




4203UC ULTRA-COMPACT 24 V DC IONIZER

WITH INTEGRATED REMOTE MONITOR

Static Clean static control equipment has been designed to give you many years of productive service. However, the science of static control has unique rules which must be followed to allow the equipment to give a good return on your investment.

Please read the following operating and maintenance instructions carefully. 

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1. Introduction

The Static Clean 4203UC Ultra-Compact 24V DC Ionizer is part of a high-performance range of static eliminators from Static Clean. These products are used by leading manufacturers throughout the world to increase safety and productivity.

Before you install the Ionizer, please follow the installation instructions carefully for maximum benefit.

1.1. Features & Benefits

- The Static Clean 4203UC Ultra-Compact 24V DC Ionizer is designed to neutralize electrostatically charged surfaces and small products.
- The use of Pulsed DC high voltage provides excellent charge decay performance even at longer distances, and ion balance suitable for most industrial applications.
- Powered by 24 V DC, it features integrated high voltage supplies meaning that no high voltage cabling is required.
- The status of the 4203UC Ultra-Compact Ionizer, including need for cleaning, is indicated by a single LED. An 'ATTENTION' output signal and a 'STANDBY' input signal enable integration with control system/PLC.
- The 24 V DC power supply and remote signaling connections are made via an M8 4 pin connector. An external AC-DC PSU can be ordered if 24 V DC is not available.

- Mounting onto the machine is achieved with fixing holes integrated into the product body. Can be combined with air nozzles for cleaning functions.
- The 4203UC Ultra-Compact Ionizer is intended for use in indoor factory environments only. It is not suitable for outdoor use.

1.2. Explanation of Symbols

Warning!

This symbol appearing in the operating instructions refers to operations which, if carried out improperly, may result in serious personal injuries.



Caution!

This symbol appearing in the operating instructions refers to operations which, if carried out improperly may result in damage to property.



2. Checking On Delivered Equipment

Before starting the installation please check that the 4203UC Ultra-Compact Ionizer has not been damaged in transit. If the packaging material is damaged, please report this immediately to the vendor.

Check that the additional items are present with the Ionizer:



Power Supply Cable

If ordered, a 24 V power supply cable with an M8 x 4 pin connector will be supplied.

See Section 9 for details of cables and other accessories.



AC-DC Power Supply Unit

If ordered, a 24 V DC output, 100-250 V AC input PSU (Part No. 4203-31101) will be supplied. The 0 V output is earthed and a secondary safety earth connection is provided.

IMPORTANT: DO NOT USE standard 'computer style' PSUs without earthed outputs to avoid risk of operator shocks and damage to the PSU or Ionizer.



3. Safety

The Static Clean 4203UC Ultra-Compact 24V DC Ionizer has been designed in accordance with the safety requirements of EN 62368-1:2014. This IEC-derived standard is harmonized under the EU Low Voltage Directive.

Warnings:

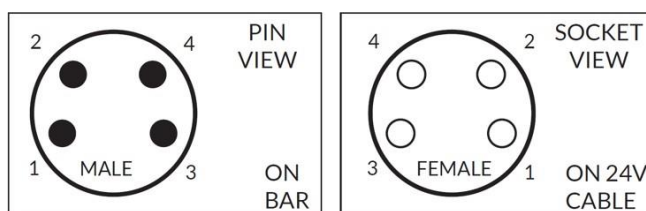
- The product should be cleaned regularly. The product **should not** be cleaned whilst powered.
- The emitter pins are a **Class 1** electrical energy source, as defined in EN 62368 1:2014. Direct contact with the emitter whilst the product is powered will not result in electrically-caused injury, but may cause a detectable sensation due to the small current which will flow.
- The emitter pins are necessarily sharp. The emitter pins are a **Class 2** mechanical energy source, as defined in EN 62368 1:2014. Contact with the emitters during cleaning may be painful, but will not cause an injury requiring emergency medical attention.
- Installation and maintenance must only be carried out by suitably qualified personnel.
- The negative pole of the 24 V DC supply provided to the product **must** be permanently earthed. A secondary earth connection be made to the optional air nozzle, if fitted.
- Adequate installation earth / ground is required to ensure safe and proper operation.
- Do not connect or disconnect the M8 cable from the Ionizer whilst it is powered.
- A small amount of ozone will be produced as part of the ionization process. When installed correctly the level of concentration of ozone is less than 0.1 ppm and is within internationally accepted limits.



