



Fronius



VIZOR  
CONNECT

Full protection  
to unleash your  
welding potential

# Health & Safety

Occupational  
health and safety

- greater safety
- greater comfort
- better welding results

# Welding



## and health

Welding is one of mankind's  
oldest and most traditional  
joining processes

and it is hard to think of life without it, particularly in industry and trade. The aim is to find ideal solutions for a wide range of materials. In order to do so, however, important factors like metallurgy, physics, and electrical engineering must be taken into account.

It is precisely this interaction that makes welding such an exciting yet challenging trade. Because alongside all the possibilities, there are also health risks, against which we want to protect all welders adequately and sustainably.





The protective measures to be taken depend on the welding process, the parent material, and the filler metal.

Protection against welding fumes, UV exposure, heat, and electricity is, of course, paramount. The aim is not only to prevent typical welder illnesses, such as headaches, “flash” (burn to the eyes), and metal fume fever, but also to prevent much more serious conditions—such as lung, respiratory tract, and neurological diseases. As a pioneer in the field of welder protection, our products make an essential contribution towards protecting the health and ensuring the comfort of all welding specialists.

## Important protection areas

### **Protection against welding fumes**

A major goal is to protect against serious welding fumes and prevent respiratory diseases. In 2017, the WHO’s International Agency for Research into Cancer (IARC) classified welding fumes as “carcinogenic for people”

### **UV and glare protection**

Protects eyes and skin against carcinogenic radiation and dangerous injuries

### **Flame and heat protection**

Reduces health risks due to heat, sparks, or welding spatter

### **Ergonomics**

Designed for low fatigue welding that is gentle on the joints over long periods of time.



# Welding processes

All types of manual arc welding result in varying degrees of exposure to welding fumes, spatter, or UV radiation, so it is particularly important to choose the right protective equipment.

Modified process variants, such as PMC (Pulse Multi Control), LSC (Low Spatter Control), and CMT (Cold Metal Transfer), offer significantly lower spatter and welding fume formation. Lower spatter reduces the need for additional grinding work that can release additional fine dust particles.

The lowest health risks for welders come from automated welding processes, which are implemented in correspondingly equipped welding cells such as Cobot.



## CMT welding

A very low heat input and an extremely stable arc—with these characteristics, the Fronius CMT (Cold Metal Transfer) welding process is impressive compared to conventional MIG/MAG welding. Short circuit and droplet detachment are accurately controlled and the current is kept low. The result: Low-spatter material transfer and, consequently, very low welding fume development.

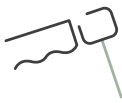
## Stresses and hazards



### **High welding fume formation and spattering**

#### MIG/MAG welding

The varied application areas and different process variants of MIG/MAG welding increase the danger of welding fumes, UV radiation, welding spatter, etc. As MIG/MAG is one of the most common welding processes worldwide, particularly effective protection measures must be used to protect the welder.

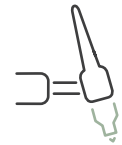


### **High welding fume formation and spattering**

#### Stick welding

Electrical current and heat, UV radiation, and, above all, increased welding fume formation are everyday risks during manual arc welding.

The type of hazardous materials in the welding fumes is crucially dependent on the material of the electrode and its coating.



### **Low welding fume formation, absolutely spatter-free**

#### TIG welding

A relatively small amount of visible welding fumes is produced from TIG welding. This low fume formation, in conjunction with the often highly reflective surfaces of the parent material—usually stainless steel or aluminum—results in an increased spread of the UV rays. The result is increased ozone formation, often at some distance from the welding point.



### **Low welding fume and UV exposure**

#### Cobot welding cell

The Cobot welding cell is a simple way to get started with automated MIG/MAG welding. The welding process is completely automated and performed without any welding personnel. The protective enclosure with automatic glare protection and integrated extraction provides optimal protection against UV radiation, welding spatter, and welding fumes for people standing near the welding cell.



#### **Welducation simulator**

Saves resources and protects the health of training personnel and apprentices. Virtual MIG/MAG, TIG, and stick welding can be an important part of the welding apprenticeship



# Protection against welding fumes



## Why is this so important?

All welding processes produce fumes, gases, and vapors that affect the welders. How harmful the released welding fumes are depends on the combination of welding process, parent material, and filler metals, as well as the protective gas shield.

