
Installation and Operating Instructions

Electrostatic charging system

iONcharge 4.0 20 kV

in potentially explosive area



Translation of the original operating instructions

Documentation iONcharge 4.0-ATEX

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Introduction

General

Electrostatic charging systems are the most efficient non-contact method of preventing powder transfer on the back of the workpiece to be powder-coated.

Hildebrand Technology's charging applicators are representing the most advanced and easy way of effective handling and controlling high voltage charging applications. A single charging unit or a combination of charging units with positive or negative output voltage can be used to prevent powder transfer on the back of the workpiece to be powder-coated.

Versions

Type	Designation	ATEX labeling	Zone
IC52	iONcharge 4.0 20 kV (positive)	PTB 22 ATEX 5003 X  II Ex 2D IIIB T85 °C Db	Zone 21 / 22
IC54	iONcharge 4.0 20 kV (negative)	PTB 22 ATEX 5003 X  II Ex 2D IIIB T85 °C Db	Zone 21 / 22

***X** Special prerequisites for application:

- 1) The iONcharge 4.0 20 kV charging bars may only be operated in Zone 21 or Zone 22 potentially explosive atmospheres caused by the operation of electrostatic spraying equipment for ignitable coating powders.
- 2) The iONcharge 4.0 20 kV charging bars are only permitted in powder coating booths in accordance with EN 16985, EN 12981 or under equivalent ventilation conditions.
- 3) The electrostatic spraying equipment for ignitable coating powders used at the same time must meet the requirements of the European regulations.
- 4) The iONcharge 4.0 20 kV charging bars must not be used to charge surfaces in which conductors are insulated.
- 5) The iONcharge 4.0 20 kV charging bars with positive polarity may only charge insulating surfaces, e.g. powder-coated surfaces with a conductive backing and where the backing is electrostatically earthed (integrated into the equipotential bonding with $\leq 1 \text{ M}\Omega$), at a distance of $\geq 150 \text{ mm}$.
The iONcharge 4.0 20 kV charging bars with negative polarity may only charge insulating surfaces, e.g. powder-coated surfaces with a conductive backing and where the backing is electrostatically earthed (integrated into the equipotential bonding with $\leq 1 \text{ M}\Omega$), at a distance of $\geq 200 \text{ mm}$.
- 6) The iONcharge 4.0 20 kV charging bars must not be used on insulating surfaces (e.g. glass, plastic) with a thickness $\leq 10 \text{ mm}$ if the opposite side of the insulating surfaces is being electrostatically powder-coated at the same time. This condition is not differentiated further, regardless of the combined polarities.

- 7) The iONcharge 4.0 20 kV charging bars must be connected within the potentially explosive area (zone) with the torque defined by the manufacturer.
The connection to the power supply must be made outside the potentially explosive area (zone).
The connections must be checked accordingly during maintenance and test intervals.
- 8) When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.
- 9) The tips of the iONcharge 4.0 20 kV charging bars must be kept free of dirt 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.
- 10) The iONcharge 4.0 20 kV charging bars must not be used by employees with active physical aids, e.g. pacemakers, insulin pumps, cochlear implants, etc.

Application

The iONcharge 4.0 20 kV charging bars may only be operated in Zone 21 or Zone 22 potentially explosive areas caused by the operation of electrostatic spraying equipment for ignitable coating powders. Use in potentially explosive areas caused by other sources is not permitted.

The iONcharge 4.0 20 kV charging bars prevent coating powder from sticking to the back of the workpiece to be coated.

The ATEX certified version of the iONcharge-4.0 system guarantees the highest safety levels for usage in potentially explosive environments, which are at risk of explosion due to electrostatic powder coating.

