Protector

TORNADO T/POWER

Respiratory Protective Systems

DRAFT

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WARNING

Read this leaflet together with the user leaflets for the TORNADO facepiece and filters used with T/POWER.

These instructions must not be confused with instructions for similar devices.

The power off condition is regarded as an abnormal condition. In the unlikely event of a blower failure the wearer should leave the hazardous area immediately and remove the equipment.

At very high work rates the pressure inside the facepiece may become negative with the result that the protection may be less than expected.

DO NOT remove the facepiece while in the hazardous area.

DO NOT interfere with the seals in any way whilst work is progressing.

DO NOT snag the hose or disturb the fit of the facepiece.

DO NOT use the device if the seal is adversely affected by spectacles or beards.

INTRODUCTION

TORNADO is a powered respirator system which conforms to European Standards prEN12941 and prEN12942. It is approved as intrinsically safe for use in explosive or flammable atmospheres EEx ib IIc T3. It protects against the inhalation of harmful dusts, mists, fumes, vapours, or gases especially where protection is required for long periods, and is of particular benefit in hot or humid environments.

In use, filtered air from the **TORNADO** blower is delivered via a hose to the facepiece and exits through the faceseal or exhalation valve.

The basic blower has single filter port. Two additional filters can be fitted by replacing blanking plugs, at each end of the blower body, with filter adaptors (Item 7 in Fig.1).

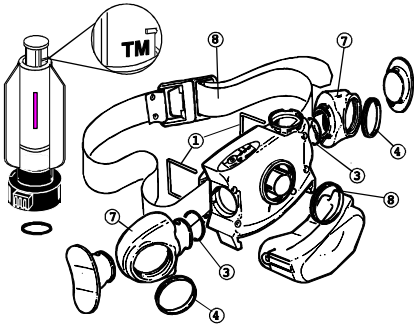

Fig. 1

T/POWER is electronically controlled to provide sufficient air to the wearer and to warn when:

Flow rate is too low: the bleeper sounds intermittently and a yellow LED flashes. This warning continues until the unit is switched off or flow rate reaches a safe level. For example: low flow due to a blocked filter will cause this alarm. Fitting a new filter will cancel the alarm automatically.

Battery charge is low: when approximately 5 minutes power remains the bleeper sounds intermittently and red LED flashes. To switch the unit off, the POWER OFF button must be pressed for 3 seconds.

The replaceable filters are mounted on the belt mounted blower, to which is also connected a rechargeable battery pack. A single filter must always be mounted on the blower. For multi-filter requirements, blanking panels at each the end of the blower body may be replaced with adaptors that permit the attachment of a further two filters. The correct facepiece together with the correct filters should be chosen, after considering the intended application, the hazards likely to be present and the preferences of the wearer.

Full details of suitable filters and all **TORNADO** powered respirator systems can be obtained from **Protector Respirator's** Customer Careline.

LIMITATIONS TO USE

1. Do not use in areas immediately dangerous to life or health.
2. Do not use in stills, tanks and other confined spaces.
3. Do not use in oxygen deficient (<19.5%) or oxygen enriched atmospheres (>21%).
4. This product must only be used by trained persons fully aware of prevailing workplace hazards.
5. Do not exceed the design duration of the battery.
6. Do not use if the ambient temperature is outside of the range -10°C to 40°C as this invalidates the intrinsic safety approval. Humidity levels up to 95% RH do not present any operational problems. If intrinsic safety (Use in a flammable or explosive atmosphere) is not a consideration T/POWER may be used up to 50°C.
7. All TORNADO systems are designed for use in potentially explosive atmospheres but must only be considered as intrinsically safe if both the battery and blower are marked as such.
8. Wind speeds in excess of 2 metres per second may affect the degree of protection expected from the equipment.

FILTER SELECTION

T/POWER should be fitted with filters appropriate to the application, selected by a competent person with a full knowledge of respiratory hazards, and their concentrations in the workplace. To ensure adequate protection is afforded, it is essential that the **T/POWER** is correctly configured and that the filters are used in the combinations listed in the following table.

