

# 3M™ Versaflo™ TR-300 Powered Air Respirator

Powered Air Respiratory Protection system



## Comfort

It is critical that your Personal Protection Equipment (PPE) must not interfere with your task. The new TR-300 Powered Air Respirator is significantly smaller than other similar products on the market. It sits closely against the user's back and is profiled to be comfortable for users worldwide. The low-profile product envelope coupled with the new self-adjusting breathing tube allows users to work in tight spaces with less chance of snagging their equipment on nearby objects.

This is complimented by the low weight of the product. Furthermore the centre of mass is positioned close to the body to minimise the torsional loading which can make this type of equipment feel heavy.

## Performance

Despite its compact dimensions, the TR-300 delivers air flow to support the highest respiratory protection category for this type of system, when used with suitable headgear.

The TR-300 utilises the latest Li-ion rechargeable battery technology to provide the maximum run time for minimum battery pack weight and bulk.

The filter, motor, fan and air paths are all optimised to provide maximum efficiency.

The TR-300 performance is managed by sophisticated flow control algorithms, eliminating user calibration and providing power management. These optimise air flow performance and battery pack life duration, allowing users to work safely for longer in more comfort.

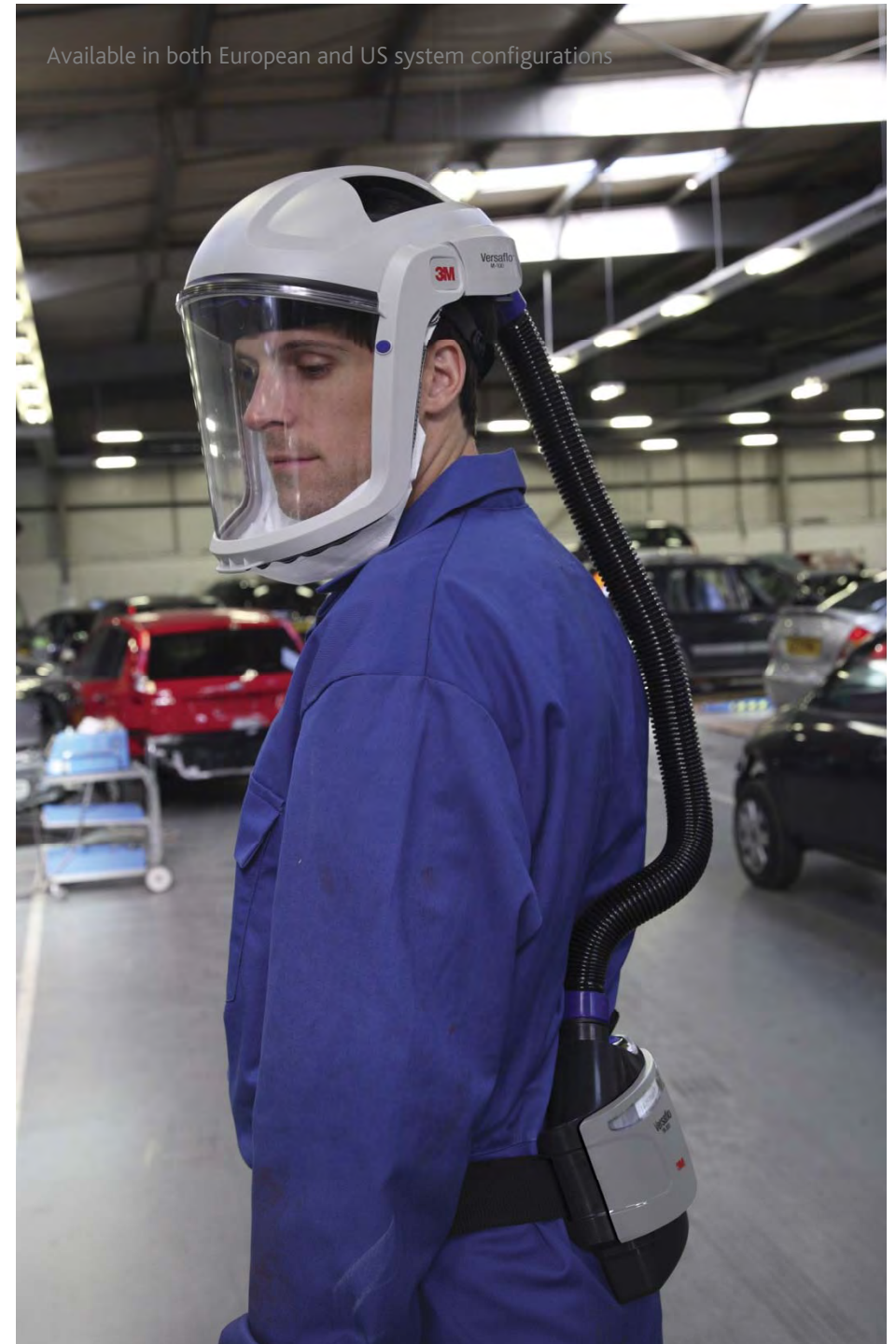


## Innovation

To achieve the TR-300's combination of low profile and high performance, a wide range of new technologies and novel design solutions were required. Key innovations for the TR-300 included:

- Curved filter beds to optimise the product's spatial envelope.
- Contoured product layout to conform to the back profile, and place the centre of mass close to the user's body.
- Innovative metal filter clip mechanism to provide a low profile positive clipping mechanism with proven durability.
- Custom designed low profile, high efficiency brushless DC motor that drives the TR-300 impeller.
- Innovative self-adjusting breathing tube helps reduce the risk of snagging in the working environment (3M IPC has patent applications pending, including EP1871488 – Supplied air Respirator that has an adjustable length hose. )
- Careful management of the air flow path and plenum gaps through the product to maintain flow performance and efficiency.
- Low profile connection to the belt, keeping the TR-300 close to the user's body.
- Intelligent, compact and powerful removable Li-ion battery packs, with an integrated fuel gauge relaying charge status to the user.
- Supported by sophisticated electronics that keep the factory-calibrated airflow at a nominal 190 l/min, eliminating the need for regular calibration by the user. Even as the battery discharges, or the filter becomes loaded with particles, the unit continues to deliver a steady flow of air.