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
- High voltage adjustment on the electrode or via CAN bus connection
- Control of compound solutions via Can-Bus and iONcontrol Touch Panel
- 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

NOTICE

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 iONcharge electrostatic charging 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 iONcharge 4.0 20 kV high-performance electrostatic charging systems are designed for the static charging of surfaces during powder coating with electrostatic spraying equipment for ignitable coating powders. The technology represents the latest generation of electrostatic charging systems and is used as a counter-electrode. This prevents coating powder from sticking to the back of the workpiece to be coated.

NOTICE

Damage to the system or components

Any use not described in 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.

NOTICE

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 charging 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 iONcharge system, while the 24 VDC power supply is operational regardless of whether the application is operational.

⚠ WARNING

Danger of electric shock

Keep charging 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

Switch off the supply voltage (24 VDC) if surfaces in which conductors are insulated are to be charged. Electrostatic charging systems in some circumstances, are not beneficial and could create a safety hazard.

⚠ DANGER

Danger of sliding stem brush discharges

The iONcharge 4.0 20 kV charging bars with positive polarity may only charge insulating surfaces, e.g. powder-coated surfaces with a conductive backing and where the backing is electrostatically earthed (integrated into the equipotential bonding with $\leq 1 \text{ M}\Omega$), at a distance of $\geq 150 \text{ mm}$.

The iONcharge 4.0 20 kV charging bars with negative polarity may only charge insulating surfaces, e.g. powder-coated surfaces with a conductive backing and where the backing is electrostatically earthed (integrated into the equipotential bonding with $\leq 1 \text{ M}\Omega$), at a distance of $\geq 200 \text{ mm}$.

⚠ WARNING

Danger of electrical voltage breakdown

The iONcharge 4.0 20 kV charging bars must not be used on insulating surfaces (e.g. glass, plastic) with a thickness $\leq 10 \text{ mm}$ if the opposite side of the insulating surfaces is being electrostatically powder-coated at the same time.

During installation and removal

NOTICE

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 iONcharge 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 iONcharge system.

⚠ WARNING

Danger of electric shock

- ▶ The iONcharge 4.0 20 kV charging bars must not be used by employees with active physical aids, e.g. pacemakers, insulin pumps, cochlear implants, etc.

⚠ WARNING

Danger of electric shock

- ▶ Keep charging 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 coating powder-air atmosphere

- ▶ When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.

During charging bar cleaning

⚠ WARNING

Danger of electric shock

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

⚠ WARNING

Danger of coating powder-air atmosphere

- ▶ When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.

⚠ CAUTION

Sharp pins

Grounding

⚠ WARNING

Danger of electric shock

- ▶ The iONcharge charging systems **MUST** be grounded.

In problem situations

NOTICE

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 iONcharge charging systems in explosive environments if they are not Ex-Certified.

- ▶ Ex-Certified bars have an ATEX Ex label attached to the bar profile.

⚠ WARNING

Danger of coating powder-air atmosphere

- ▶ When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.

Ozone generation



Ozone may be generated when the iONcharge is in use.

Due to their intended use, the iONcharge 4.0 20 kV charging bars are used together with electrostatic spraying equipment for ignitable coating powders in areas with technical ventilation or under equivalent ventilation conditions. This prevents an increased ozone concentration in the employees' work area.

- In the event of abnormalities, an ozone measurement should be carried out in the employee's work area.
-

User Duties

General

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

Safety instructions

The iONcharge 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 ATEX, Low Voltage and EMC directives.

NOTICE

Damage during transport and installation

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

NOTICE

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

- ▶ Installation, commissioning and maintenance of the iONcharge system may only be carried out by trained, qualified personnel authorized by Hildebrand Technology or Gema Switzerland GmbH.

**⚠ 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 iONcharge 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 iONcharge 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 charging 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).