4. Electrical Connections

4.1. M8 Pin Assignments

The M8 connector pin numbering scheme is shown below. Note that due to the STANDBY input, this numbering scheme differs from other Static Clean products, such as the 4203 & 4103 Bars.



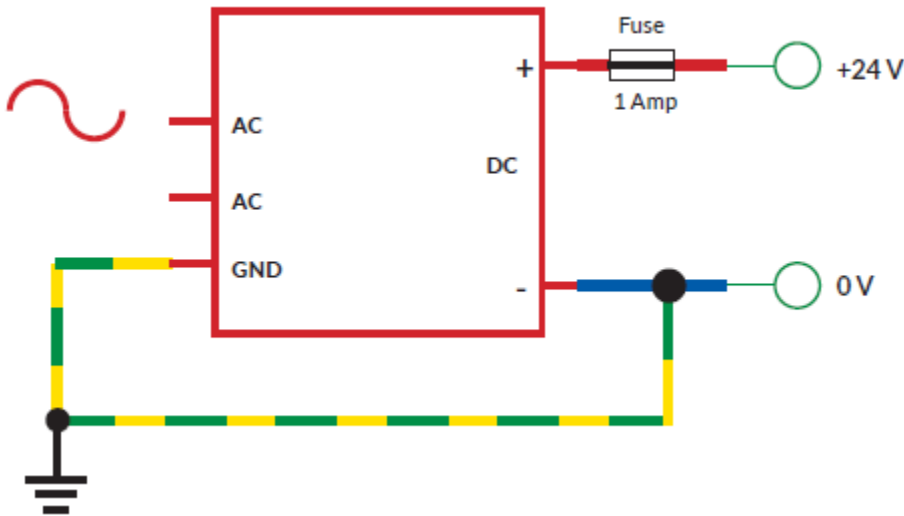
The pin assignment and typical wire colors are given in the table below. This refers to cables supplied by Static Clean. Other cables may have different color schemes.

Pin	Wire Color	Function	Details
1	Brown	+ 24 V	21 – 27 V operating range, 0.25 A maximum current.
2	White	STANDBY Input Signal	Applying a voltage of between +21V and +27V causes the product to enter STANDBY mode, in which the high voltage output is disabled and the LED flashes red. Either leave disconnected or connect to 0V if not required. 5 kΩ nominal input impedance.

3	Blue	0 V + GND	0 V must be connected to ground.
4	Black	ATTENTION Output Signal	+24 V nominal output voltage, 3 k Ω output impedance in active state. Low impedance connection to 0 V in inactive state.

4.2. Power Supply Connections

The diagram below shows the power supply connection requirements when using the 24 V DC power supply on the customer's machinery.



The 24 V supply connection (Pin 1, brown wire) **must be** fitted with a 1 A fuse. It is recommended that a type 'T' or 'G' fuse is installed.

The 0 V supply connection should be earthed. This connection should be made at the power supply output terminal if possible.

The earthing terminal on the product **must** be connected to installation protective earth (PE).

WARNING: If the product is not properly earthed, there is a risk of the operator receiving an electric shock from the product.



CAUTION: If the product is not earthed the residual ion balance of the product cannot be guaranteed.



5. Monitoring: LED and Remote

The LED on the Ionizer indicates its status as follows:

LED Indication	Ionizer Status	Ionization
Green	OK	Active
Green / Red Flashing	Cleaning / attention required	Active
Red	Overload, over temperature, hardware fault, supply voltage out of range	Inactive
Red Flashing	STANDBY mode	Inactive
Not Illuminated	Ionizer not powered	Inactive

The Ionizer is equipped with a remote monitoring interface which allows the operating status of the product to be fed into a PLC system or checked remotely.