The filler metals used produce the majority of the welding fume particles. Without adequate protection, welding fumes can cause headaches and nausea, chronic respiratory and lung diseases as well as damage to the nervous system or cancer.



## Components

### of the welding fumes\*

Welding fumes consist of particulate and gaseous materials. Depending on the material to be processed, these can have different impacts on the human body.

#### **Damaging substances for respiratory tract and lungs**

iron oxide, aluminum oxide, magnesium oxide, titanium dioxide

#### **Toxic or irritative substances**

fluorides, manganese oxides, zinc oxide, carbon monoxide, nitrogen oxides, copper oxide, lead oxide, ozone

#### **Carcinogenic substances**

chrome(VI) compounds, beryllium oxide as well as nickel oxides, ozone

\* Source: German Federal Institute for Occupational Health and Safety (Bundesanstalt für Arbeitsschutz und Arbeitsmedizin [BAuA])  
– German Technical Regulations for Hazardous Substances (TRGS 528)

# Demonstrably safer

The Welding and Joining Institute of the RWTH Aachen University (ISF) has tested our protection measures and rated their effectiveness with regard to welding fume emission and exposure\*:

\* Results of the welding fume study at:  
[www.fronius.com/welding-fume-study](http://www.fronius.com/welding-fume-study)





## Combination of all measures

**Summary of the study:** Each individual protection measure results in a significant reduction in welding fume emissions and exposure. The most effective solution proved to be the combined use of all of the following protection measures. In this case, only very low welding fume exposure was detectable, in part only just at the level of the detection limit.



### Welding helmet with powered air-purifying respirator

A breathing apparatus is deemed particularly important, when it comes to personal protective equipment. So-called PAPR systems (powered air-purifying respirator) provide maximum protection against welding fumes. Regardless of the power range, exposure values in the test always remained at the same low level. The only negative: The PAPR system only protects the person wearing it and not the other people in the hall.



### Low vacuum extraction

In the comparison test, the low vacuum extraction system with flexibly adjustable extraction arm and extraction hood ensured a significant reduction in welding fumes. However, the extraction arm must always be in the correct position. In contrast to the PAPR system, all welding personnel are protected.



### High vacuum extraction

Combining the fume extraction torch with the high vacuum extraction was particularly effective when using lower welding power and emissions. In these cases, the fumes spread directly around the welding point and can be extracted perfectly with the fume extraction torch.

Additional hall ventilation is recommended even when all protection measures are combined. This keeps the ambient air clean during production and is especially necessary, when extraction at the source is no longer sufficient.

# Clean air



## Greater welding comfort, breath by breath

Modern welding helmets with powered air-purifying respirators (PAPR systems) provide maximum personal protection against welding fumes and must also meet the increasingly strict national requirements and regulations.

Another bonus is that PAPR systems produce a pleasant cooling effect, which significantly increases working comfort for the welding specialist.



\* For further information on VizorConnect, visit:  
[www.fronius.com/vizor-air-3x](http://www.fronius.com/vizor-air-3x)





### Optional ergo-belt

Provides fatigue-free work, even during long periods of use with the respiratory protection system.



### Respiratory protection system

Vizion Air/3X

Filters up to **99.8%** of welding fume particles



out of the ambient air!

Filtered air and a clear view—with our Vizion Air/3X PAPER system, consisting of a powered air-purifying respirator, interconnecting hose and carry strap. Combined with one of our matching welding helmets (e.g. Vizion Air/3X Connect), this system filters up to 99.8% of welding fume particles via a TH3P-R-SL particle filter (maximum classification).

It then routes the cleaned air through the interconnecting hose and directly back into the inside of the welding helmet.



# Mobile extraction

## Properties of Exento HighVac

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### Suitable for:

- Welding torch extraction
  - Continuous use
  - Changing workplaces  
(compact, mobile)
- 

### Benefits

- High extraction capacity thanks to side channel blowers
- Compact design
- For use with a wide variety of fume extraction torches: infinitely variable pre-selection of the extraction capacity
- Intuitive, single-button operation, even while wearing gloves
- Automatic air volume flow control



Always there  
where it's  
needed

Mobile extraction devices, combined with extraction arms or fume extraction torches, are used to extract welding fumes and—depending on the model—are suitable for temporary and permanent jobs.