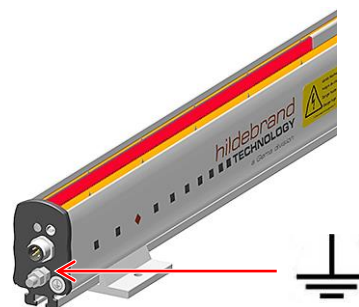


Fig. 1: Connection to machine or plant mass / ground

The iONcharge systems for electrostatic charging 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 iONcharge system is an electrostatic charging system consisting of a charging bar with integrated high voltage modules and encapsulated microprocessor electronics. The charging bars are in lengths from 320 mm to 4500 mm available. 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.

⚠ WARNING

Danger of coating powder-air atmosphere

- ▶ When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.

Charging bars contamination and cleaning

Contamination of the emitter pins will occur. The emitter tips of the iONcharge 4.0 20 kV charging bars must be kept free of dirt and cleaned regularly. The power supply (24 VDC) must be switched off before cleaning. Mounting the iONcharge 4.0 20 kV charging bars with a downward inclination can delay soiling of the emitter tips and support safe operation up to the specified weekly cleaning intervals.

⚠ WARNING

Explosion hazard

The tips of the iONcharge 4.0 20 kV charging bars must be kept free of dirt and cleaned regularly.

- ▶ The tips of the iONcharge 4.0 20 kV charging bars must be cleaned with non-abrasive brushes (e.g. natural hair or brass brushes).
- ▶ Clean heavy soiling that cannot be brushed off with diluted aqueous soapy water or IPA alcohol or a suitable solvent that evaporates without leaving any residue.
- ▶ Unless the operational and local conditions specify a shorter cleaning interval, weekly cleaning of the emitter tips is defined.

NOTICE**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 charging bars

⚠ WARNING

Explosion hazard

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

Attach the iONcharge 4.0 20 kV charging bar to the desired position, as shown in Fig. 2, where the distance between the bar and the material does not vary.

Ensure that there is no ground nearby pins beside the ground needed for the charging application. Mounting bars and parts must be behind the electrode and minimum 2 x the distance from pin to workpiece as shown in Fig. 2.

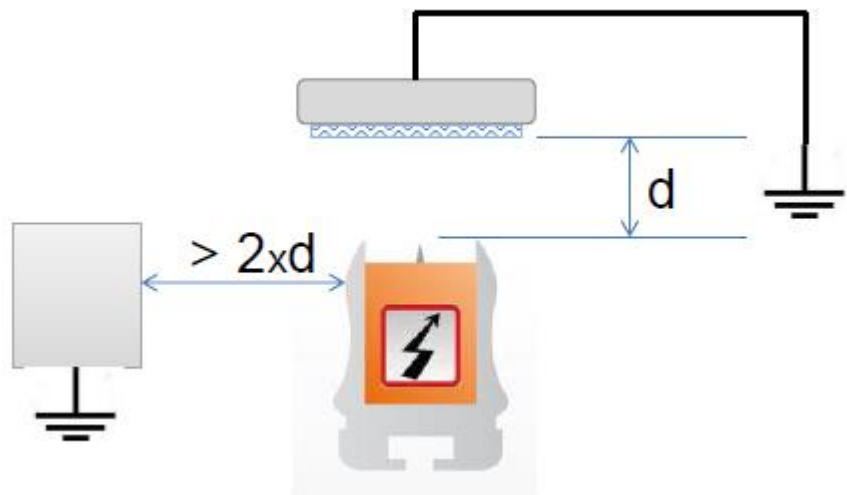


Fig. 2

⚠ WARNING

Danger of coating powder-air atmosphere

- ▶ When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.