Please see Appendix II for wiring instructions and examples for the remote monitoring interface.

Please read these instructions carefully before installing the ionizer, because the electrical specifications and signaling scheme of the remote monitoring interface differ from those of other Static Clean 24 V static eliminator products (4203 & 4103 series bars).



6. Commissioning and Operation

Before turning the Ionizer on for the first time, check:

- The positioning and mounting of the Ionizer. The emitters of the Ionizer should face the product to be neutralized, and the emitters should both be mounted a minimum of 25mm (ideally at least 50mm) from an earthed metal object. Sharp metal edges within 50mm of the emitters should be avoided.
- All metal objects, structures and surfaces in proximity to the product are earthed, such that the proximity of the high voltage emitters does not cause these objects to become electrically charged.
- The electrical installation of the ionizer has been completed in accordance with the wiring instructions in this document. In particular, ensure that the 0V supply return is connected to earth.
- If using the external AC-DC power adaptor, ensure that the supplementary grounding wire is connected to the installation protective earth.
- Any operators who will work in close proximity to the Ionizer are aware of its presence and familiar with its operation.

7. Maintenance

WARNING: Always disconnect power before working on the Ionizer.



Cleaning is the only maintenance required. Dirt around the emitters will reduce ionization effectiveness and result in unsatisfactory static neutralization performance.

The frequency of cleaning will depend on the process and the environment in which the lonizer is installed. The lonizer should be cleaned when an 'ATTENTION' state is indicated by the LED, or after approximately 1 month of continuous operation, whichever occurs first.

To ensure best performance, the lonizer should be visually inspected on a regular basis and cleaned whenever convenient.

A toothbrush or soft nailbrush can be used to clean the high voltage emitters. Do not use a wire brush as this may cause damage to the product.

Suitable cleaning materials are warm soapy water or isopropyl alcohol (IPA). The product must be dry before the power is switched back on.

8. Troubleshooting





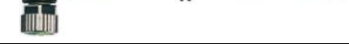



In the event of problems with the product, please use the following checks:



Symptom	Cause(s)	Solution(s)
No LED (Not Illuminated)	Product not powered	<ul style="list-style-type: none"> • Check power supply and connections • Check external fuse • Check supply cable for damage
Constant Red LED	Power supply voltage outside of specified range	<ul style="list-style-type: none"> • Check and adjust power supply voltage • Ensure appropriate power supply cable used • Ensure power supply not overloaded
	Internal fault	<ul style="list-style-type: none"> • Contact supplier
Flashing Red LED	Product in STANDBY mode	<ul style="list-style-type: none"> • Connect pin 2 of the M8 connector (usually white wire) to 0 V, or leave disconnected. Refer to installation instructions.
Flashing Red / Green LED	Emitters need cleaning	<ul style="list-style-type: none"> • Power off product, clean emitters

Poor Ionization / Neutralization Performance	Emitters need cleaning	<ul style="list-style-type: none"> Power off product, clean emitters
	Emitters worn	<ul style="list-style-type: none"> Check emitters for excessive wear
	Ionizer installed too far from material to be neutralized	<ul style="list-style-type: none"> Review installation, move ionizer closer to material if possible. Refer to installation instructions.
	Emitters too close to earthed metal surfaces	<ul style="list-style-type: none"> Review installation, move ionizer further away from earthed metal surfaces if possible. Refer to installation instructions.

9. Accessories

A range of accessories to assist with installation and maintenance of the Ionizer are available from Static Clean. Please contact your local distributor to enquire regarding pricing and delivery of these items.

