IONFIX
COMPACT STATIC GENERATOR

DISTRIBUTOR MANUAL

This Manual is to be read in conjunction with the existing 'Static Generation' Distributor Manual which gives a wider overview of the static generation process.

Contents Page

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

1. PRODUCT PROFILE

The IONFIX Compact is the first in a new range of Static Generators designed to position us as a leading supplier of industrial static generation equipment.

The IONFIX Compact has many performance and cost advantages over existing products on the market. These advantages will give us a strong competitive position in this growing technology.

There are two areas of particular interest in this Manual:

1. Load capability of the new Generator
    - it will be a market beater within its capability. We believe that this covers half the market. Better guidance on current loads is included in this manual.
2. Connectors
    - the IONFIX range of generators uses connectors rated at 60 kV for reliability. This means that backward compatibility has to be addressed for replacement bars for older generators.

2. REASONS FOR ITS DEVELOPMENT

- The 7333 AC & DC models had disappointing sales due to the absence of on-case controls and lack of aesthetic appeal. Although it worked well, it was not an exciting product.
- We needed a range of better static generators for this growing market.
- Our research and development department identified ways of substantially reducing cost and also giving the new product many extra qualities. We incorporated this knowledge and experience in a technical design which combines with better cosmetics and a competitive price to produce a market-beating product.
- The 7333 models will continue to be available for OEMs, but the IONFIX will eventually replace them, because it offers more advantages at a lower price.

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

3. THE MAIN SALES POINTS

The Features and Benefits for the Customer:

PERFORMANCE

The performance of the IFC (IONFIX Compact) gives it the ability to be used in over 50 % of industrial static generation applications. In many of these applications customers are using competitors' products which are more than twice the price and have fewer capabilities. This is a huge opportunity for us.

A short summary of the benefits are:

Power

It is a true 20 Watt generator which can deliver 0.67 mA of current at 30 kV and 1 mA of current at 20 kV.
This is a unique capability, which compact models from our competitors cannot match. If a competitor's equipment is rated at, say, 0.5 mA that means that this is the maximum current available at all levels of voltage - whether it is 30 kV, 20 kV or 10 kV. This is a serious limit to the use of the product.

Control

The clear, simple controls, with dedicated buttons, are easy to use and satisfy the most demanding users.
The user interface has a large, clear display with precise running and fault analysis.

The IFC offers remote functionality which has previously been available only on Generators costing twice the price.
Duplicate remote operation is available for:

- on/off
- adjustment of voltage
- adjustment of current limit
- display of voltage and current limit

The IFC is the only generator in its class with these features.

The industry standard remote interface is easy to link with process controls/PLCs.

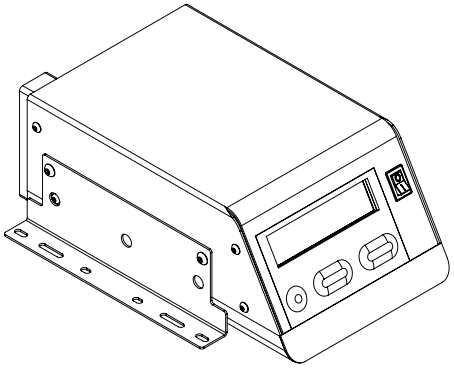
Supply Voltage

Model IONFIX-DC: 24 V DC. Combicon or M12 inlets.
24 V DC Models offer a significant cost-saving and are increasing in popularity.

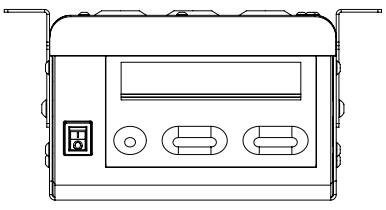
Model IONFIX-AC: 90 - 250 V AC, 50/60 Hz. IEC 320 C14 Inlet.

Installation

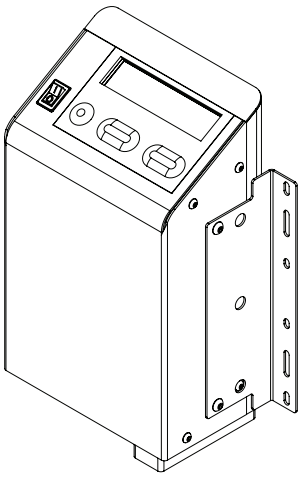
The display can rotate 180° which allows versatile mounting possibilities: on a bench, on a wall or under a bench:



Bench Mounted



Under-Bench Mounted



Wall Mounted

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

3. THE MAIN SALES POINTS

HV Connectors

There are four connections for generator electrodes/bars. These connectors are rated at 60 kV for maximum reliability.

Protection

Our new generator provides a safe, stable and regulated high voltage supply with a comprehensive set of internal protection functions and the ability to provide clear indication of any abnormal conditions in plain language on the display - for example arc faults due to damaged cable.

Size

Where space is limited, the compact design of the IONFIX enables it to be used as a size replacement for its main competitors. Actual dimensions: 276 x 161 x 103 mm.

Pricing

The IFC was designed to be competitive in price and specification with all of our international rivals, especially the Simco CM Lite, the Puls 20 kV and the Meech 992v3.

Variants

- IONFIX Compact, 24 V DC input, 30 kV DC output, positive output polarity.
- IONFIX Compact, 24 V DC input, 30 kV DC output, negative output polarity.

- IONFIX Compact, 90 - 250 V AC input, 30 kV DC output, positive output polarity.
- IONFIX Compact, 90 - 250 V AC input, 30 kV DC output, negative output polarity.

- IONFIX Compact IML, 24 V DC input, 20 kV DC output, positive output polarity.
- IONFIX Compact IML, 24 V DC input, 20 kV DC output, negative output polarity.

- IONFIX Compact IML, 90 - 250 V AC input, 20 kV DC output, positive output polarity.
- IONFIX Compact IML, 90 - 250 V AC input, 20 kV DC output, negative output polarity.

UL Certification

The IONFIX Compact has passed the rigorous UL testing procedures. Any manufacturer can be confident that this equipment is safe for the operator to use and safe in the production environment.

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

4. THE MARKET FOR THE IONFIX COMPACT GENERATOR

A review of our enquiries and sales showed that most static generation applications use 30 kV generators and require less than 600 µA of current.

To help assess whether the IONFIX Compact should be specified, we made some load tests.

IONFIX COMPACT LOAD EXAMPLES

IONFIX Compact has 667 µA available at 30 kV and 1000 µA available at 20 kV. We believe that this is sufficient power for over half the applications in the static generator market. Specifying the right equipment for static generation applications is a matter of judgement - the data below is intended to be a useful guide to help assess whether the IONFIX Compact Generator will have sufficient power (current) for the application.

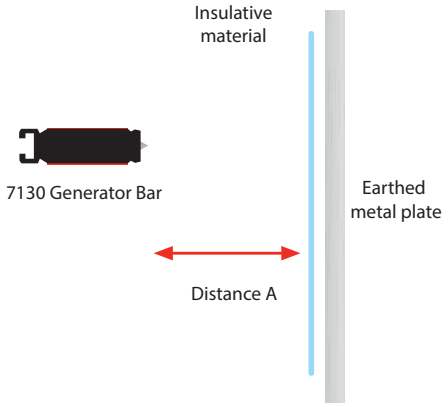
It is only a guide - you must use common-sense/experience and allow for:

- Speed of process - the faster the speed the more current is required.
- Type of material - resistivity and thickness of materials. The thicker the material the more voltage is required, but the current requirement may not increase proportionally.
- The level of adhesion required. In all of the tests below 'good' adhesion was achieved.

There are two main processes:

Mode 1: Sticking a non-conductive material to an earthed metal base.

Typical examples are interleaving, cooling rollers, web wandering and neck-in on cast film lines. This is normally the most intensive type of temporary adhesion requiring the highest current level.