Avoiding loss of efficiency

NOTICE**Ground near emission pins**

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

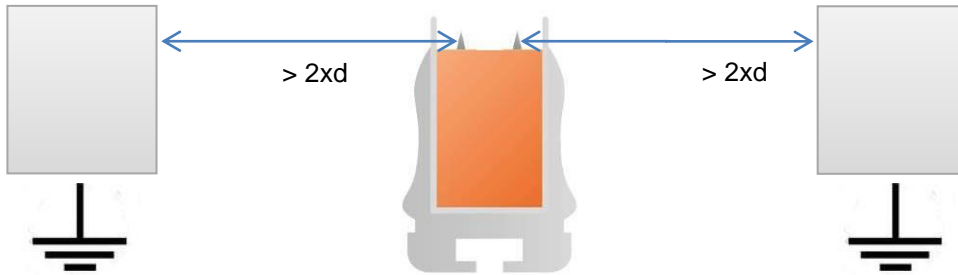


Fig. 3:

Electrical Connection

Connector specification

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

IP54 protection class: The plugs must be tightened to the torque defined by the manufacturer. This is usually in the range of 0.6...1.5 Nm.



Fig. 6: Standard version

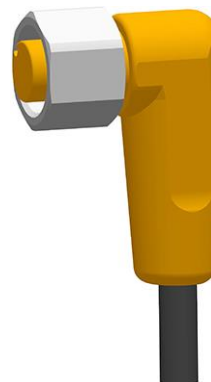


Fig. 7: 90 degree version: Option

Description of the Connections

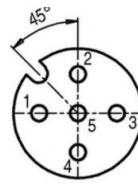


Fig. 8: Pin position and number

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 (20 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!

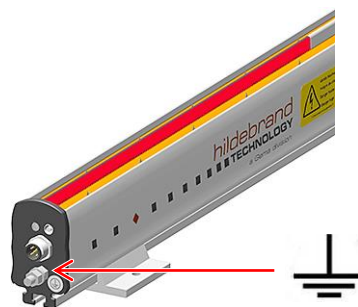


Fig. 9: Connection to machine or plant mass / ground

Use in standalone operation

Standalone operation occurs without the use of a communication interface. For use of an individual charging 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.

▲ WARNING

Explosion hazard

- ▶ In stand-alone operation, the iONcharge 4.0 20 kV charging bars must be connected to the power supply using the stand-alone cable outside the potentially explosive area (zone).



IMPORTANT for system status detection:

- Machine runs = 24 VDC Switch on
- Machine off or in stop = 24 VDC Switch off

Factory settings

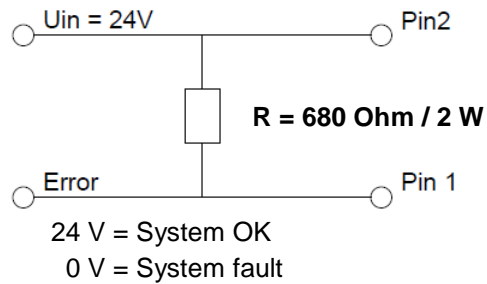
HV frequency range to	100 Hz
max. output voltage	20 kV
Operating mode	DCDC

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 charging 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 charging 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 charge 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 not be found. This function is only active when the FEEDBACK mode is activated and an iONsense 4.0 sensor is connected.</p>
10	Error	<p>This mode shows that the charge 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 charge.</p>
13	Check Installation	<p>This mode shows that the charge electrode has been installed to close to a ground / machine ground.</p>

Network Operation

iONcharge systems are charging 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.