Item Photo	Description	Part No.
	3 m cable M8 female, bare ends. Straight socket.	4203-80892
	5 m cable M8 female, bare ends. Straight socket.	4203-80930
	7.5 m cable M8 female, bare ends. Straight socket.	4203-80931
	10 m cable M8 female, bare ends. Straight socket.	4203-80932
	3 m cable M8 female, bare ends. 90° socket.	4203-80933
	5 m cable M8 female, bare ends. 90° socket.	4203-80934
	7.5 m cable M8 female, bare ends. 90° socket.	4203-80935
	10 m cable M8 female, bare ends. 90° socket.	4203-80936

	Universal AC/DC power supply: 100-250V AC, 24V DC output Fitted with 1.5m of cable.	4203-31101
	2 m M8 male to M8 female 4-pin extension cable for AC/DC power supply unit.	4203-80937

10. Appendix I: Technical Specification and Dimensions

Power Supply

Input Voltage:	24 V DC nominal, 21-28 V operating range 0 V earthed
Input Current:	0.25 A max
Maximum Input Power:	7 W
Input Connector:	M8, 4-pole, male

Output

Ionization Method:	Pulsed DC
Output Voltage:	+/- 7 kV nominal
Output Frequency:	10 Hz as standard Other frequency on request from 1-50 Hz
Emitter Material:	Tungsten
Emitter Touch Current:	<100 µA (EN 62368-1:2014 ES1 source)

Monitoring

LED Status Indication:	Flashing Green: OK, Ionizer operating normally Flashing Red / Green: Ionizer requires cleaning Constant Red: Supply voltage out of range or internal fault Flashing Red: Ionizer in STANDBY mode
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Remote Monitor Output

Signaling Output:	'ATTENTION' output signal on pin 4 (black wire)
Output Signaling Levels:	24 V output, 3 kΩ output impedance
Output Current:	Sourcing (+24 V): 8 mA Sinking (0 V): 20 mA Limited to 50 mA max (output low) by internal protection
PLC Compatibility:	Compatible with IEC 61131-2 'Type 3' PLC inputs
Remote Monitor States:	+24 V: Ionizer OK 0 V: Ionizer requires cleaning, Ionizer fault, Ionizer in STANDBY mode

Remote Input

Signaling Input:	'STANDBY' input signal on pin 2 (white wire)
Input Signaling Levels:	0 V / 24 V nominal signal level (28 V max) <1 V or disconnected: Ionizer operates normally >21 V: Ionizer in STANDBY mode
Input Signaling Delay:	<1 s
Input Impedance:	5 k Ω nominal input impedance

Protection

Internal Protection:	Under-/over-voltage indication, surge protection, reverse supply polarity protection HV supplies protected against internal overload and short-circuit Signaling output protected against short-circuit
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Environmental Conditions