Without any insulative material

To see the maximum current draw we ran tests without any insulative material between the 7130 and the metal plate. Of course no customers want to do this, but it acts as a reference.

Voltage	Distance A	Current Draw per m of Bar
20 kV	30 mm	600 µA
20 kV	40 mm	400 µA
20 kV	50 mm	90 µA
30 kV	30 mm	1220 µA
30 kV	40 mm	800 µA
30 kV	50 mm	230 µA

The test arrangement was as shown in the illustration.

You can see that the current draw doubles between 20 kV and 30 kV and reduces quickly with increased distance.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

With insulative material

The film thickness will affect the current draw, so we tested with 50 µ and 150 µ thicknesses.

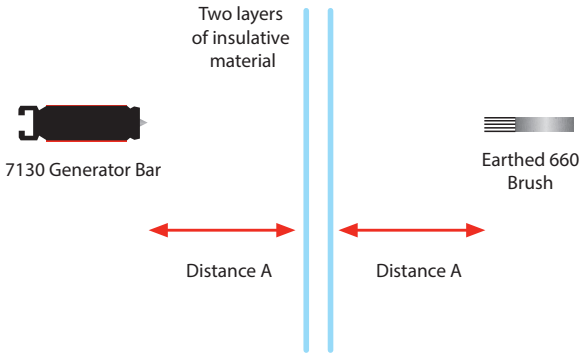
The results were:

Voltage	Distance A	Current draw 50 µ film	Current draw 150 µ film
20 kV	30 mm	280 µA	20 µA
20 kV	40 mm	160 µA	12 µA
20 kV	50 mm	120 µA	8 µA
30 kV	30 mm	760 µA	38 µA
30 kV	40 mm	580 µA	44 µA
30 kV	50 mm	340 µA	56 µA

The current draw is for 1 m of bar. Some of the results are not linear, but the trends are clear. In all of the tests above, the adhesion between film and metal plate was excellent. There was no noticeable difference in adhesion between 30 kV at 30 mm or 40 mm, but the current draw was much less at 40 mm.

Mode 2: Sticking two non-conductive materials together.

This is a less intensive application generally, although for thick materials more voltage is needed - for example laminated work tops need 60 kV (+) on one side and 60 kV (-) on the other side.



The tests results below are for two sheets of 50 µ and two sheets of 150 µ.

Voltage	Distance A	Current draw 50 µ film	Current draw 150 µ film	Current draw 150 µ film
20 kV	60 mm	320 µA		
20 kV	20/20 mm		20 µA	7 µA
20 kV	30/30 mm		16 µA	5 µA
30 kV	60 mm	992 µA		
30 kV	20/20 mm		120 µA	44 µA
30 kV	30/30 mm		98 µA	56 µA

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

SUMMARY OF LOAD DATA

The IONFIX Compact is suitable for:

- all pinners at 30 kV - 7090, 7095, 7093
- bars at 30 kV up to 1 m total length in normal Mode 1 applications.
- bars at 30 kV up to 3 m total length in normal Mode 2 applications.
- large IML systems at 20 kV.

* Normal means reasonable speed, reasonable application, reasonable thickness and type of material.

APPLICATIONS

This is a wide market and typically includes:

Bagmaking:	30 kV and 0.5 mA are adequate for bars up to 1.5 m in these applications. This includes wicket and flat bagmakers. Bag-on-reel applications include air extraction between layers and using static for a tight rewind.
Pinning:	Most pinning applications use 30 kV and use small generator electrodes which draw less than 0.67 mA.
Packaging:	Shrink wrappers. Holding labels and inserts.
Bindery:	Holding stacks together.
IML:	The Ionfix Compact is too big for mounting at the end of a robot arm, but it can be used in other IML applications. For example, it can be used where the generator is mounted at the base of the robot arm, or in charging the label on its way to the tool.

We believe that the Ionfix Compact can be used in more than half of the applications where generators are required in industry.

It may be easier to define the market for Ionfix Compact by saying what it would definitely not be used for. This includes:

- all 50 and 60 kV applications, typically
  - laminated worktops
  - pinning very thick piles of paper and film
  - laminating very thick (a few mm) materials to metal
- some non-stop winding applications where the cutting blade is close to the generator bar and uses a lot of the available current.

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Power Supply Requirements: DC Variant	
Input voltage:	24 V DC nominal, 21 - 28 V operating range.
Input current:	2 A max.
Maximum input power:	48 W.
Input connector:	Combicon connector: Phoenix Contact 'Combicon' 2-pole pluggable terminal block. Mating plug type Phoenix Contact MSTB 2,5/2-STF, manufacturer Part No. 1786831. Fraser Part No. 730215.
	M12 connector: M12 male, 4-pole, flange mount. A-coded. A range of connecting cables is available from Fraser.

Power Supply Requirements: AC Variant	
Input voltage:	90 – 250 V AC, 50/60 Hz.
Input current:	1 A max.
Maximum input power:	74 W.
Input connector:	IEC 60320 C14 inlet. Mating plug IEC 60320 C13.
Fuse type and rating:	5 x 20 mm, 1 A - type 'T', 'gG' or 'gL' (slow-blow, general-purpose).

Electrical Output Characteristics	
Output voltage:	0 – 30 kV, adjustable in 0.1 kV increments. 0 – 20 kV, adjustable in 0.1 kV increments for dedicated IML models.
Output polarity:	Fixed positive or negative, specified at time of order.
Output current limit:	1 mA max, up to 20 kV, reducing to 0.67 mA at 30 kV. Adjustable from zero to max. in 0.01 mA increments.
Maximum output power:	20 W, available from 20 kV to 30 kV. 20 kV limit for IML models.
Set-point display accuracy:	1 % of maximum output voltage.
Voltage ripple:	10 % of maximum output voltage at maximum load.
Load regulation:	2 % of maximum output voltage for full-load step change.
Line regulation:	2 % of maximum output voltage for full input range step change.
Output voltage rise time:	< 15 ms.
Output connector type:	4 x Fraser 30/60 kV tubular spring-contact HV connector.

Protection	
Short-circuit protection:	Continuous output current electronically limited.
Output arcing protection:	HV output disabled for 4 seconds in event of arcing.
Thermal protection:	HV output disabled if internal temperature exceeds safe limit.
Minimum load impedance:	1.5 MΩ – below this, output will be disabled.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

5. TECHNICAL SPECIFICATION

Remote Interface	
Connector type:	25-pin subminiature D-type, female. Mating plug: Amphenol L717DB25P or equivalent.
Remote control functions:	HV on/off (digital, 10 - 30 V 'on', 10 - 25 mA input current). Voltage setpoint adjust (analogue, 0 - 10 V = 0 - 100 %). Feature enabled/disabled by separate control input.
Remote monitoring functions:	Overload signal. Open collector/emitter outputs, 50 V/50 mA maximum load. Operating signal. Open collector/emitter outputs, 50 V/50 mA maximum load. Remote voltage monitor (analogue, 0 - 10 V = 0 - 100 %). Remote current monitor (analogue, 0 - 10 V = 0 - 100 %).
Auxiliary power supply:	12 V, 20 mA. May be used to drive remote on/off input.

Environmental Conditions	
Ambient temperature:	0 - 50 °C .
Relative humidity:	Maximum 70 %, non-condensing. Tested to IEC 60068-2-30:2005 (Damp heat, cyclic), 55 °C, 6 cycles.
Ingress protection:	IP20 (must not be exposed to falling, splashing or spraying water).
Vibration:	Installation location must be vibration-free.
Mechanical fixing:	See mounting information.

Mechanical	
Dimensions:	277 mm x 163 mm x 106 mm (without brackets).
Weight:	4.6 kg.