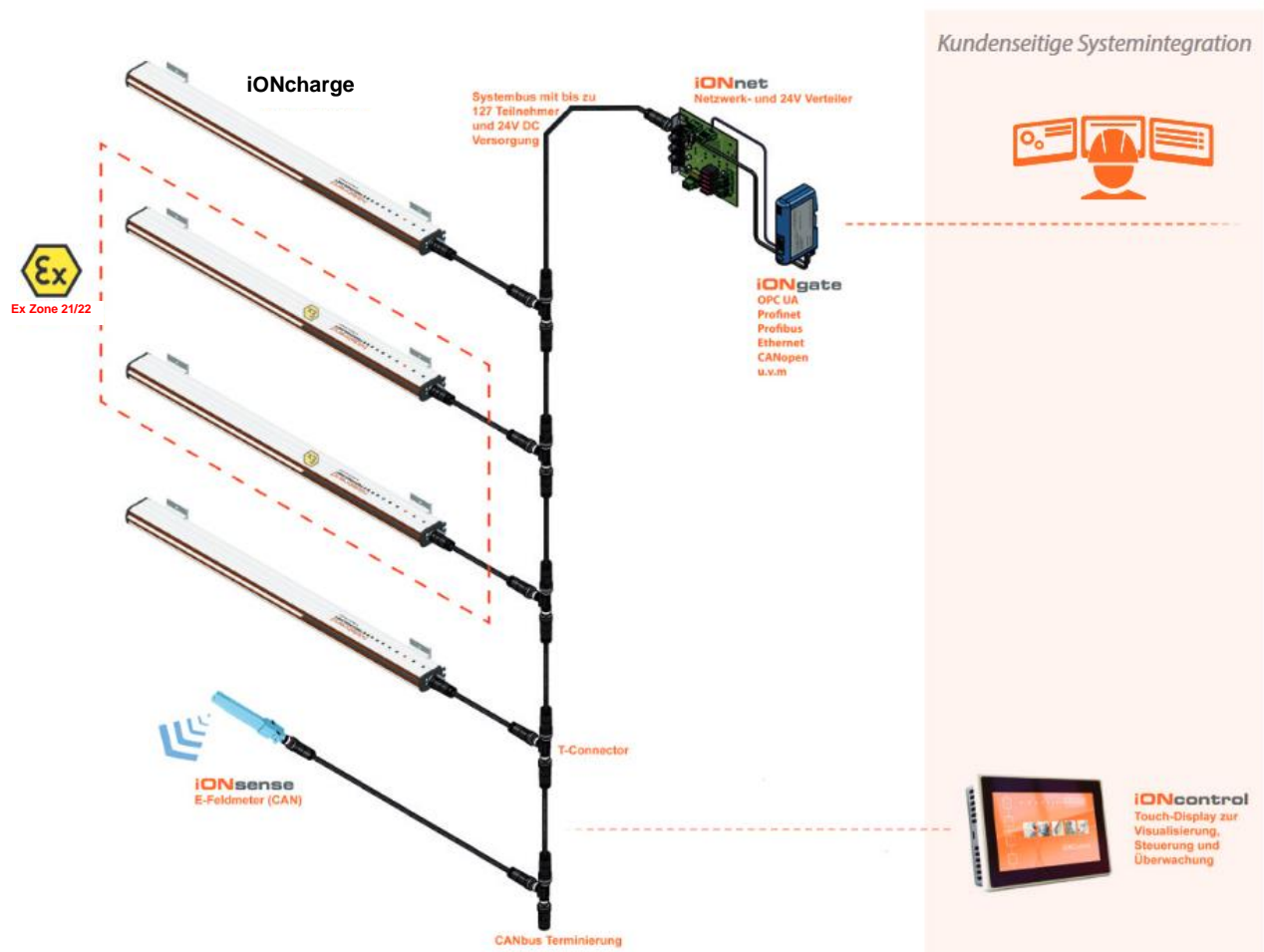


Fig. 10: Overview



Bus cable lengths from the charging 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.

Application information

The iONcharge 4.0 20 kV charging bars make it possible to coat the workpiece more effectively when using electrostatic spraying equipment for ignitable coating powders. The use of the iONcharge 4.0 20 kV charging bar as a counter-electrode to the electrostatic spraying equipment prevents unintentional coating of the workpiece.

⚠ WARNING

Never use charging systems in flammable or explosive environments if they are not Ex-Certified. Ex-Certified bars have an ATEX Ex label attached to the bar profile.