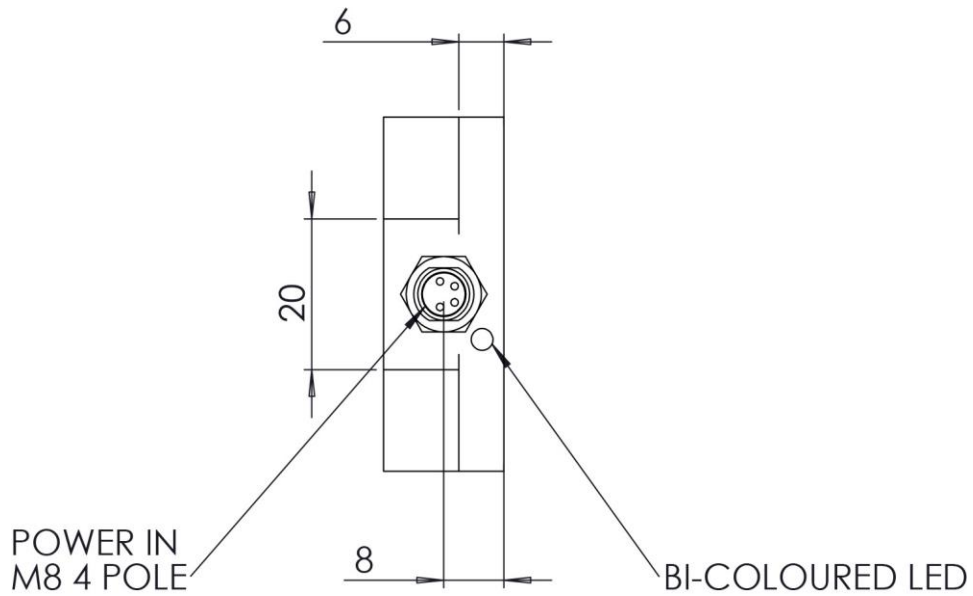
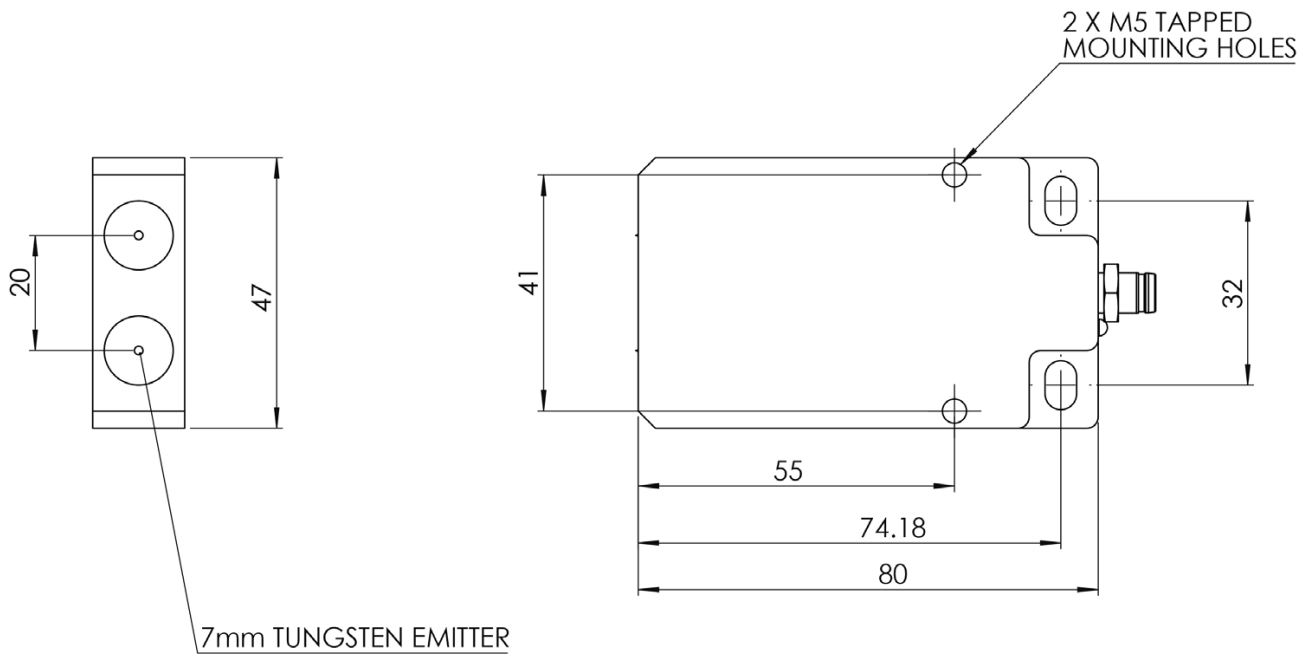
Ambient Temperature:	0 – 55 °C
Relative Humidity	Maximum 70%, non-condensing
Ingress Protection:	IP67
Vibration:	Installation location must be vibration-free

Mechanical

Dimensions:	80mm x 47mm x 16mm (excluding connector)
Mass:	100g
Materials:	PVC body, epoxy resin encapsulant, tungsten emitter

CE Marking

EU LVD (2014/35/EU):	EN 62368-1:2014
EU EMCD (2014/30/EU):	EN 61000-6-3:2007, EN 61000-6-2:2005



11. Appendix II: Remote Interface and Wiring Examples

This section describes the functioning of the remote monitoring interface in more detail and provides wiring examples for common installation types.