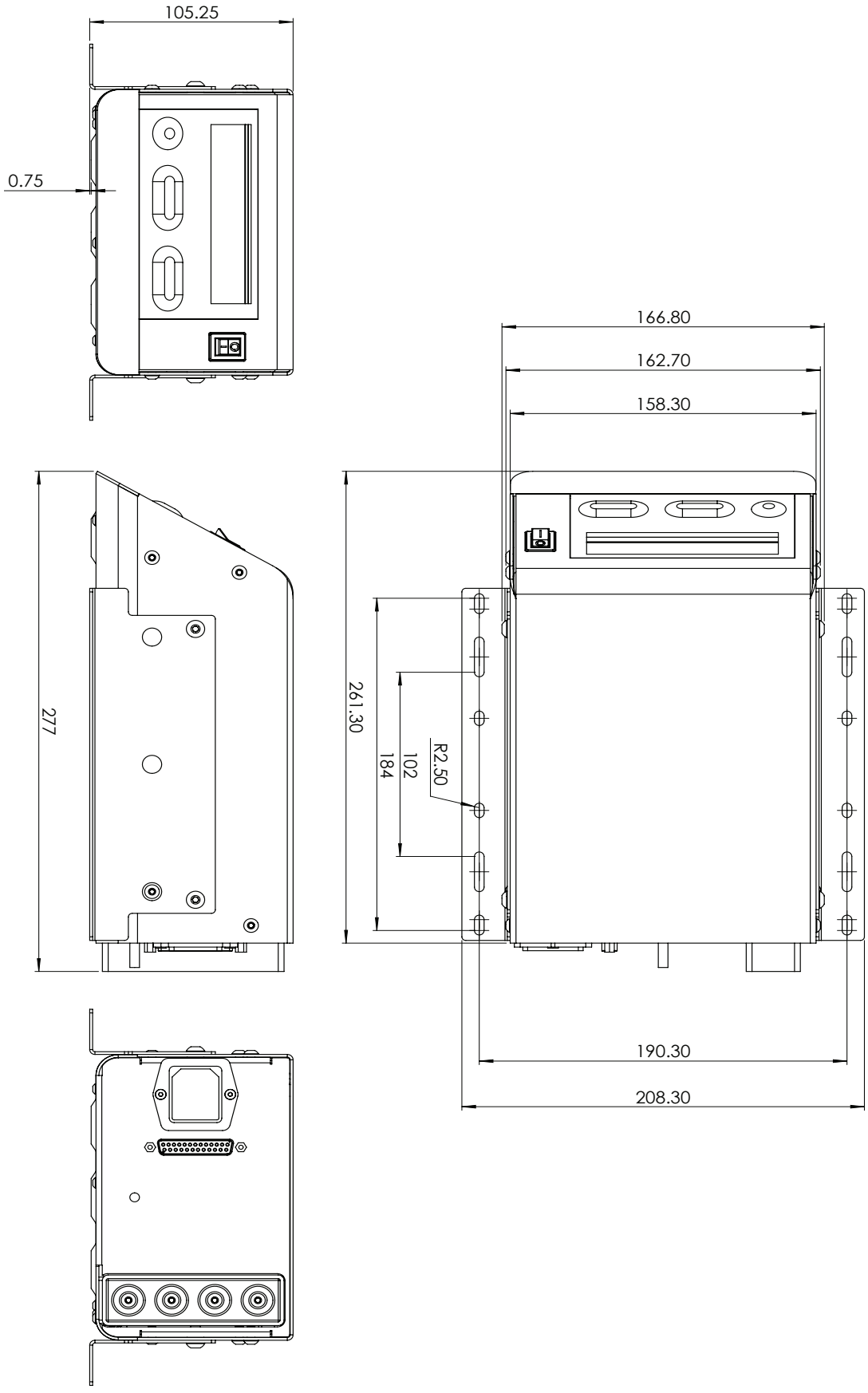
Regulatory	
CE Marking:	EU LVD (2014/35/EU) Electrical safety: EN 62368-1:2014 EU EMCD (2014/30/EU) Emissions: EN 61000-6-3:2007 Immunity: EN 61000-6-2:2005 Harmonics: EN 61000-3-2:2006+A2:2009
Approvals:	IEC CB Certificate: DK-94020-UL UL Certified: File No. E313877

Options	
No-cost options:	Display orientation ('desktop' or 'wall-mount').

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

DIMENSIONS



FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Checking on the Delivered Equipment

The equipment leaves our factory in suitable protective packaging. Please check that it is undamaged when it arrives.

If there is visible damage, contact the Factory or one of our Distributors immediately, before carrying out any installation.

Check that the parts which have been delivered are the same as you have ordered.

Front Panel Rotation

The front panel display and controls of the generator can be rotated by 180° in order to accommodate a range of mounting orientations.

To rotate the display from 'desktop' to 'wall-mounted' orientation, follow the steps below:

1. Ensure the generator is switched off and disconnected from its power supply (24 V or mains connection isolated and removed).
   AC Variant: Allow 5 minutes for stored charge to dissipate before opening the cover.

   Perform this operation in a clean and dry environment.
2. Remove the 8 M4 x 8 mm screws securing the lid of the generator using a 3 mm hex key or driver.
3. Remove the 2 M3 screws securing the front panel assembly to the generator chassis (underneath the generator).
4. Undo the 4 M3 x 15 mm threaded spacers securing the display and control assembly to the generator front panel, using a 5.5 mm spanner.
5. Rotate the display and control assembly by 180°. Ensure that the flexible cable connecting the display and controls to the main PCB does not become trapped or kinked.
6. Secure the display and control assembly in its new orientation, then re-fit the front panel assembly to the generator chassis.
7. Replace the lid and secure using the 8 M4 screws.

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

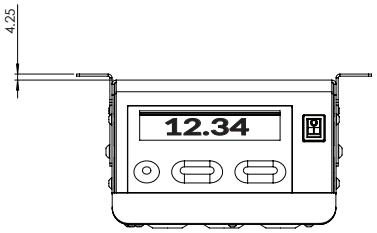
Mounting

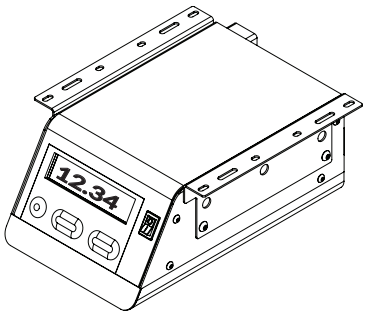
The generator is provided with mounting brackets to allow mounting to a wall or panel, under a table or shelf, etc.
Use only the hardware provided (M5 x 10 mm) to attach the mounting brackets to the generator.

If wall-mounted, suitable fixings should be used to secure the generator.

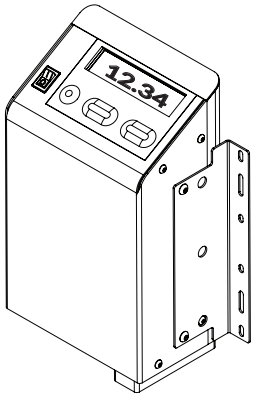
Ensure that the generator is securely mounted and that all mounting fasteners have been tightened before use.

Under Bench Mounting

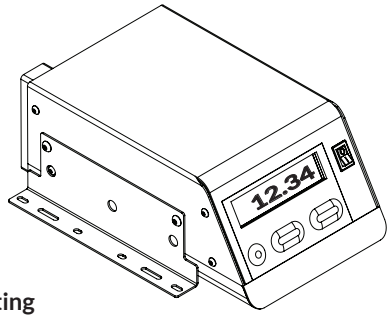




Wall Mounting Option



Bench Mounting



Earthing

The M5 protective earthing (PE) terminal of the generator must be permanently connected to the main earthing terminal of the electrical installation by a conductor of at least 1.5 mm^2 cross-sectional area.