NOTICE

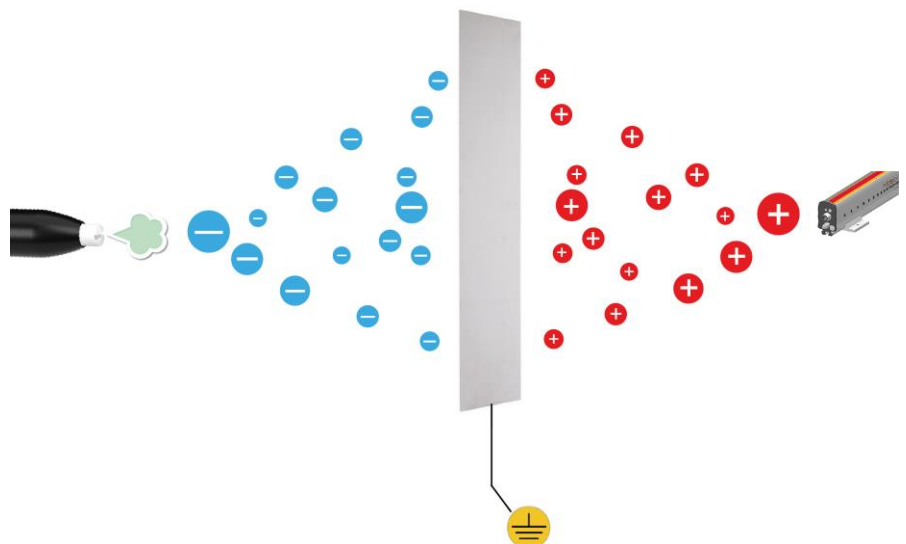
Only for insulating substrate materials!

Electrostatic bonding is based on insulating substrate material.

Any metalized or metal substrate cannot be charged and may result in the damage of material as well as damage of the charging system.

Basic layouts for charging applications

Example: Prevent color change



The charging electrode prevents negative paint particles from sticking to the back of the workpiece.

Setting the NodeID and the high voltage

The setting is made using the T button:



⚠ CAUTION

Danger due to electrostatic charge

People not connected to the ground can be electrostatically charged, which could result in an electric shock if they are touching a metal part.

- ▶ Before the button is pressed (preferably with a screwdriver), the operator must ensure that he is earthed himself.
- ▶ Touch and hold a grounded metallic machine part, or use a wrist ground strap.
- ▶ The strap must be connected to a grounded metal part or grounding point using a terminal or plug, e.g. a machine part or an grounding point at the workplace.

