zone 1 / 2
IC43	iONstream 4.0 12 kV	–	–
IC44	iONstream 4.0 12 kV	PTB 21 ATEX 5003 X  II 2D IIIB T85 °C	Zone 21 / 22
		 II 2G IIB T6	Zone 1 / 2
IC45	iONstream 4.0 18 kV	–	–
IC46	iONstream 4.0 18 kV	PTB 21 ATEX 5003 X  II 2D IIIB T85 °C	Zone 21 / 22
		 II 2G IIB T6	Zone 1 / 2

***X** Special prerequisites for application:

- 1) The ionizers must be operated in such a way that, if one or both rows of an ionizer fail, suitable measures (e.g. reduction of process speed, bringing the process to a standstill, ...) are taken immediately for working or production processes requiring ionization.
- 2) In stand-alone operation, the connection to the power supply of the ionizers must be carried out outside the explosive area (zone) by means of the stand-alone cable.
- 3) The tips of the ionizers must be kept clear of contamination and cleaned regularly. The cleaning intervals must be defined by the operator on the basis of operational and local conditions. The maximum cleaning intervals specified by the device manufacturer must not be exceeded.

Application

Typical applications include the electrostatic neutralization of plastics, carton, film, foams, non-woven tissue, glass textiles and many other insulating materials. The ATEX certified version of the iONstream 4.0 system guarantees the highest safety levels for usage in potentially explosive environments – refer to version table.

Advantages

The high-voltage supply is integrated in the electrode profile and is designed for demanding industrial applications with outstanding safety standards.

- Power supply 24 VDC (20-28 VDC)
- extremely compact, stable and glass fiber-reinforced electrode profile for mounting with mounting clips or T-slot and screws
- completely encapsulated
- housing protection type IP 68
- non-contact Tungsten emitter tips,
- short circuit-proof design, 30 mm pin distance.
- Microprocessor-controlled with local intelligence.
- The emitter pins are decoupled from the high voltage using resistors
- All electrical connections are fail safe, vibration-proof plugs in housing protection type IP 54.

Safety Instructions

ATTENTION

Damage to the system or components

Please read and understand the instructions fully before installing the system!

- ▶ All installation and repair work must be performed by qualified technicians!

The iONstream electrostatic discharge systems were developed according to the latest safety requirements for industrial applications and have successfully passed the relevant safety and life tests before delivery. The systems consist of an encapsulated, glass fiber-enforced plastic electrode profile with integrated HV generator that contains resistances and emitter pins.

Follow all instructions of this manual to ensure proper function of the system and to retain your entitlement under the guarantee. Any installation or commissioning deviating from the instructions in this manual will lead to the loss of guarantee.

Applications / Scope of Use

The iONstream high performance systems for electrostatic discharge are designed to neutralize the static charge of surfaces. The technology is the latest generation of electrostatic discharge systems and is used in a wide range of applications with moving webs, sheets or 3D parts applications.

ATTENTION

Damage to the system or components

Any use not described this manual as well as changes to the hardware are not permitted.

- ▶ Only original spare parts delivered by Gema Switzerland GmbH may be used for maintenance and repair of the systems!

Installation and commissioning of the system need to fulfill all local safety standards and instructions for safe use. Operators may be exposed to potentially dangerous situations if installation and use are not in accordance with the instruction manual. Persons coming in contact with the emitter pins while they are energized can be charged and may suffer from an electric shock when they come into contact with the ground. Place guards and "Danger High Voltage" warnings signs around the point of use of the bar.

Safety symbols (pictograms)

The following contains a list of warnings with their meanings found in the Gema operating instructions. Apart from the regulations in the relevant operating instructions, the general safety precautions must also be followed.

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Caution!

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

ATTENTION

Indicates a potentially harmful situation which, if not avoided, the equipment or something in its surrounding may be damaged.

ENVIRONMENT

Indicates a potentially harmful situation which, if not avoided, may have harmful consequences for the environment.



MANDATORY NOTE

Information which must be observed.



Note

Useful information, tips, etc.

During normal operation

WARNING

Danger of electric shock

Even though the neutralizing bar is insulated and the current is limited, touching the electrodes of the emitter pins is strongly discouraged when the bar is in operation. It is possible that persons (depending on the shunt resistance) are charged to a greater or lesser extent and experience an electric shock when they make direct contact with ground.

WARNING

Danger of electric shock

Do not disconnect any wiring of the iONstream system while the 24 VDC power supply is operational regardless of whether the application is operational.

WARNING

Danger of electric shock

Keep neutralizing bars wired to ground at all times while the system is operational regardless of whether the 24 VDC power supply is operational or not.

WARNING

Danger of electric shock

Disable the 24 VDC supply voltage input when processing webs that contain a metal foil or metallized film. Under certain circumstances, metallized areas, strips or webs can store charges or conduct them along the material web and can therefore represent safety risks. If metallized products are processed, please contact Hildebrand Technology. An application engineer is available to assist in the assessment of whether the use of electrostatic neutralizing equipment is suitable.



High voltage operation (green LED lights up permanently) should only be active when it is required for the application.