Available in both European and US system configurations





## Functionality

Respiratory protection to the highest level for this type of equipment (TH3), by providing a Nominal Protection Factor (NPF) of 500 when used with selected headgear.

Respiratory protection from particles and nuisance level gases and vapours.

Easy to clean. IP53 rated casework means that the product can be decontaminated in a shower.

Filter identification clearly visible through cover viewing lens.

Visual and audible user interfaces indicate a low battery and clogged filter.

The air inlet is positioned across the lower front edge of the filter cover. The downward facing inlet minimises the intake of heavy particles in use.

The air inlet position allows users to use the respirator whilst sitting, without the risk of obstructing the air inlet. The unit's low profile and smooth contours make seated operations practical and comfortable.



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## Ergonomics

The product layout has been developed to be low profile and contoured to be comfortable when worn against the body. The product is lightweight with its centre of mass close to the body to minimise the perceived weight.

Product controls are intuitive to use and the product is quick to set up as no ongoing calibration of flow rate is required due to the sophisticated flow control algorithms that maintain the factory calibrated airflow under varying battery and filter status conditions.

Consumable filters and rechargeable batteries are quick and easy to remove and replace.

All clip actuation forces are designed and developed to be within an ergonomically acceptable range that will suit the global workforce.

A two second press and hold off button, combined with partially shrouded filter and battery release mechanisms protect against accidental activation.

Breathing tube connection is positioned and detailed to be quick and easy to attach and provides positive tactile feedback.

Breathing tube connection is angled to work in conjunction with the self-adjusting breathing tube to generate low forces on the user and reduce the likelihood of snagging.

The belts have been sized to suit the global workforce.



## Self explanatory quality

Making adjustments to the belt harness is straightforward and intuitive.

The position and attachment method for the breathing hose is clear.

The user interface is simple, it is immediately apparent how to operate unit. All user interaction points are highlighted in blue.

The user can quickly feel the impact of switching the unit on. There is no need to add complex measurements, readouts or indicators.

The user interface relays alarm conditions audibly and visually that can be addressed by removing and recharging the battery, or by replacing the blocked and fully loaded filter.

Alarms cannot be bypassed or reset, the user must address the cause of the alarm condition. Once resolved, the alarms are immediately silenced and the unit returns to its normal operating state.

Whilst wearing the equipment as part of a system you sense the airflow inside the visor, this reassures you that you are being protected.



## Formal quality



The overall product form is contoured to sit comfortably in the small of your back. The filter details are visible to immediately confirm the protection the respirator provides. The hose outlet is angled to support efficient air delivery to the headgear. The colour breaks across the product define the functional areas, separating the filter from the power source and air supply. This delivers a product that appears appropriate to be used in a range of working environments ranging from heavy metal working to powder handling laboratories.

## Durability & Ecological compatibility

The TR-300 is a global product, offering improved levels of safety and personal protection to users worldwide.

It is constructed from robust high quality materials and is designed to be serviced and maintained over a prolonged life span.

It is an energy efficient design, meaning that long duty cycles can be achieved from a compact battery pack between recharges.

The TR-300 uses high density re-chargeable battery packs. The onboard monitoring and status indicators allow users to maintain their battery packs appropriately, prolonging their lifespan.

The filter is the only consumable element of the TR-300. This compact curved design with a high pleat density is supported and fully enclosed within the removable exterior cover moulding, so need not incorporate any exterior surface mouldings of its own and requires reduced structural integrity. This reduces the amount of disposable waste when a filter is changed.

Wear parts such as belts and breathing tubes can easily be replaced.





## Product periphery

Powered Air Purifying Respirators (PAPR) systems help provide respiratory protection for workers in many industries operating in a broad range of applications and environments. They consist of three modules:

- Headgear
- Breathing tubes
- Air delivery respirator

The Versaflo™ TR-300 is part of a new integrated range of PAPR equipment. Designed to co-ordinate functionally and visually with 3M's range of headgear to create a broad series of CEN and NIOSH approved personal protection systems.

The TR-300 powered air respirator offers the flexibility to be used in conjunction with a range of headgear from lightweight hoods to industrial helmets, giving users integrated protection tailored to their individual requirements.



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## Symbolic and Emotional content

Our over-riding aim was to design a new respirator that removed emotional and functional barriers to use. Increasing user acceptance by delivering design characteristics that built and reinforced a positive image for PPE, and performance and usability levels that inspire confidence and trust.

Our empathy with the user's needs guided us to develop a product that excelled at delivering core functionality – comfort and performance. This led us to the design of a compact and powerful respirator that helps users to work more easily for prolonged periods in increased comfort often in challenging environments.

The goal was to deliver a product that was considered an enabler rather than a barrier to work.