Their high mobility and the 360-degree usage radius make them particularly flexible and the ideal partner for changing workplaces.

Welding fume exposure for all of the welding personnel is therefore significantly lower.



## Properties of Exento LowVac

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### Suitable for:

- Stick, MIG/MAG, and TIG welding
  - Regular jobs
  - Changing workplaces (mobility)
- 

### Benefits

- Less need to reposition the extraction arm thanks to flow-optimized design of the extraction hood
- Increased safety due to filter monitoring and contamination-free filter replacement
- High cost-effectiveness due to large capacity and long service life of the filter

For further information, visit:  
[www.fronius.com/welding-fume-extraction](http://www.fronius.com/welding-fume-extraction)

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# Fume extraction torch and extraction set



## Precision extraction directly where welding fumes are produced

Fume extraction torches and extraction sets eliminate welding fumes where they are produced. Welding fumes are detected before they are able to spread, which not only protects the welder, but also everyone in the vicinity.

During the development of fume extraction torches, particular attention should be given to the ergonomics. After all, the different size compared to conventional welding torches must not be detrimental to the health, safety, or performance of the welder.







## Exento

### extraction set, retrofit set

- Suitable for all TPS/i Standard, Multilock, PullMig, and PullMig CMT with 45° torch body angle
- For improved accessibility of the workpiece:  
The extraction hose can be rotated around 360°
- Adjustable extraction nozzle
- Gas shroud protected thanks to specially-designed shape of the extraction nozzle



## Exento

### extraction set, robotics, retrofit set

- Suitable for 9 different TPS/i robot torch bodies with 0°, 22°, 36°, 45° angles in all lengths
- 360° adjustable extraction hose
- Gas shroud protected thanks to specially designed shape of the extraction nozzle
- Cleaning via Robacta Reamer
- 3D data is available for simulations





## Exento fume extraction torch

- 5 different power categories:  
3x air-cooled and 2x water-cooled
- Extraction capacity can be controlled directly on the handle
- 4 different user interfaces available:  
Up/Down, JobMaster, top torch trigger
- LED light for quality control and welding in dark environments
- 1.3 m long leather protection tube directly on the handle for perfect protection against high temperatures and welding spatter
- Quick test of the extraction capacity directly at the extraction nozzle

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Exento extraction welding torches are the perfect addition to Exento HighVac systems and ensure efficient and precision extraction.

They meet the requirements of standard EN ISO 21904-1 Health and safety in welding and allied processes.

For further information, visit:  
[www.fronius.com/welding-fume-extraction](http://www.fronius.com/welding-fume-extraction)

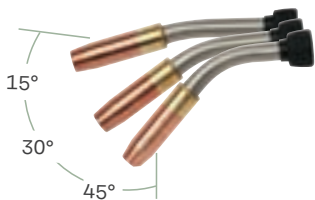




# Ergo nom

## Uncompromising flexibility:

Cables up to 15 meters long, balanced welding torches, and torch bodies of different lengths and angles make life easier for every welder. Remote controls in the torch handle are also available.



### Multilock

The torch body can be turned through 360° to permit the greatest possible welding flexibility on components with challenging geometries.



### Remote control on the welding torch

Important welding parameters are always at the welder's fingertips and can be adjusted via the integrated remote control in the handle.



### Small handle

Depending on the application, the welder can choose between a standard handle or a smaller handle.

# ics

## Greater welding comfort for greater welding quality

Ergonomics during welding cannot be taken for granted. It supports and protects the welder during their work.