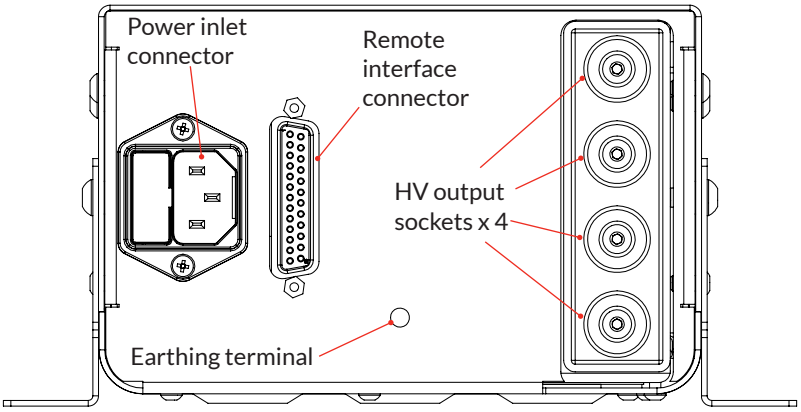
DC variant: the 0 V rail of the 24 V supply MUST be permanently connected to earth.

AC variant: an earthed IEC 320 C13 cable MUST be used with the generator, and the socket outlet supplying the generator MUST be earthed correctly.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

7. ELECTRICAL INSTALLATION

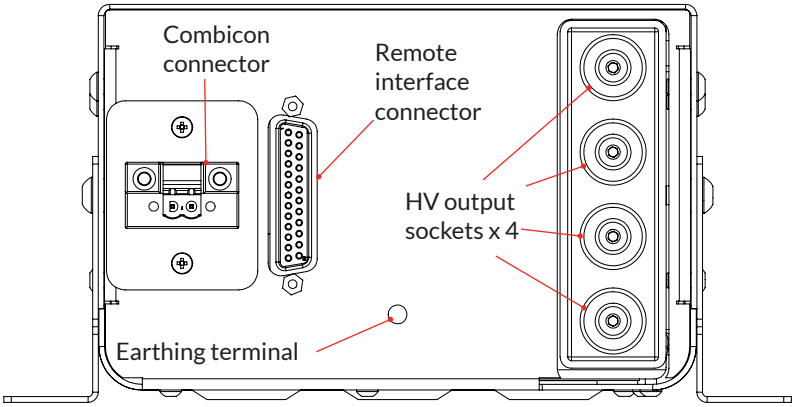
This section describes the electrical installation of the generator.



Rear view of the generator. AC IEC power inlet connector shown for example.

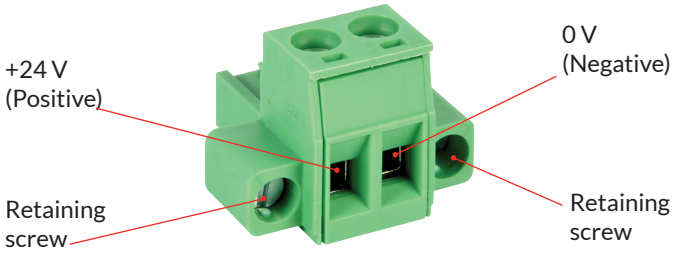
1. Ensure that the generator is earthed as previously described.
2. Connect the high-voltage electrode(s) to the HV output sockets at the rear of the generator. Ensure that any unused HV output sockets are plugged with the supplied blanking plugs to prevent dirt ingress.
   - Do not route HV cables near to sharp metal components.
   - Avoid bends or kinks in the HV cables.
   - Route HV cables separately from low-voltage cables.
   - Keep HV cables as short as practically possible.
3. Connect the remote interface cable or breakout board to the 25-way, D-type connector at the rear of the generator. For details of the remote interface, see Section 8 of these instructions.
4. Connect the power input cable to the generator.

   a. **DC variant:** 'Combicon' connector.



Rear view of the generator. 24 V DC Combicon power inlet connector.

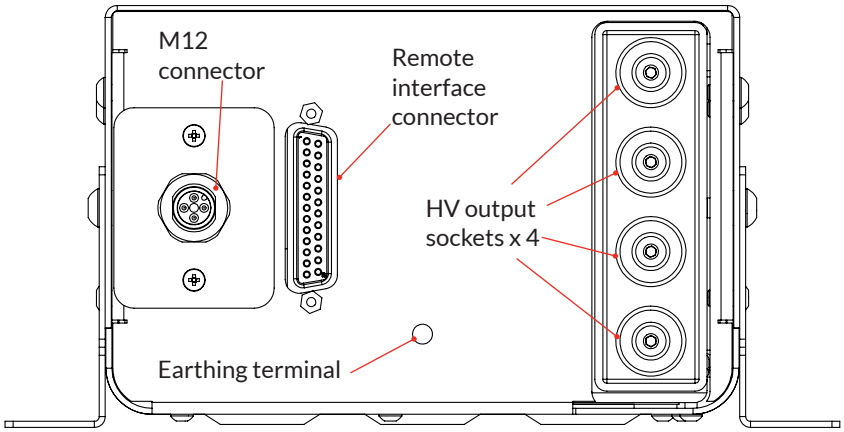
FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com



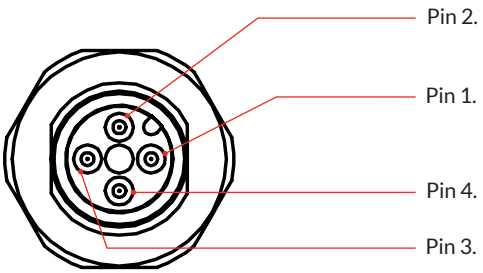
Combicon power inlet connector

Connect +24 V to the left-hand terminal of the 'Combicon' pluggable terminal block (viewed from rear of generator), and 0 V to the right-hand terminal of the 'Combicon' pluggable terminal block.
It is recommended to fit bootlace ferrules to the stripped ends of the 24 V input cable. Insert the terminal block into the 'Combicon' socket at the rear of the generator and tighten the retaining screws.

b. DC variant: M12 connector



Rear view of the generator. 24 V DC M12 power inlet connector shown.



M12 power inlet connector.

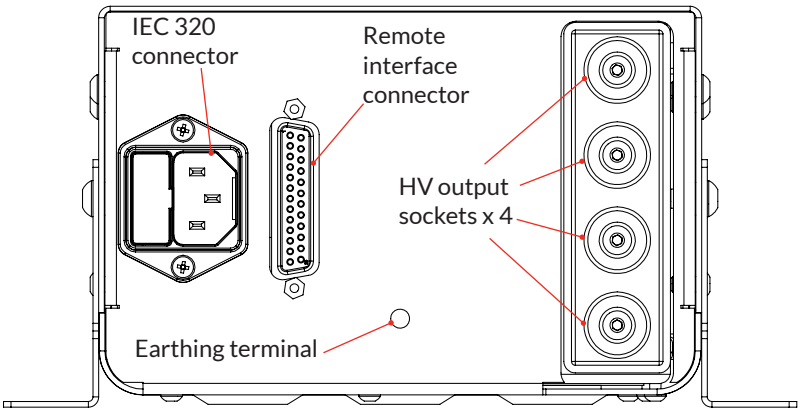
Align the pins on the cable to the pins on the connector on the rear panel of the generator.
Connect the cable to the connector and turn the locking ring to the right to secure the cable.

The pin assignments on the cable are as follows:

Pin No.	Wire Colour	Assignment
1	Brown	+24 V DC. Pins 1 and 2 must be joined together.
2	White	+24 V DC. Pins 1 and 2 must be joined together.
3	Blue	0 V/Earth. Pins 3 and 4 must be joined together and to the Earth at the electrical supply.
4	Black	0 V/Earth. Pins 3 and 4 must be joined together and to the Earth at the electrical supply.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

c. AC variant: IEC connector



Rear view of the generator. AC IEC power inlet connector shown.

Insert the IEC 320 C13 plug into the socket at the rear of the generator.
Make sure that the IEC plug is fully and firmly seated.