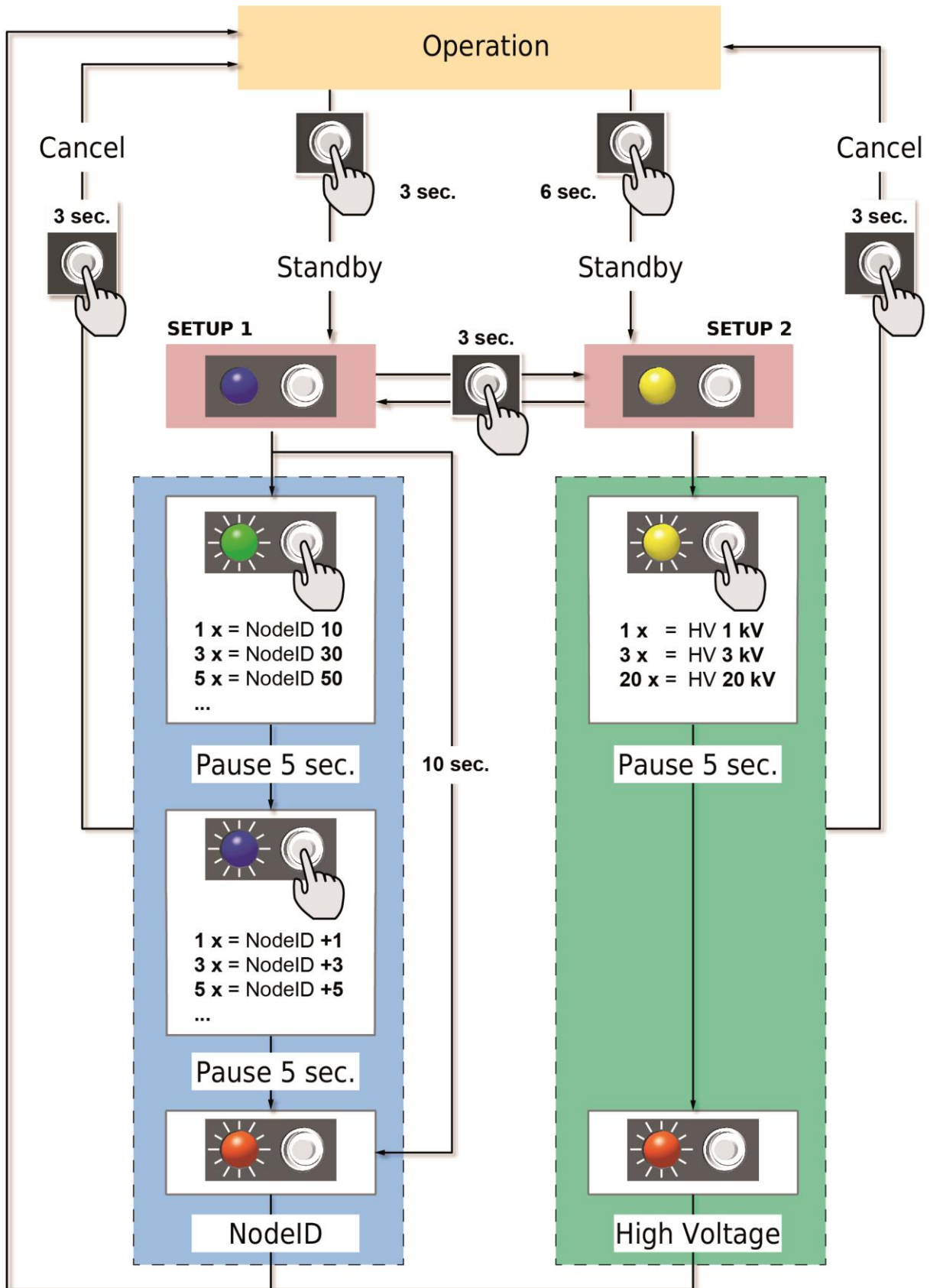
⚠ WARNING

Danger of coating powder-air atmosphere

- ▶ When working on the iONcharge 4.0 20 kV charging bars, electrostatic spraying equipment for ignitable coating powders must be switched off.



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



Technical Data

Electrical data

Input

		Value	min.	Nom.	Max	Unit
Number of contacts		N	5 pin/M12			
Power supply (pin2(+); 3(GND))		U_{in}	20	24	28	VDC
Current consumption	20 kV	I_{in}	40	100	300	mA

Output

		Value	min.	Nom.	Max	Unit
Voltage	20 kV	U_{out}	0	± 20	± 20	kV
Current of all emitter tips	20 kV	I_{out}	0		± 500	μA
Contact current (1 emitter tip)	20 kV	I_b		60		μA
Protective resistor	20 kV	R_{out}		300		$M\Omega$
Grid	20 kV	I_{pitch}		30	30	mm
Error Pin (Pin 1)		Open collector (OR-circuit) max. 28V 100mA				

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 20 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	TAmb	5	25	40	°C
Humidity/ non-condensing	rF		35	80	%rel. F.
Protection class acc. to DIN 60529	IP68 (M12 tightened to specified torque)				
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
Pin Aged	6	flickering red 50/50 ms	active
Timeout	7	triple flash red	active
Failure	8	constant Red	active
Unconfigured	9	blinking Red 200/200 ms	active
Startup	10	blinking green 200/200 ms	Off
Check Installation	11	flickering red yellow 50/50 ms	active

Technical Service

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