11.1. Remote Output Signaling Scheme

The remote monitoring interface has one output signal, **ATTENTION**. The signaling scheme is

described in the following table:

Condition	Ionization	Attention (Black, Pin 4)
Ionizer powered, all OK	ACTIVE (HV ON)	ACTIVE (24 V)
Ionizer powered, requires attention (e.g. cleaning)	ACTIVE (HV ON)	INACTIVE (0 V) Will sink current
Overload, hardware fault, supply voltage out of range	INACTIVE (HV OFF)	INACTIVE (0 V) Will sink current
Ionizer in STANDBY	INACTIVE (HV OFF)	INACTIVE (0 V) Will sink current
Ionizer not powered	INACTIVE (HV OFF)	INACTIVE (0 V) Will not sink current

IMPORTANT: Because the output is implemented using an electronic switch rather than a relay, when the ionizer is not powered, the output will not sink current.

11.2. Remote Output Electrical Specifications

The **ATTENTION** signal is designed to allow direct connection to PLC digital inputs conforming with IEC 61131-2 'Type 3' characteristics. The detailed specification of the remote signaling output is given in the table below.

Characteristic	Specification	Notes
High-level output voltage, open-circuit	$V_{IN} - 0.5 \text{ V}$	V_{IN} is nominally 24 V. High-level output voltage depends on power supply voltage.
Output impedance, high-level	3 k Ω	Internal pull-up to V_{IN}
Maximum output current, high-level, $V_{IN} = 24 \text{ V}$ (sourcing)	8 mA	Output shorted to 0 V
Low-level output voltage, open-circuit	0 V	Connected internally to 0 V by low-impedance switching device
Output impedance, low-level	<50 Ω	
Maximum output current, low-level (sinking)	20 mA	Protected by internal self-resetting fuse
Maximum externally applied voltage	28 V	Signal output is also protected against transient over-voltage

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11.3. Remote Input Signaling Scheme

The remote interface has one input signal, STANDBY. The signaling scheme is described in the following table:

Standby (White, Pin 2)	Ionization	LED
Low (<0.5V)	ACTIVE (HV ON)	Flashing Green
	ACTIVE (HV ON)	Green / Red Flashing
	INACTIVE (HV OFF)	Constant Red
High (+21V to +27V)	INACTIVE (HV OFF)	Flashing Red

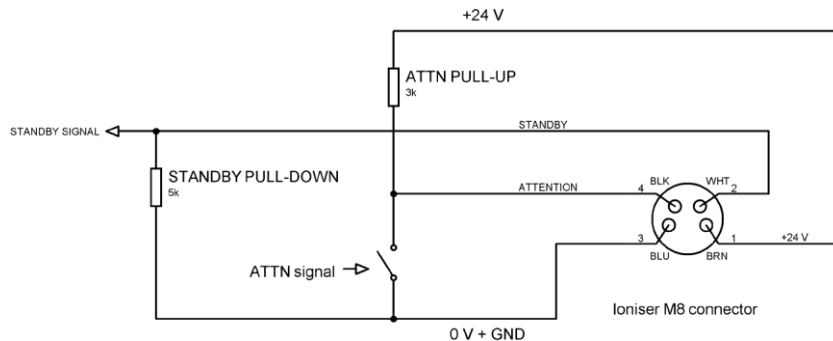
11.4. Remote Input Electrical Specifications

The **STANDBY** input signal is designed to allow direct connection to a PLC digital output, a switch or a relay contact. The detailed specification of the remote signaling input is given in the table below:

Characteristic	Specification	Notes
Nominal drive voltage	0 V / 24 V	Digital input with 24 V logic-level
High-level threshold voltage	8 V typical 20 V maximum	A high-level drive voltage of at least 21 V is recommended
Low-level threshold voltage	6 V typical 1 V maximum	A low-level drive voltage of less than 0.5 V is recommended
Input impedance	5 kΩ +/- 10%	Internal pull-down to 0 V
Maximum input current, input connected to +28 V	6 mA	Limited by internal resistor
Maximum externally applied voltage	28 V	Input is protected against transient over-voltage. However, prolonged exposure to voltages higher than 28 V may permanently damage the product.
Minimum externally applied voltage	-1 V	Drive voltages below 0 V are not recommended. Prolonged exposure to voltages lower than -1 V may permanently damage the product.