During installation and removal

ATTENTION

Damage to components

- ▶ Do not drill holes in the bar housing, and follow the wiring instruction accurately to avoid equipment damage.

⚠ WARNING

Danger of electric shock

- ▶ Do not install or remove iONstream equipment while the machinery and/or application are operational.

⚠ WARNING

Danger of electric shock

- ▶ Always disable the 24 VDC power supply when installing or removing the iONstream system.

⚠ WARNING

Danger of electric shock

Persons with a pacemaker must not touch the emitter pins!

- ▶ Pacemakers may no longer function correctly when the distance between emitter pins and chest is < 3.5 cm.
- ▶ Touching the emitter pins, especially with a large surface area such as the palm of your hand, can temporarily switch a pacemaker into error mode and may result in major health risk.

⚠ WARNING

Danger of electric shock

- ▶ Keep neutralizing bars wired to ground at all times while the system is operational regardless of whether the 24 VDC power supply is operational or not.

During neutralizing bar cleaning

⚠ WARNING

Danger of electric shock

- ▶ Always disable the 24 VDC power supply when cleaning the neutralizing bars.

⚠ Caution!

Sharp pins

Grounding

⚠ WARNING

Danger of electric shock

- ▶ The iONstream neutralizing systems **MUST** be grounded.

In problem situations

ATTENTION

If liquid has been spilled on the bar, disable 24 VDC power immediately. Correct the problem before restarting the machine.

⚠ WARNING

Danger when using uncertified systems

Never use iONstream neutralizing systems in explosive environments if they are not Ex-Certified.

- ▶ also refer to version table
- ▶ Ex-Certified bars have an ATEX Ex label attached to the bar profile.

Ozone generation



Ozone may be generated when the iONstream is in use.

This phenomenon and its concentration depend on several parameters. It is not possible to specify a common figure of the ozone concentration during usage.

- If the ozone concentration becomes an issue at a specific workstation, on-site measurement has to be taken and adequate ventilation must be provided.

User Duties

General

This manual must be available at all times to personal/operators using this equipment.

Safety instructions

The iONstream system may only be installed and operated in accordance with this manual. Always follow local regulations and standards concerning repair and grounding according to relevant European regulations such as the Low Voltage and EMC directives.

ATTENTION

Damage during transport and installation

- ▶ During transportation, the iONstream system must be protected against damage and bending.

ATTENTION

Damage to the system or components

Please read and understand the instructions fully before installing the system!

- ▶ All installation and repair work must be performed by qualified technicians!



Authorized and trained personal

- ▶ Assembly, commissioning and maintenance of the iONstream system may only be performed by trained and qualified personnel

⚠ WARNING**High voltage shocks**

- ▶ Always switch off the 24 VDC power supply before working on the system!
- ▶ Use protection equipment against unauthorized restart of the power supply during this period.
- ▶ If the iONstream system needs to be removed from the point of use, switch off the power supply.
- ▶ If the power plug needs to be removed, ensure **safe grounding** of the system on the ground terminal next to the bus system.

Storage, Transport and Packaging/Unpacking

The iONstream system must be packed in the original packaging and protected against breakage, ingress of water and humidity. Establish the ambient conditions in accordance with the technical data in this manual.

⚠ Caution!

Sharp pins

The emissions pins of the neutralizing bars are extremely sharp and can cause injury when touched. Check carefully for possible transport damage. Inform the transporting company immediately about transport damage. Also inform Gema Switzerland GmbH immediately.

Check the following carefully when unpacking:

- Quantity delivered
- Type and model according to label
- Accessories
- Correct manual

In case of incorrect deliveries or questions, please contact your local representative or Gema Switzerland GmbH. Follow local instructions for package material disposal.

User and working safety prior to commissioning

⚠ WARNING

Danger of electric shock

- ▶ Always ground by using the ground stud!

Prior to commissioning, ensure that the device ground is connected to the ground stud as shown in figure 1. The ground wire must have a minimum cross-section of 2.5 mm² (AWG 13).

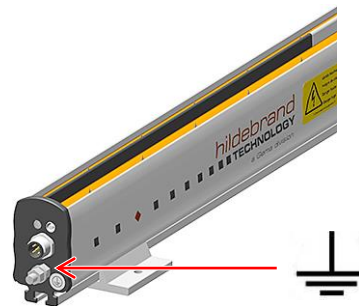


fig. 1: Connection to machine or plant mass / ground

The iONstream systems for electrostatic neutralizing must be regularly checked for mechanical damage as well as for bar contamination. Any errors must be eliminated prior to switching on the system.

Installation and commissioning

The iONstream system is an electrostatic neutralizing system consisting of a neutralizing bar with integrated high voltage modules and encapsulated microprocessor electronics. The neutralizing bars are available in lengths from 320 mm to 4500 mm. The local status LED is visible on the front side and indicates the system status.

⚠ WARNING

Danger of electric shock

Only connect or disconnect when the power supply is OFF!

- ▶ Ensure that the 24 VDC supply is disconnected before connecting or disconnecting the main plug.
 - ▶ The device ground must always be connected.
-

Neutralizing bar contamination and cleaning

Contamination of the emitter pins will occur. The emitter tips of the ionizers must be kept clear of contamination and cleaned regularly.