5. Connect the power input cable to the supply.

a. DC variant: connect the 24 V and 0 V lines to the 24 V DC supply of the machine/control cabinet.
The 0 V rail of the 24 V supply MUST be permanently connected to earth.

b. AC variant: connect the plug to an earthed socket outlet, or into the AC supply of the machine control cabinet.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

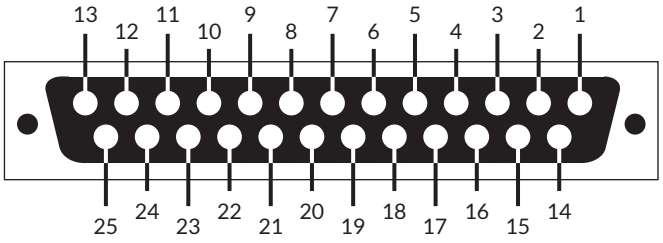
8. REMOTE INTERFACE

The generator is equipped with a remote control and monitoring interface permitting remote setting and operation of the generator.

The following functions are provided:

- **Remote on/off enable:** enables operation of the remote on/off input.
- **Remote on/off input:** permits the HV output of the generator to be switched on or off using a voltage signal.
- **Remote voltage setpoint enable:** enables operation of the Remote voltage setpoint input, overriding the value set using the front panel controls.
- **Remote voltage setpoint input:** permits the HV output of the generator to be controlled from 0 - 100 % according to an analogue voltage signal, e.g. from a PLC output.
- **Remote current limit enable:** enables operation of the Remote current limit input, overriding the value set using the front panel controls.
- **Remote current limit input:** permits the output current limit of the generator to be controlled from 0 - 100 % according to an analogue voltage signal.
- **Operating signal output:** signals when the generator is operating normally.
- **Overload/limit signal output:** signals when the generator maximum output current is reached, or when an arc or overload condition occurs at the generator output.

The remote interface connector is a 25-way, D-type at the rear of the generator.
The pins are numbered as shown below (viewed looking into the socket on the rear of the generator).



The interface connections are as follows:

Pin No.	Function	Pin No.	Function
1	Remote on/off input +ve	14	Remote on/off input -ve
2	Remote current limit input	15	GND (0 V)
3	Remote voltage setpoint input	16	GND (0 V)
4	Remote voltage monitor output	17	GND (0 V)
5	Remote current monitor output	18	Remote voltage setpoint enable
6	+24 V reference output	19	GND (0 V)
7	+12 V reference output	20	GND (0 V)
8	Reserved	21	Reserved
9	Overload open collector	22	Overload open emitter
10	Operating open collector	23	Operating open emitter
11	Remote current limit enable	24	GND (0 V)
12	Not connected	25	Remote on/off enable
13	Not connected		

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Pins that are identified as 'reserved' must be left disconnected and not 'tied' to any potential (e.g. ground, 24 V, etc.) These pins are reserved for future expansion and may be connected to internal circuitry within the generator.

Pins that are identified as 'not connected' can be connected to ground if desired.

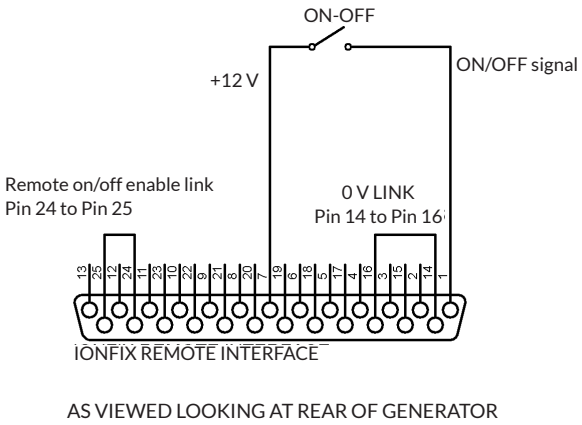
Remote On/Off Input (pins 1, 14, 24, 25)

The remote on/off input allows the high voltage output of the generator to be turned on or off by a voltage signal.

To use the remote on/off function, it must first be enabled by connecting pin 25 (remote on/off enable) to pin 24 (GND).

To turn the high voltage output on, a signal level of 10 - 30 V must be applied between pin 1 and pin 14 (pin 1 positive with respect to pin 14). This is a low impedance input, and will draw approximately 8 mA from the signal source at 10 V rising to 35 mA at 30 V.

The wiring example below shows how to connect an external HV on/off switch to the generator using the internal 12 V supply to provide the signal voltage.



AS VIEWED LOOKING AT REAR OF GENERATOR

The front panel 'RUN/STOP' button can be used to momentarily over-ride the remote on/off input for testing/ commissioning purposes. The HV output of the generator will be enabled while the 'RUN/STOP' button remains pressed. It is not possible to turn off the HV using the 'RUN/STOP' button if it is enabled via the remote on/off input.

Remote Voltage Setpoint Input (pins 3, 17, 18)

The Remote voltage setpoint input (pin 3) allows the high voltage output level of the generator to be programmed by an analogue voltage signal.

To use the remote voltage setpoint function, it must first be enabled by connecting pin 18 (external setpoint enable) to pin 17 (GND).

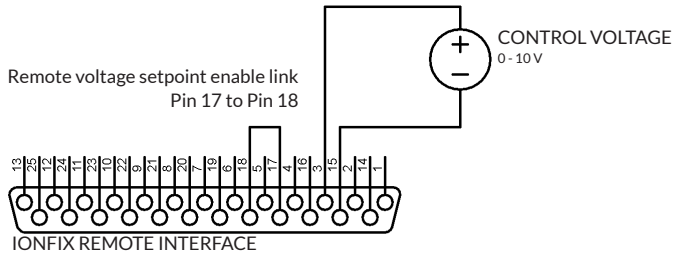
The Remote voltage setpoint input (pin 3) accepts a ground-referenced signal of 0 - 10 V, where 0 V represents 0 % and 10 V represents 100 % (i.e. 30 kV). The input impedance is 13 kΩ to GND.

The signal ground can be connected to any of the GND pins in the table - pin 15 or pin 16 are most convenient.

The input is protected against transient over-voltage but can be damaged by applying a low impedance voltage source exceeding 28 V.

The wiring example that follows shows the remote voltage setpoint function enabled and supplied by an external control voltage source (e.g. a PLC analogue output).

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com



AS VIEWED LOOKING AT REAR OF GENERATOR

If the front panel voltage setpoint adjustment buttons are pressed when the remote voltage setpoint function is enabled, an error message will be shown.

Remote Current Limit Input (pins 2, 11, 20)

The Remote current limit input (pin 2) allows the output current limit of the generator to be programmed by an analogue voltage signal.

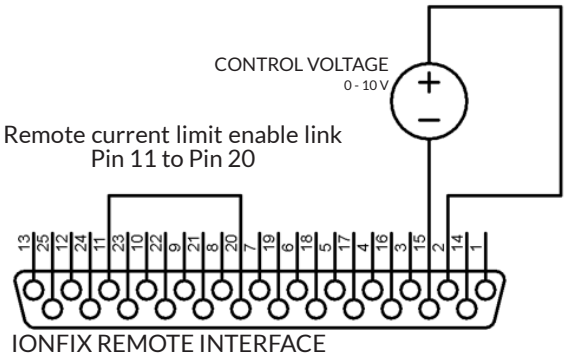
To use the remote current limit function, it must first be enabled by connecting pin 11 (Remote current limit enable) to pin 20 (GND).

The Remote current limit input (pin 2) accepts a ground-referenced signal of 0 - 10 V, where 0 V represents 0 % and 10 V represents 100 % (i.e. 1 mA). The input impedance is 13 kΩ to GND.

The signal ground can be connected to any of the GND pins in the table: pin 15 or pin 16 are most convenient.

The input is protected against transient over-voltage but can be damaged by applying a low impedance voltage source exceeding 28 V.

The wiring example below shows the remote voltage setpoint function enabled and supplied by an external control voltage source (e.g. a PLC analogue output).