11.5. Remote Interface Schematic

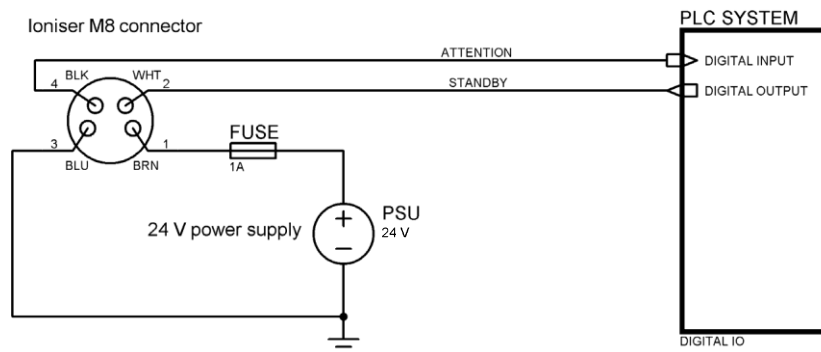
The simplified schematic diagram below shows the implementation of the remote signaling input and output on the Ionizer. This is a simplified model of the electronic interface within the Ionizer.



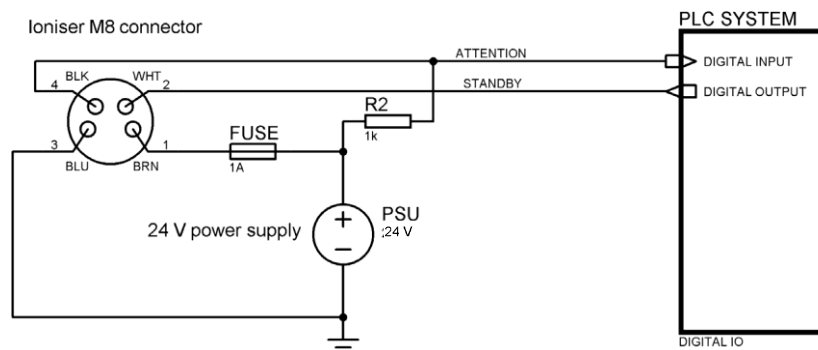
The switch in the diagram above is shown in the position corresponding to 'Ionizer powered, all OK'.

11.6. Interfacing with PLC Systems

To interface the Ionizer with a PLC digital input conforming with IEC 61131-2 'Type 3' characteristics, simply connect the 'ATTENTION' output from the Ionizer to the PLC digital input module as shown below. The 'STANDBY' line may be driven directly from a 24 V digital output.



To interface the Ionizer with a PLC system having IEC 61131-2 'Type 1' or 'Type 2' input characteristics, fit an external 1 kΩ pull-up resistor to supply the current required by these input types, as shown below. The resistor should have a power rating of at least 1 W.



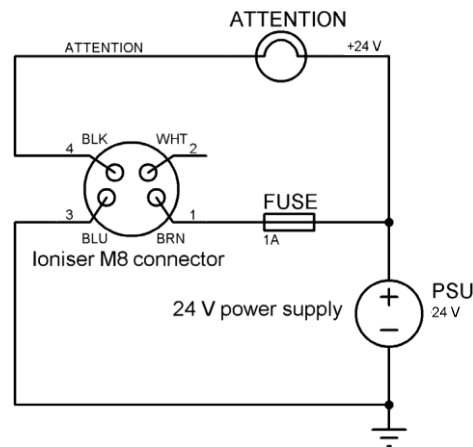
11.7. Powering the Ionizer directly from a PLC digital output

A typical 24 V, 0.5 A PLC output is capable of supplying the average current required by the Ionizer, and can be used to power the Ionizer directly.

It is possible that over-current trips may be experienced on PLC outputs due to the pulsing of the HV supplies in the Ionizer. This will depend on the characteristics of the PLC output module. In this case, use the PLC output to control a relay which switches the main 24 V supply to the Ionizer.