⚠ WARNING

Explosion hazard

The tips of the ionizers must be kept clear of contamination and cleaned regularly.

- ▶ Only use IPA alcohol or a suitable solvent.
 - ▶ Unless the operational and local conditions specify a shorter cleaning interval, we recommend cleaning the emitter tips on a weekly basis.
-

ATTENTION

Damage to components

Use a brass brush for cleaning in order to avoid damage and scratches.

- ▶ This should preferably have a curved handle in order to avoid injuries to the hand from the emitter pins.
-

Mechanical Installation

Determining Locations for Neutralizing Bars

⚠ WARNING

Explosion hazard

- ▶ If the system is installed in a potentially explosive zone, the position of the neutralizing bar must be selected in such a way that the substrate is discharged and does not pose a risk of ignition.

Attach the neutralizing bar to the desired position, as shown in **Fig. 2**, for neutralization of web spans and other applications where the distance between the bar and the material does not vary.

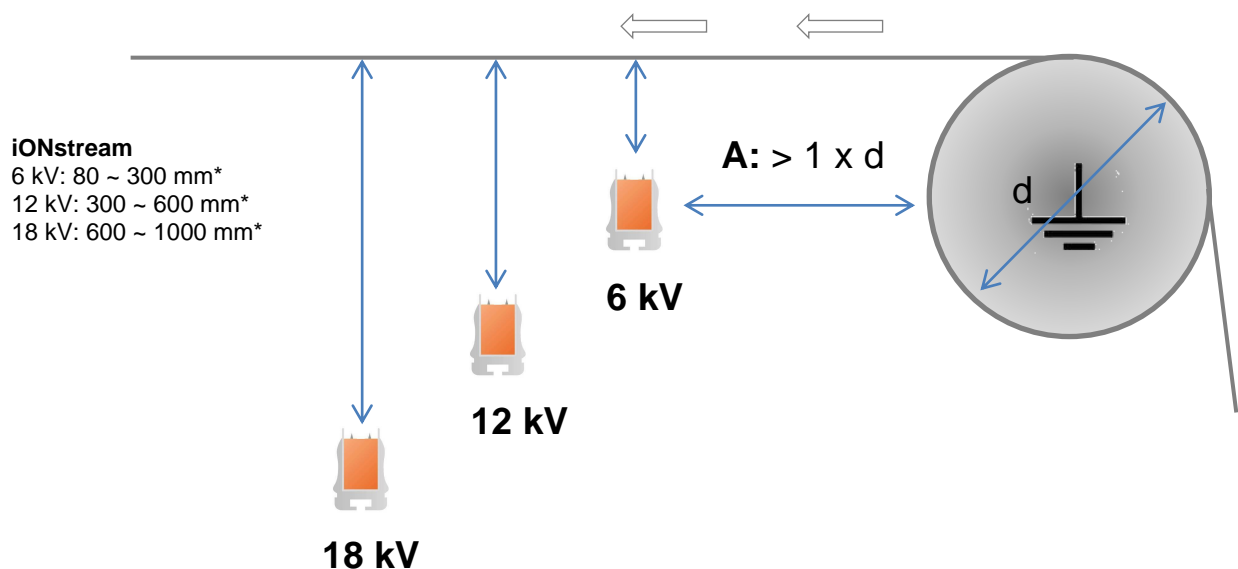


fig. 2

A: Distance to roller must be greater than 1x diameter of the roller.

* Dimensions in this image are based on experience and may differ from case to case. Adequate ionization efficiency must be demonstrated for the particular application by measurement.



The bar should not be closer than 80 - 300 mm (6 kV), 300 - 600 mm (12 kV) or 600 - 1000 mm (18 kV) to the roller.

For reels, the neutralizing bar should be installed so that it neutralizes the roll after the last separating point (contact roller) (see **Fig. 3**) and is not near metal objects on the sides of the bar.