AS VIEWED LOOKING AT REAR OF GENERATOR

If the front panel current limit adjustment buttons are pressed when the remote current limit function is enabled, an error message will be shown.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Remote Voltage Monitor Output (pin 4)

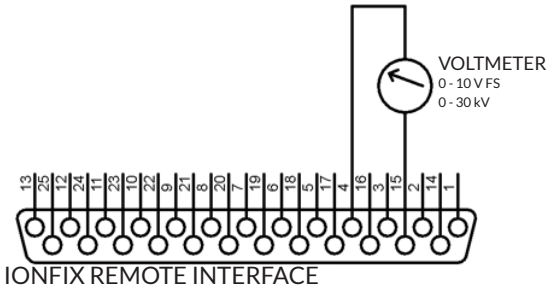
The remote voltage monitor output (pin 4) allows the present output voltage of the generator to be monitored remotely. This signal can be fed into a PLC system, or used to drive a panel meter (10 V full-scale sensitivity).

The voltage monitor output is always active, and always reports the actual measured output voltage of the generator. Note that if the current limit is active, the actual output voltage will be less than the demanded setpoint voltage (e.g. if the generator is heavily loaded).

The remote voltage monitor output provides a ground-referenced signal of 0 - 10 V, where 0 V represents 0 % and 10 V represents 100 % (i.e. 30 kV). Any of the GND pins can be used as a reference for this signal.

The voltage monitor output is protected against short circuit to GND, and applied voltages up to +28 V. The output impedance of the signal driver circuit is approximately 150 Ω.

The wiring example below shows a panel meter connected to the remote voltage monitor output.



IONFIX REMOTE INTERFACE

AS VIEWED LOOKING AT REAR OF GENERATOR

Remote Current Monitor Output (pin 5)

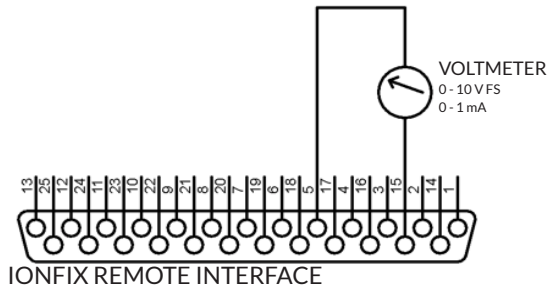
The remote current monitor output (pin 5) allows the present output current of the generator to be monitored remotely. This signal can be fed into a PLC system, or used to drive a panel meter (10 V full-scale sensitivity).

The current monitor output is always active, and always reports the actual measured output current of the generator. Note that if the current limit is not active, the actual output current will be lower than the demanded current limit (e.g. if the generator is lightly loaded).

The remote current monitor output provides a ground-referenced signal of 0 - 10 V, where 0 V represents 0 % and 10 V represents 100 % (i.e. 1 mA). Any of the GND pins can be used as a reference for this signal.

The current monitor output is protected against short circuit to GND, and to voltages up to +28 V. The output impedance of the signal driver circuit is approximately 150 Ω.

The wiring example below shows a panel meter connected to the remote current monitor output.



IONFIX REMOTE INTERFACE

AS VIEWED LOOKING AT REAR OF GENERATOR

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Overload Output (pins 9, 22)

The overload output is activated when any of the following conditions are present:

- Output current limit reached (e.g. due to material not being present between the charging and counter-electrodes).
- Load impedance less than 1.5 MΩ (overload condition including output short circuit).
- HV output arcing detected.

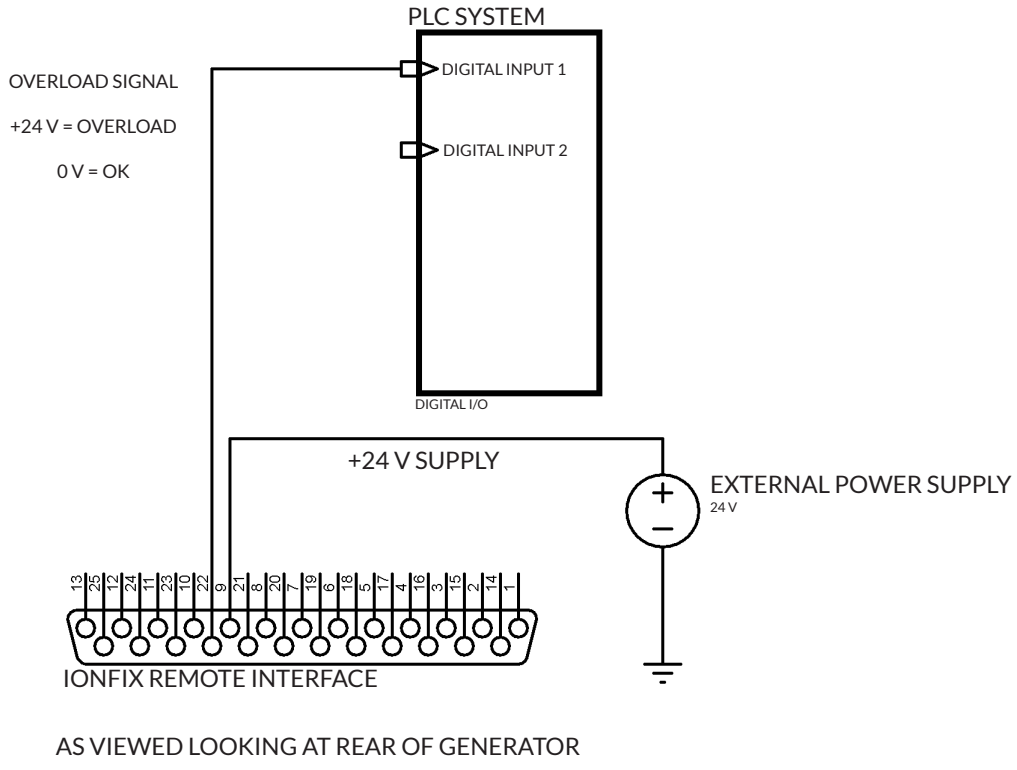
In the case of an overload or arc fault, the overload output will remain active while the generator HV output is disabled for a period of 4 seconds.

The overload output signals that a condition exists which is preventing the generator HV output level from reaching the demanded voltage setpoint.

This is an optically-isolated switching output, with the open collector on pin 9 and open emitter on pin 22.
This output can switch up to 30 V with a load current of 50 mA in order to drive a relay, indicator, PLC input, etc.

To provide a PLC-compatible signal, connect +24 V (supplied externally or from pin 6) to pin 9, and the PLC input to pin 22.

The wiring example below shows the overload output connected to a PLC system using an external power source to provide the 24 V signal level.



FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Operating Output (pins 10, 23)

The operating output is activated when all of the following conditions are satisfied:

- HV output enabled via either the front panel run/stop button or the remote on/off input.
- Voltage setpoint not set to zero.
- Current limit not set to zero.
- No fault conditions present (input under-voltage, arc fault, over temperature, etc).

The operating output therefore signals that the generator is producing a high voltage output and is not experiencing any fault conditions.