European Device Classification	Assigned* Protection Factor	Nominal Protection Factor	No. of Gas Filters	No. of Combined Filters	No. of Particulate Filters (PF251/2)	No. of Particulate Filters (PF251 SUPER)
TH2	20	50	2	3	1	1
TH3	40	500	2	3	1	1
TM2	20	200	3	3	1/2/3	1
TM3	40	2000	3	3	1/2/3	1

* *Protection factors assigned according to BS4275 : 1997*

Please consult the facepiece leaflet for classification of the device.

Note:

1. TH2/TH3/TM2/TM3 PSL filters are suitable for all types of particulate hazards including dust, mist and fume of all types, radioactive dusts, bacteria and viruses.
2. Contact the Protector Respiratory Customer Careline for more detailed information on filter selection, appropriate maximum use concentration levels and relevant local legislation.

The following filters are available for use with TORNADO:

Code	Filter Type	Colour Code	Application
TF 200	TH1/TH2/TH3/TM2/TM3 A2 (Gas)	Brown	Organic gases and vapours with a boiling point above 65ºC
TF 203	TH1/TH2/TH3/ TM2/TM3 K1 (Gas)	Green	Ammonia and organic ammonia derivatives
TF 210	TH1/TH2/TH3/TM2/TM3 A1B1E1 (gas)	Brown,Grey and Yellow	As TF 200 plus inorganic and acid gases and vapours
TF 220	TH1/TH2/TH3/TM2/TM3 A2 PSL (combined)	Brown and White	As TF200 plus solid and liquid particulates
TF 223	TH1/TH2/TH3/TM2/TM3 K1 PSL (combined)	Green and White	As TF203 plus solid and liquid particulates
TF 230	TH1/TH2/TH3/TM2/TM3 A1B1E1 PSL (combined)	Brown,Grey/ Yellow & White	As TF210 plus solid and liquid particulates
TF 233	TH1/TH2/TH3/TM2/TM3 A2B2E2K2HgPSL	White, Red, Green, Yellow, Grey, Brown	As TF230 plus Ammonia, organic ammonia derivatives and Mercury Vapour – Maximum 50 hours for Hg.
PF 251/2	TH1/TH2/TH3/TM2/TM3 PSL (particulate)	White	Solid and liquid particulates, including: dusts, mist, fumes, fibres, bacteria and virus
PF 251 SUPER	TH1/TH2/TH3/TM2/TM3 PSL (particulate)	White	As PF 251/2. Longer lasting / high capacity particulate filter.

Note: Gas and combined filters must be used in multiples and one must be mounted on the blower body.

FITTING A FILTER

Damaged, worn, or badly fitted filter seals permit contaminant to bypass the filter, endangering wearer life and health.

When tornado is used with more than one filter, the filters must be changed as a set and not individually, all filters must be of the same type.

1. Configure the blower by adding or removing filter adaptors (Fig. 2).
2. Check that adaptor seals are in good condition and properly fitted.
3. Ensure that the adaptor retainers are inserted from the rear and that they are visible in the holes at the front of the unit. When inserted correctly the retainers should be held in position by the lugs underneath the belt loops.
4. Remove the filter from its packaging which should be undamaged. If in doubt do not use.
5. Check that the filter has not exceeded its use by date and that the filter thread is in good condition.
6. Check that the filter is appropriate to the hazard. If in doubt consult a qualified, responsible person.
7. Check that the filter seal is in good condition and properly located.
8. Check that the threads in the filter adaptor, or filter body is in good condition and clear of contaminant.
9. Screw the filter firmly home until the tab on the base of the filter is felt to pass over the protrusion on the blower body or filter adaptor. Then continue until the filter is finger tight (See Fig. 3). DO NOT OVER TIGHTEN. DO NOT allow the tab to pass the 2nd mark (See Fig. 4).