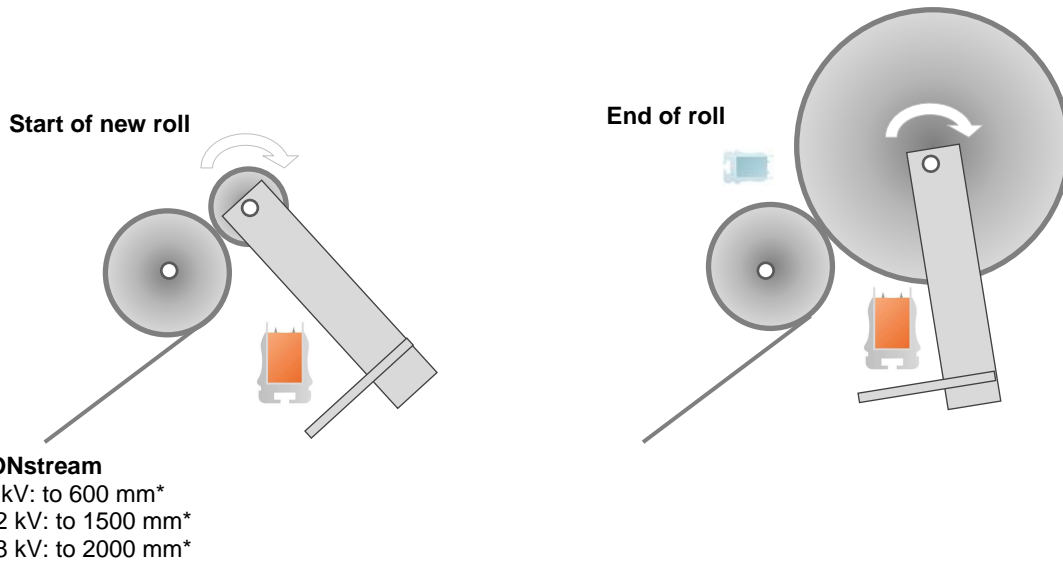


fig. 3

* Dimensions in this image are based on experience and may differ from case to case. Adequate ionization efficiency must be demonstrated for the particular application by measurement.



Blue is an alternative position for the reel but only for the rotary direction shown.

Avoiding loss of efficiency

ATTENTION

Ground near emission pins

- ▶ Ensure that there is no ground near the pins.

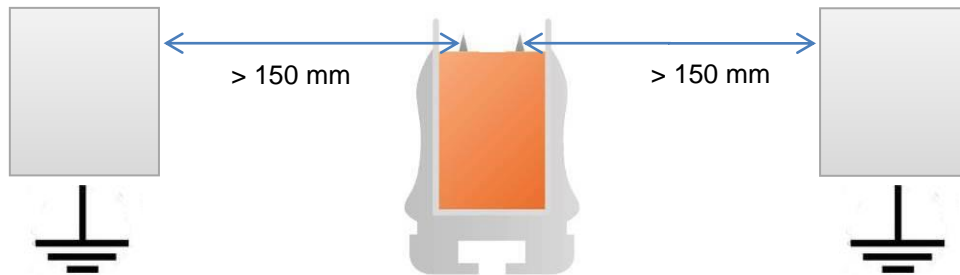


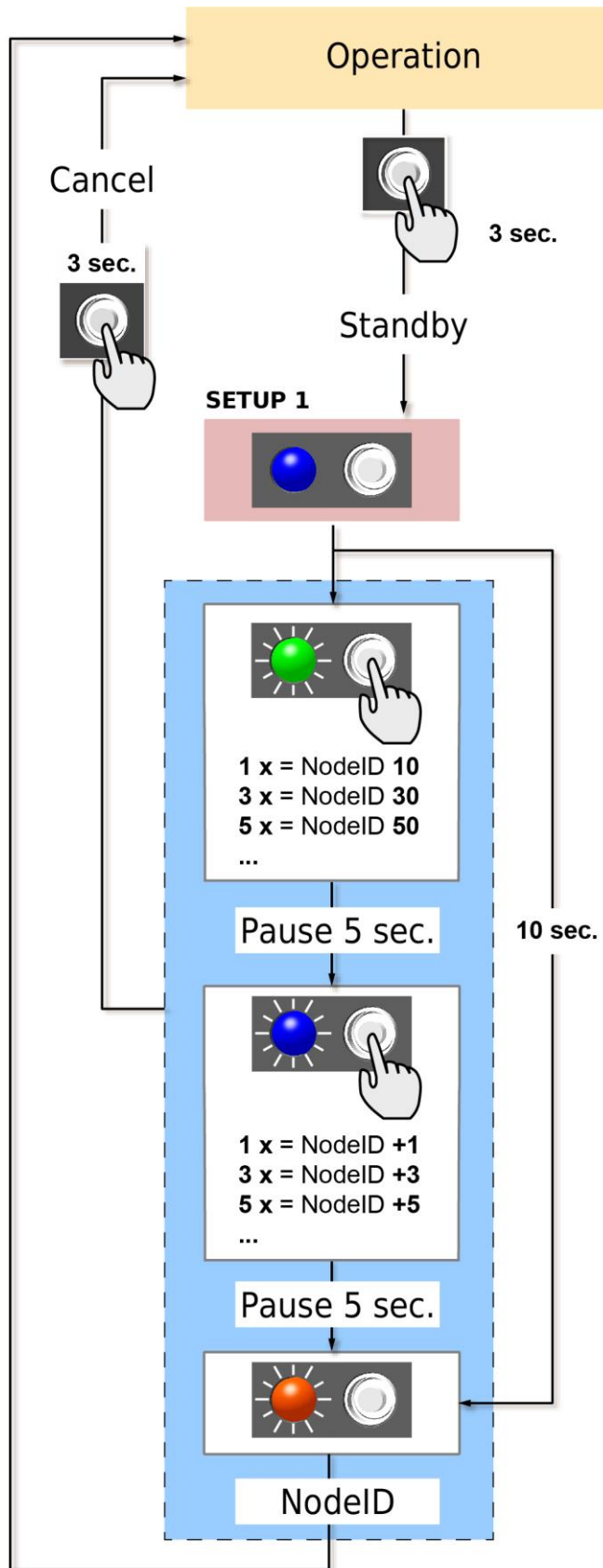
fig. 4:

Setting the NodeID

The setting is made using the T button:

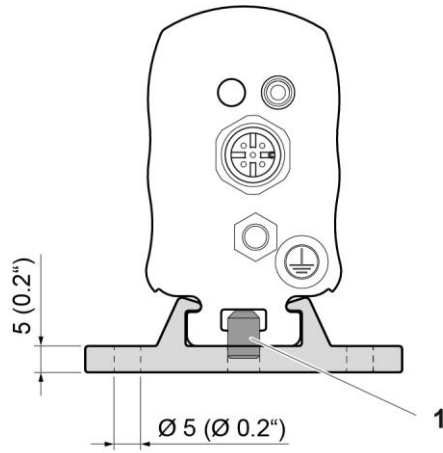


In order for the newly set NodeID to be updated, the supply must be interrupted for 3 seconds.



Mounting options

Option 1:
Slide on clip



Option 2:
M5 screw in T-slot

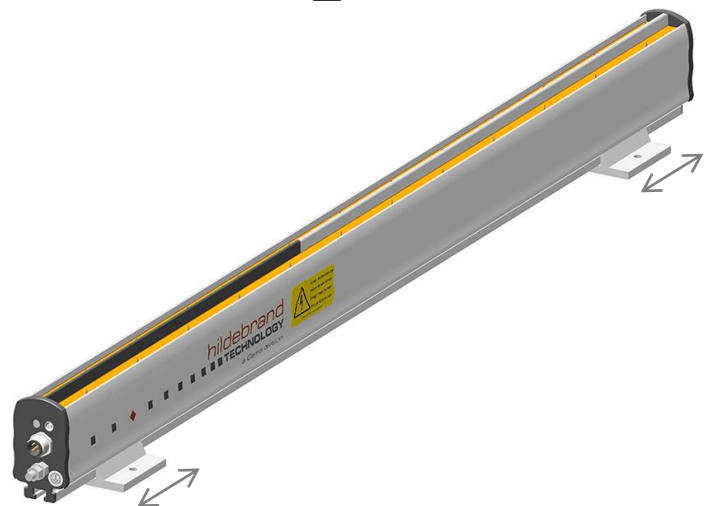
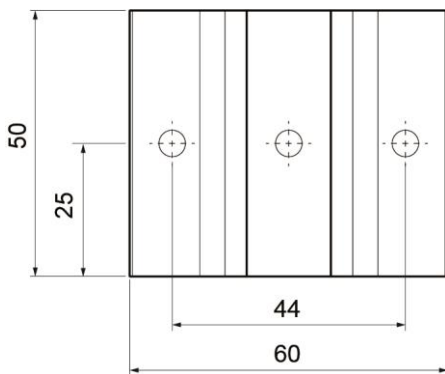
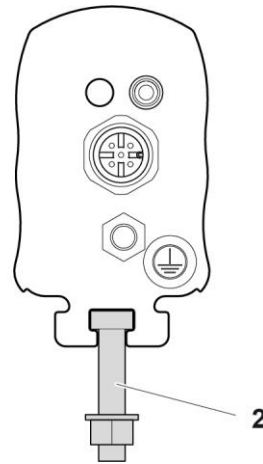


fig. 5:

1 Grub screw for position fixation

2 Screw set is part of delivery (hexagon head screw DIN 4017 M5x25; plain washer DIN 125 M5; screw nut DIN 4032 M5)

Dimensions

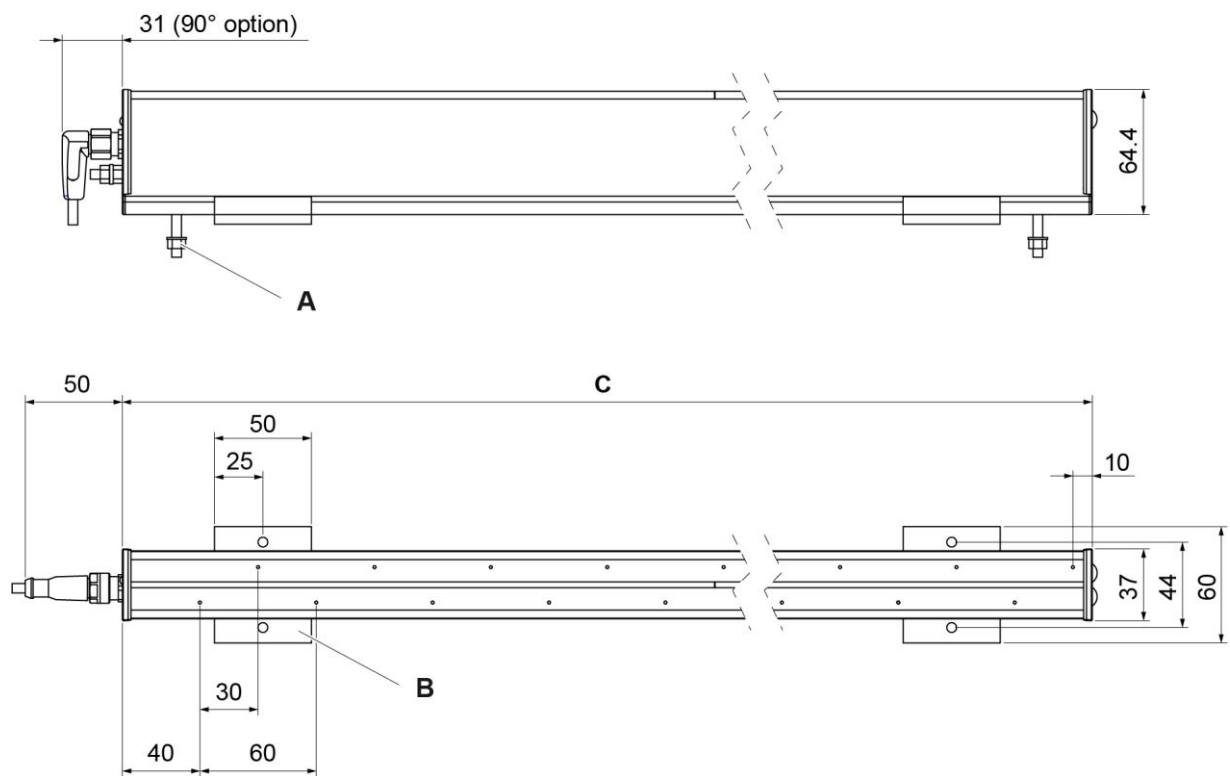


fig. 6:

- A** Mounting option 1 at least 2 attachment screws per m + 1 Pro per additional m
- B** Mounting option 2 Freely slidable GRP brackets (at least 2 per m + 1 Pro per additional m)
- C** GL working width

Electrical Connection

Connector specification

Bus system connector, M12, 5-pin, easy and flexible adaptation for individual systems via "daisy chain" connection.



fig. 7: Standard version



fig. 8: 90 degree version: Option

Description of the Connections

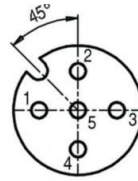


fig. 9: Pin position and number

Pin	Function	Standard Hildebrand cable
1	Error	brown
2	U _{in} 20-28 VDC	white
3	GND	blue
4	CAN H	black
5	CAN L	gray

Explanation of pin functions

Pin 1	Return signal for clean bar or system error. <ul style="list-style-type: none"> – 24 V = System OK – 0 V = System fault – Must be connected to 24 V power supply via 680 Ohm resistor.
Pin 2	Supply voltage 20–28 VDC (6 kV < 300 mA / 12 kV < 400 mA / 18 kV < 500 mA)
Pin 3	GND
Pin 4	CAN High
Pin 5	CAN low

WARNING

Danger of electric shock

- ▶ Always ground using the ground stud!

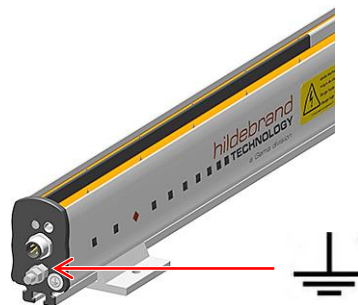


fig. 10: Connection to machine or plant mass / ground

Use in standalone operation

Standalone operation occurs without the use of a communication interface. For use of an individual neutralization bar, simply connect the 24 VDC power supply protected by the fuse (for value, refer to “Technical Data”). The system runs according to the factory settings or, in individual cases, according to the ordered system values.

▲ WARNING

Explosion hazard

- ▶ In stand-alone operation, the connection to the power supply of the ionizers must be carried out outside the explosive area (zone) by means of the stand-alone cable to prevent the risk of ignition.



IMPORTANT for system status detection:

- Machine speed > 0 m/min. = 24 VDC ON
- Machine STOPP = 24 VDC OFF

Factory settings

HV frequency range to	100 Hz
max. output voltage	6 kV, 12 kV or 18 kV
Operating mode	AUTO ^{DC}
Clean Bar Warning	at 40% efficiency loss
Clean Bar Alarm	at 60% efficiency loss

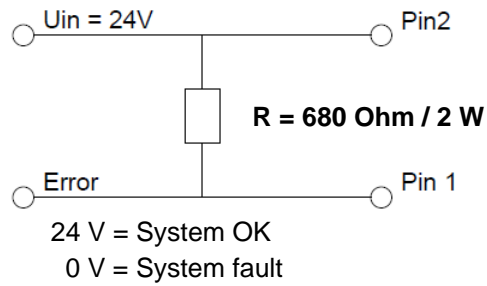
The pulse pause length is set automatically between 50/50 and 90/10 as this is AUTO^{DC} technology depending on the external field so that the best possible discharge is achieved.

Use of PIN1 output: for clean bar or system error



In order to use the error output, PIN 1 must be connected via a 680-Ohm resistor to the 24 V power supply.