This is detailed in the truth table below:

Remote on/off input 0: low (ENABLE = 0) 1: high (ENABLE = 1)	Front panel run/stop button 0: not pressed/toggled 1: pressed/toggled	Voltage setpoint & current limit 0: either = 0 1: neither = 0	Fault (any) 0: not present 1: present	Operating signal
0	0	0	0	INACTIVE
0	0	0	1	INACTIVE
0	0	1	0	INACTIVE
0	0	1	1	INACTIVE
0	1	0	0	INACTIVE
0	1	0	1	INACTIVE
0	1	1	0	ACTIVE
0	1	1	1	INACTIVE
1	0	0	0	INACTIVE
1	0	0	1	INACTIVE
1	0	1	0	ACTIVE
1	0	1	1	INACTIVE
1	1	0	0	INACTIVE
1	1	0	1	INACTIVE
1	1	1	0	ACTIVE
1	1	1	1	INACTIVE

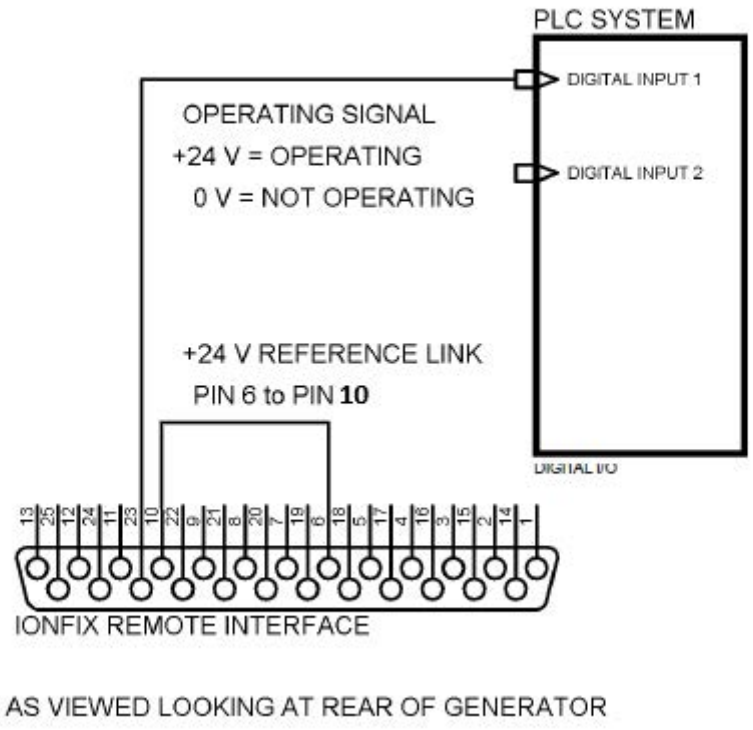
FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

8. REMOTE INTERFACE

This is an optically-isolated switching output, with the open collector on pin 10 and open emitter on pin 23.
This output can switch up to 30 V with a load current of 50 mA in order to drive a relay, indicator, PLC input etc.

To provide a PLC-compatible signal, connect +24 V (supplied externally or from pin 6) to pin 10, and the PLC input to pin 23.

The wiring example below shows the operating output connected to a PLC System, and uses an external 24 V DC source connected to pin 10.



AS VIEWED LOOKING AT REAR OF GENERATOR

+24 V Reference Output (pin 6)

A 24 V reference output is supplied on pin 6 of the remote interface. This can be used to provide a signal for the overload and operating outputs. The maximum current that can be drawn from this output is 20 mA. This output is protected against overload and short-circuit.

+12 V Reference Output (pin 7)

A 12 V reference output is supplied on pin 7 of the remote interface. This can be used to provide a signal for the remote on/off input. The maximum current that can be drawn from this output is 20 mA. This output is protected against overload and short-circuit.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

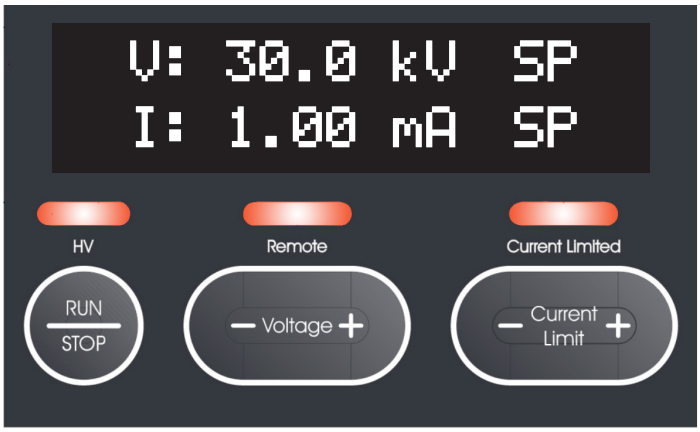
9. COMMISSIONING

Before turning the generator on for the first time, ensure that:

- The power input and case are correctly grounded as described in Section 6.
- The charging electrodes are correctly connected to the output sockets, with no loose connections or damaged cables.
- Any wiring connected to the remote interface is configured correctly. If the remote interface is configured to override the front panel controls, ensure that the charging electrodes becoming energised does not pose a safety risk.
- The generator is securely mounted.

GENERATOR FRONT PANEL CONTROLS AND DISPLAY

The diagram below shows the front panel controls and display of the generator. The function of the controls is described in brief below the diagram.



Display:	Indicates the settings and output parameters of the generator, and any warning messages.
LED Indicators (HV, Remote, Current Limited):	Show the operating status of the generator at a glance.
RUN/STOP Button:	Toggles the high voltage output of the generator on and off.
Voltage +/- Buttons:	Allow the high voltage output level of the generator to be adjusted.
Current Limit +/- Buttons:	Allow the output current limit level of the generator to be adjusted.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Turning On the Generator

To power up the generator, put the main power switch on the front panel into the 'ON' position.

The LCD backlight will illuminate and the following text will be displayed on the screen as the generator initialises and performs self-checks.

```
Fraser IONFIX C+
Startup = V: xxx
```

Note: 'V: xxx' is the software level of the generator.

The LCD will then switch to the normal operating display (positive generator shown):

```
V:   0.0 kV   SP
I:   1.00 mA  SP
```

If the generator remote interface functions are enabled, the 'Remote' LED indicator will illuminate. Note that in this case, the HV output of the generator can be enabled remotely at any time.

If the remote on/off function is not enabled, the generator HV output will always be OFF when the generator is powered up. If it is necessary for the generator to power up with the HV output enabled, use the remote on/off function to achieve this.

Setting the Output Voltage

When the HV output is not enabled, the generator voltage and current limit values are shown on the display, along with 'SP' to indicate that these are setpoint values.

When delivered, the generator output voltage is set to 0.0 kV. The setpoint value is stored in non-volatile memory and does not need to be re-set every time the generator is powered on.

To adjust the generator output voltage setpoint, use the 'Voltage +' and 'Voltage –' buttons. For example, if the voltage setpoint is increased to 12.5 kV, the following will be displayed:

```
V:   12.5 kV  SP
I:   1.00 mA  SP
```

Press the appropriate button once to increase or decrease the voltage in 0.1 kV steps.

Press and hold the appropriate button to make larger adjustments. The IML models restrict the output voltage to 20 kV.

On negative polarity generators, the 'Voltage +' button increases the magnitude of the voltage setpoint, making it more negative. This corresponds to a greater pinning effect at the generator electrode.

If the voltage setpoint is adjusted while the HV output is enabled, the setpoint value followed by 'SP' will be shown briefly on the display.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Setting the Current Limit

The output current of the generator is electronically limited to protect the generator and minimise electrode wear. The current limit level can be adjusted using the front-panel controls. By default, the generator current limit is set to its maximum value of 1 mA. The current limit value is stored in non-volatile memory and does not need to be re-set every time the generator is powered on.

When the current limit is active, the 'Current Limited' LED indicator will illuminate.

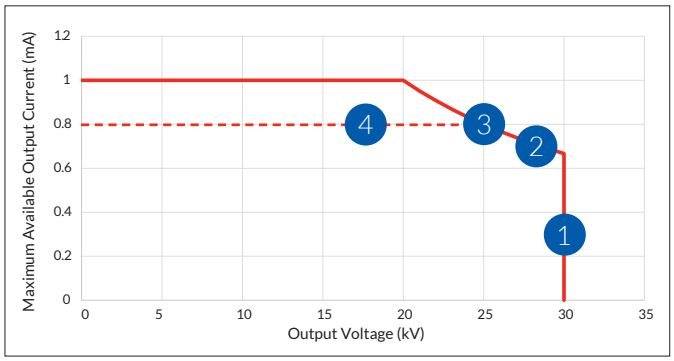
If the voltage setpoint is greater than 20 kV, the actual current limit will be reduced accordingly to maintain a maximum output power of 20 W. At 30 kV, a maximum of 0.66 mA is available. The IML models restrict the output voltage to 20 kV.