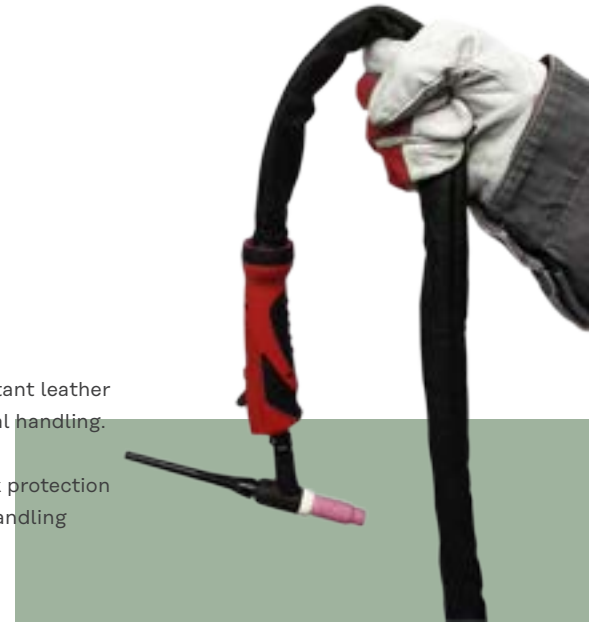
That is why, to promote a healthy musculoskeletal system, we need solutions that offer necessary occupational safety and required working comfort at the same time. Light-weight welding systems and cables, ergonomic and non-slip welding torch handles, ergonomic and non-slip welding torch handles, fast retooling options, and flexible operating units make daily work significantly easier.



### Flexible cables

Ergonomic and wear-resistant leather protection tube for optimal handling.

Rotatable rubber anti-kink protection with ball joint for better handling



### Pistol grip

The pistol grip enables comfortable work that is gentle on the wrist and can be retrofitted as an option.



### Top torch trigger

The welding process can be conveniently started and stopped from above.



### Integrated LED light

The LED light in the handle means optimal welding is possible even in dark environments.

## Perfect protection for eyes, face, and head

The eyes, face, and head are exposed to harmful UV and IR radiation during the welding process.

A modern, automated welding helmet protects the welder against these and other potential health hazards, such as welding spatter and slag particles.

Automated welding helmets detect the arc automatically and darken quickly and independently.

Only Bluetooth®-enabled welding helmets are faster and safer. These are darkened by the welding system even before the arc is ignited, and therefore combine maximum safety with the best working comfort.

# UV p



### Vizor Connect

Thanks to Bluetooth® technology, the welding helmet is darkened even before the arc is ignited. Panorama view, autopilot, brightness level 2.5, shade level range 5–12, and much more.



### Vizor 4000 Professional

Top marks with regard to EN379 classification 1/1/1/1, broad range of uses, perfect visibility, and option to choose between autopilot and manual levels of protection, brightness level 4, shade level range 5–13



VIZOR  Bluetooth  
CONNECT

For further information, visit:  
[www.fronius.com/vizor-connect](http://www.fronius.com/vizor-connect)



# and glare rotection



### Vizor 4000 Plus

True color display, adjustable angle thanks to sensor slider, grinding mode, brightness level 2.5, shade level range 8–12



### Fazor 1000 Plus

Robust quality with outstanding price/performance ratio, brightness level 4, shade level range 9–13

# Flame and heat protection



## Heat shield

Rotatable heat shield to protect against radiant heat and welding spatter



## Button extension

For a more flexible grip and a further distance from the arc



High temperatures, an intensive arc,  
and hot workpieces instantly leave  
welders cold.

Heat-resistant and flame-retardant clothing is essential to protect welders against high temperatures and welding spatter.

It is essential that protective clothing retains its properties in tough, everyday welding environments and is protective at all times.

**High-quality protective equipment is characterized by:**

- Standards-compliant, heat-tested materials
- UV-resistant protection of eyes and body
- Spatter guard at all exposed points
- Functionality and maximum wearer comfort

In addition to clothing, plug-in heat shields and button extensions for the welding torch ensure even better heat protection during all welding tasks.

For further information, visit:

[www.fronius.com/pw/ppe](http://www.fronius.com/pw/ppe)



**Welder gloves**

Protection with durable cow split leather and heat-resistance Kevlar stitching



**Safety shoes**

For optimal protection against heat, welding spatter, and other hazards during daily use



# Responsibility for people and the environment



## Maximum protection

Perfect welding results must never be at the cost of health and safety. This is why our products protect people against typical welding hazards such as fumes, heat, UV radiation, and overload, and therefore prevent serious illnesses.



## Ergonomics and operation

We make welders' everyday work easier with our:

- compact, light-weight welding systems;
- ergonomic, user-friendly welding torches;
- modern, intuitive operating concepts;
- and innovative technologies.



## Environment and resources

When designing our welding systems, welding torches, and protective equipment, we work to develop durable, sustainable, and efficient products. With serviceable welding systems, torch bodies, extraction systems, and helmets, we help protect people and the environment, and ensure a worthwhile future for the generations to come.

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