Beschaltungsschema Error- Ausgang
Widerstand : 1x / Netzwerk



Overview of local multi-function LED: Functions

	Visual display: Device Status	LED function
1	INITIALIZING	flickering green 50/50 ms
2	STANDBY	blinking green 500/1000 ms
4	ACTIVE	constant green
6	CLEAN BAR WARNING	blinking green yellow 500/500 ms
7	CLEAN BAR ALARM	constant yellow
12	STARTUP	blinking green 200/200 ms
	Visual display: Error/Support	LED function
0	UNKNOWN	off
3	STOPPED	flashing green 50/1000 ms
5	DISCOVERY	color rotation 200 ms
8	PIN AGED	flickering red 50/50 ms
9	TIMEOUT	triple flash red
10	FAILURE	constant Red
11	UNCONFIGURATED	blinking Red 200/200 ms
13	CHECK INSTALLATION	flickering red yellow 50/50 ms

Description of LED functions

0	Unknown	System not configured or no power supply connected. LED off.
1	Initializing	Initialization in progress. The standard currents are measured. (No external electrostatic fields should be present during this process)
2	Standby	This function is only active within a CANopen network using the iONmaster, iONGate or iONlink. It shows that the discharging electrode is waiting for an activation signal from a master device.
3	Stopped	This function is only active within a CANopen network using the iONmaster, iONGate or iONlink. It shows that the discharge electrode has been manually disabled by a master device.
4	Active	System is in the correct function mode and high voltage supply is active.
5	Discovery	This function is only active within a CANopen network using the iONmaster, iONGate or iONlink. In this mode, a discharge electrode can manually be found within the network by using its NODE-ID / Serial No. as the input at the master device. Discovery mode is automatically reset after 20 minutes.
6	WARNING (contamination)	This mode shows that the contamination of the bar has reached the set warning value. (Factory setting = 40 %) System efficiency has dropped from originally 100 % to 60 %.
7	ALARM (contamination)	This mode shows that the contamination of the bar has reached the set alarm value. (Factory setting = 60 %) System efficiency has dropped from originally 100 % to 40 %.

8 Worn tips (wear & tear)	<p>This mode displays the emitter pin status. The pin sharpness has reached the set limit value for abrasion of the pins due to wear / age (factory setting = 80 %)</p> <p>The system efficiency has dropped from 100 % to below 80 % without contamination / after the bar has been cleaned.</p>
9 Timeout	<p>The external residual charge sensor cannot be found. This function is only active when the FEEDBACK mode is activated and an iONsense 4.0 sensor is connected.</p>
10 Failure	<p>This mode shows that the discharge system has detected an error and is not functioning. Within a network, the error code can be read using the iONmaster, iONgate or iONlink.</p>
11 Unconfigured	<p>This mode shows that the BUS subscriber has no NODE-ID and no application parameters are saved. This mode only occurs when the NODE-ID has been deleted or the factory settings were not saved.</p>
12 Start up	<p>In this state, the system waits for 1 sec for a "Speed Message" or a CAN "hard-beat". If there is no BUS available, the system automatically switches to the initialization state and activates the discharge.</p>
13 Check Installation	<p>This mode shows that the discharge electrode has been installed to close to a ground / machine ground.</p>

Network Operation

iONstream 4.0 are discharge systems with integrated high voltage power supply and micro controller technology. This enables the systems to be connected to a master unit such as a PC or a GateWay. Via the internal CANopen bus, the system can communicate and write as well as read parameters. All components (max. 127 subscribers) are jointly connected to the Hildebrand CAN-Bus with the same rights.