The current limit value can be set to 1 mA independently of voltage setpoint, however the full 1 mA is only available at 20 kV or less.

30 kV models only. Not IML models.

For example, if the voltage setpoint is 30 kV and the current limit is 0.8 mA, the following sequence describes the behaviour of the generator as the load is increased (the numbers refer to the diagram below):

1. Output voltage 30 kV, current increasing from 0 to 0.66 mA. Output power < 20 W.
2. Output voltage reducing from 30 kV, current increasing from 0.66 mA towards 0.8 mA. Output power = 20 W.
3. Output voltage 25 kV, output current 0.8 mA. Output power = 20 W.
4. Output voltage reducing below 25 kV, output current limited to 0.8 mA. Output power < 20 W.



With a voltage setpoint greater than 20 kV, the 'Current Limited' LED indicator will illuminate if the 20 W power limit is reached, even if the programmed current limit is not reached.

To adjust the current limit, use the 'Current –' and 'Current +' to change the setpoint value. For example, if the current limit is reduced to 0.5 mA, the following will be displayed:

```
V: 12.5 kV SP
I: 0.50 mA SP
```

If the current limit is adjusted while the HV output is enabled, the setpoint value followed by 'SP' will be shown briefly on the display.

FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Turning On/Off the High Voltage

To enable the high voltage output of the generator, press the 'RUN/STOP' button. The 'HV' indicator LED will illuminate to signal that the High Voltage output is active, and 'SP' will be replaced with 'OP' on the LCD.
This indicates that the displayed values are the present measured outputs.

```
V:   12.5 kV OP
I:   0.31 mA OP
```

If the remote on/off function is not enabled, the RUN/STOP button toggles the high voltage output on and off.

If the remote on/off function is enabled, but the HV output is not turned on via the remote interface, the RUN/STOP button can be used to temporarily override the remote on/off input for testing or commissioning purposes. If the HV output is already turned on via the remote interface, the RUN/STOP button will have no effect.

Operation with Remote Interface Active

This section describes the operation of the front panel display and controls when the remote interface is in use.
For details of the remote interface, see the 'Remote Interface' section.

'REMOTE' LED Indicator

If any of the remote control functions (remote on/off, remote voltage setpoint, remote current limit) are enabled via the remote interface connector, the 'REMOTE' LED indicator on the generator front panel will illuminate.

If the remote on/off function is enabled, the HV output of the generator could be enabled at any time via a remote signal.

Remote On/Off Input

If the remote on/off input is enabled, the 'REMOTE' LED indicator will illuminate as described above. When the HV output is enabled using the remote on/off input, the 'HV' indicator will illuminate.

Remote Voltage Setpoint

If the remote voltage setpoint function is enabled, an 'R' will be added to the 'SP' or 'OP' after the voltage readout on the generator display.

For example, with HV off and remote voltage setpoint enabled:

```
V:   17.2 kV RSP
I:   0.50 mA SP
```

With HV on and remote voltage setpoint enabled:

```
V:   17.2 kV ROP
I:   0.16 mA OP
```

If the front panel voltage adjustment buttons are pressed in this state, the following error message will be shown:

```
REMOTE VOLTAGE
SETPOINT ACTIVE!
```


FRASER Anti-Static Techniques
Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Remote Current Limit

If the remote current limit function is enabled, an 'R' will be added to the 'SP' or 'OP' after the current readout on the generator display.

For example, with HV off and remote current limit enabled:

```
V:  14.5 kV  SP
I:  0.32 mA  RSP
```

With HV on and remote current limit enabled:

```
V:  10.1 kV  OP
I:  0.32 mA  ROP
```

If the front panel current limit adjustment buttons are pressed in this state, the following error message will be shown:

```
REMOTE CURRENT
LIMIT ACTIVE!
```

If both the remote voltage setpoint and remote current limit are enabled, the following will be shown (HV off):

```
V:  17.2 kV  RSP
I:  0.32 mA  RSP
```

HV on:

```
V:  14.3 kV  ROP
I:  0.32 mA  ROP
```


FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

10. TROUBLESHOOTING

In case of problems with the generator, consult the following table to aid diagnosis and remedy.

Problem	Cause	Remedy
No output voltage Display off	Power supply not connected or energised.	Check power supply connections.
	AC variant: inlet fuse blown.	Replace fuse.
	Hardware fault.	Contact distributor.
No output voltage Display on	Voltage setpoint not changed from default 0.0 kV or remote setpoint not provided.	Change setpoint using Voltage +/- buttons or provide 0 - 10 V signal on remote interface.
	Remote on/off enabled, but no remote on/off signal provided.	Provide remote on/off signal.
	Current limit set too low.	Increase current limit using Current +/- buttons.
All LEDs flashing 'OVERLOAD' shown on display	Arcing or short-circuit on HV output due to electrode or cable fault.	Check and rectify electrode or cable faults.
	Generator overloaded.	Move charging electrode(s) further from counter-electrode.
All LEDs flashing 'OVER TEMP' shown on display	Generator internal temperature too high.	Move generator to cooler location. Reduce loading on generator.
All LEDs flashing 'UNDER VOLTAGE' shown on display	Supply voltage too low (< 21 V).	Check supply voltage.
All LEDs flashing 'OVER VOLTAGE' shown on display	Supply voltage too high (> 28 V).	Check supply voltage.
All LEDs flashing Any other message shown on display	Internal fault with generator.	Contact distributor.

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

Maintenance

- Keep the generator dry and free of dust, dirt, corrosive substances and solvents.
- Avoid touching the plastic barrel of the high voltage connectors when connecting or disconnecting charging electrodes.
- Regularly check the earthing of the generator to ensure continued safety and correct operation.
- Regularly inspect the high-voltage connectors and cables for mechanical or electrical damage.
- There are no parts requiring periodic maintenance within the generator.
- Do not use alcohol or solvent-based products to clean the high-voltage sockets on the generator.

Repairs

In the event of a fault with the generator which cannot be rectified by following the steps detailed in 'Troubleshooting', contact your Fraser Anti-Static Techniques distributor in the first instance.

The generator has been designed to allow the major internal components to be easily replaced. This must only be carried out by suitably qualified and trained persons, and using genuine replacement parts supplied by Fraser Anti-Static Techniques.

In some cases it may be necessary for the generator to be returned to Fraser Anti-Static Techniques for investigation and repair. Please ensure the generator is suitably packaged and clearly indicate the symptoms of the fault encountered, including any error messages displayed by the generator.

Disposal

Dispose of the generator in accordance with local environmental regulations pertaining to electrical waste.

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com

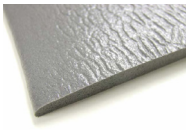
12. ACCESSORIES

Fraser Anti-Static Techniques manufactures a range of compatible charging electrodes to suit many temporary adhesion applications:

Item	Description	Part No.	Item	Description	Part No.
	Charging Bar	7081		Pinner	7095
	Spot Pinning Electrode	7090		Charging Bar	7130
	Edge Pinner	7093			

IML Accessories

Fraser IML Accessories have been developed to complement the IONFIX Compact and to give the IML processor the versatility to meet the demands of each job.

Item	Description	Part No.	Item	Description	Part No.
	Connector Box	7700		Single Point Electrode	771-R
	Single Pin Electrode	772		IML Ring Terminal	773
	Splitter Box	7701		Silicone Cable	81319
	Plated Emitter Pins	81036		Dissipative Foam	7400
	Static Wand	7097			

FRASER Anti-Static Techniques

Scotts Business Park, Bampton, Devon, EX16 9DN UK
T + 44 (0) 1398 331114 F + 44 (0) 1398 331411
E sales@fraser-antistatic.co.uk W www.fraser-antistatic.com