11.8. Connecting an external indicator to the ATTENTION output

Typical 24 V LED-based industrial indicators with rated current of 20 mA or less can be driven by the remote signaling output. The recommended wiring scheme for an external indicator is shown below. The indicator will illuminate when the Ionizer signals an 'ATTENTION' state.



IMPORTANT: Connecting indicators with higher current requirements to the Ionizer will not damage it, but it is unlikely that satisfactory brightness will be obtained.



11.9. Connecting an external relay to the ATTENTION output

To provide potential-free contacts or switch a higher voltage or current level, a relay can be installed between the Ionizer and external control circuit.

External relays must be connected with the Ionizer output **sinking** current to energize the relay coil.

PLC interfacing relays with high-sensitivity 24 V DC coils should be used to interface with the Ionizer. Some examples are:

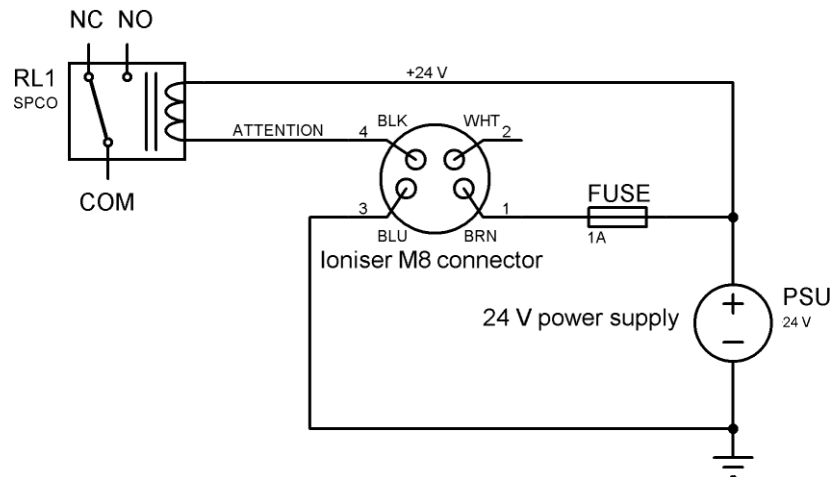
- Phoenix Contact PLC-RSC series
- Finder 38 series
- Wieland FLARE-24DC series
- Omron G2RV series

IMPORTANT: Relay coil drive current at 24 V should not exceed 20 mA.

IMPORTANT: The external relay should be fitted with a coil suppressor.

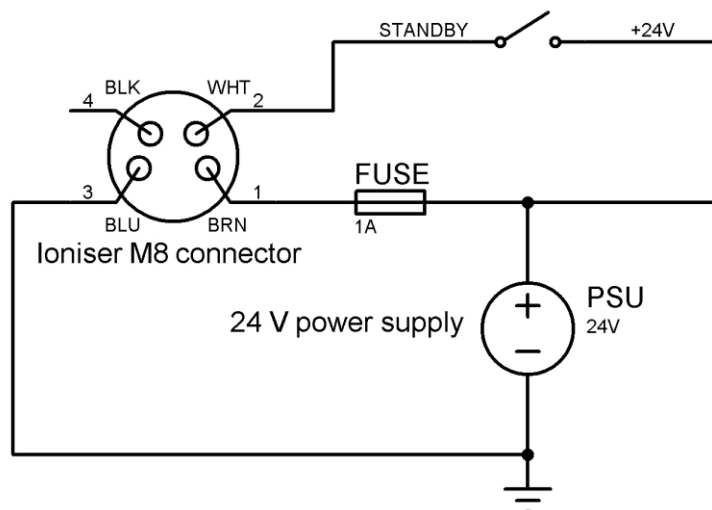


The recommended wiring scheme for an external relay (using an SPCO relay) is shown below.



11.10 Controlling the standby line from a switch or relay contact

The recommended wiring scheme for controlling the Ionizer from an external switch or relay contact is shown below. When the switch or relay contact is closed, the Ionizer is in STANDBY mode. When the switch is open, the Ionizer is active.



For more information and to view our full range of products,
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