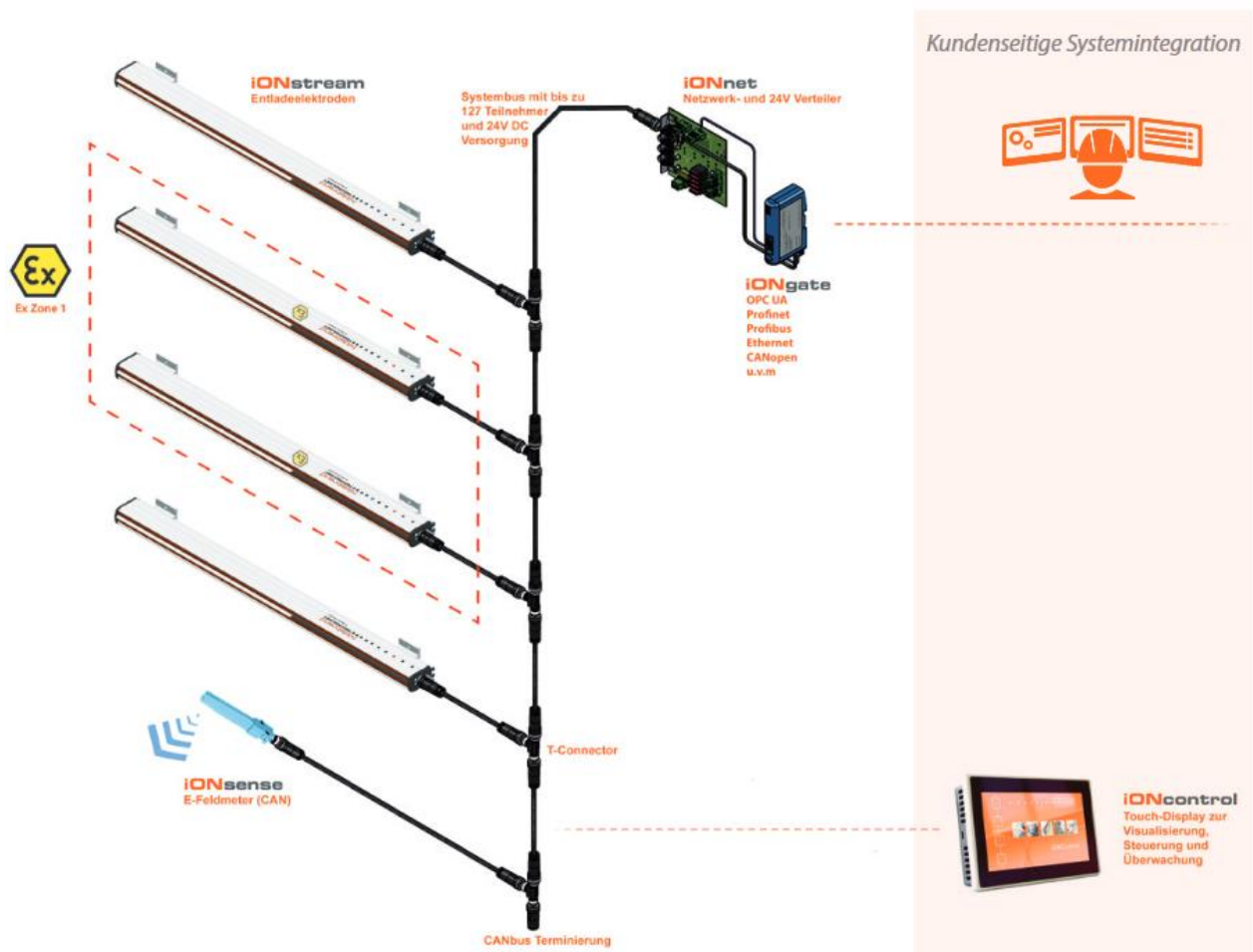


fig. 11: Overview



Bus cable lengths from the neutralizing bar to the T-connector are always shorter than from T-connector to T-connector.

- See network layout drawings, 5 m maximum.

For detailed information on the wiring of the individual options, please refer to the drawings attached to this manual.

Technical Data

Electrical data

Input

		Value	Min.	Nom.	Max	Unit
Number of contacts		N	5 pin/M12			
Power supply (pin 2(+); 3(GND))		U_{in}	20	24	28	VDC
Current consumption	6 kV	I_{in}	40	100	300	mA
	12 kV					
	18 kV					

Output

		Value	Min.	Nom.	Max	Unit
Voltage	6 kV	U_{out}			± 6	kV
	12 kV				± 12	
	18 kV				± 18	
Current of all emitter tips	6 kV	I_{out}			± 250	μA
	12 kV					
	18 kV					
Frequency	6 kV	F_{out}	1	20	100	Hz
	12 kV					
	18 kV					
Contact current (1 emitter tip)	6 kV	I_b		20		μA
	12 kV			40		
	18 kV			60		
Protective resistor	6 kV	R_{out}		300		M Ω
	12 kV					
	18 kV					

		Value	Min.	Nom.	Max	Unit
Grid	6 kV	I _{pitch}		30	30	mm
	12 kV					
	18 kV					
Error Pin (Pin 1)		Open collector (OR-circuit) max. 28 V 100 mA				

General

	Value	Min.	Nom.	Max	Unit
Communication	CAN Open				
Bus clock			125		kbit/s
Termination (external and on both sides)	R _{term.}		120		Ω
Ground connection terminal	with M5 screw and nuts at machine ground				

Mechanical data

	Value	Min.	Nom.	Max	Unit
Width	w		35		mm
Height	h		64		mm
Working width 6 kV/ 12 kV / 18 kV	GL	320		4460	mm
Weight	m		2.7		kg/m
Attachment rail	M5 T-slot or iONclip (min. 1/m)				

Ambient conditions

	Value	Min.	Nom.	Max	Unit
Temperature	T _{Amb}	5	25	40	°C
Humidity/ non-condensing	rF		35	80	%rel. F.
Protection class acc. to DIN 60529	IP68 (M12 connector tightened with tool)				
Fuse in primary circuit (provided by the customer)	F	Stand-alone 500 mA T depending on power consumption of the devices +10% (max. 4 A/ phase)			mA

Optical display/ device status/ error

Optical display/ device status/ error	#	LED (connection side electrode)	Error pin
Unknown	0	off	off
Initializing	1	flickering green 50/50 ms	off
Standby	2	blinking green 500/1000 ms	off
Stopped	3	flashing green 50/1000 ms	off
active	4	constant green	off
Discovery	5	color rotation 200 ms	off
Clean Bar Warning	6	blinking green yellow 500/500 ms	off
Clean Bar Alarm	7	constant yellow	active
Pin Aged	8	flickering red 50/50 ms	active
Timeout	9	triple flash red	active
Failure	10	constant Red	active
Unconfigured	11	blinking Red 200/200 ms	active
Startup	12	blinking green 200/200 ms	off
Check Installation	13	flickering red yellow 50/50 ms	active

Technical Service

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