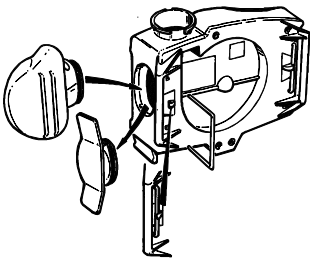

Fig. 2

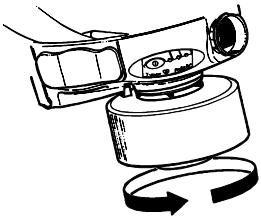

Fig. 3

BEFORE USE

1. Ensure that all parts of the complete equipment have been properly cleaned & decontaminated in accordance with these instructions (see ‚After Use“) and/or local statutory guidelines.
2. Check that the blower body and adaptors (If fitted) are not damaged or likely to leak.
3. Check that the inspection/service record is up-to-date (monthly inspection is the minimum requirement) and that the daily checks have been carried out. The user may find it convenient to personalise the battery and blower by filling in the user identity labels. Using a ball point pen print the appropriate initials on the foil label, remove the protective paper from the transparent cover and press it firmly down.
4. Check that the battery has been freshly charged and is of the required duration. The medium capacity battery is for a half shift (4 hours) and the high capacity battery is for a full shift (8 hours). Slide the battery into the blower, ensuring that both clips are engaged (See fig. 4).

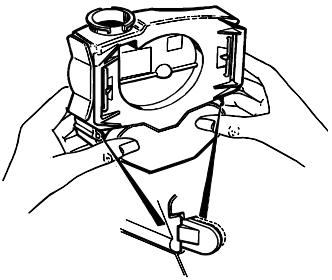

Fig 4

5. Fit the appropriate filter(s) after checking the filter seals are in good condition. Follow the instructions in Filter Fitting.

6. Check that the hose is appropriate for the type of facepiece in use and for any cracks, cuts, distortion or other damage. A damaged hose, or wrong type of hose must be replaced.
7. Fit the facepiece to the blower by inserting the hose connector into the blower outlet. This is only possible when the arrow on the connector is aligned with the arrow on the blower body (See Fig. 5). Rotate the connector clockwise past the notch. This secures the connector to the blower.
8. Carry out a flowrate test
   a) Switch T/POWER on **WITH** the flowtester fitted correctly. The unit should bleep once.
   b) Check that the float rises completely above the TM line.

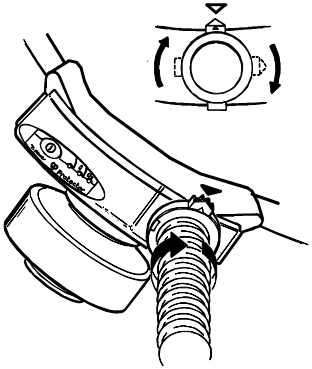

Fig 5

Note: The flow test determines the fact that the minimum flowrate of the blower is being achieved, it does NOT establish the available duration which depends on the battery in use and its state of charge.

9. Refit the hose and inspect the facepiece, checking that the facepiece, faceseal, head harness and hose are secure and undamaged. Tug the hose connection to ensure it is secure.
10. Check that the belt is secure and undamaged, then fasten the blower to the waist. The belt is adjustable and T/POWER can be worn in any comfortable position, although it is recommended that it is kept behind the wearer with the belt moderately tight.
11. Switch on T/POWER and check that the unit beeps: once for a closed facepiece, twice for an open facepiece.
12. Fit the facepiece following the appropriate instructions ensuring that the hose is not twisted or looped as this may restrict movement or the airflow.
13. Proceed to the work area.

IN USE

Safety:

To ensure that the expected level of protection is attained: Check that the filter canister is not damaged. DO NOT use the T/POWER for longer than the design duration. If there is a perceived reduction in airflow leave the work area immediately and check the equipment and the flowrate.

AFTER USE

Where the equipment must be cleaned & decontaminated when leaving the work area, a ‚dirty' area, remote from the hazardous environment, should be set aside for this.

1. Remove any protective clothing with the T/POWER still running,
2. Remove any loose contamination from the outside of the unit with a brush or cloth.
3. Take the facepiece off.
4. Switch the T/POWER off, undo the belt and cap the filters. Put the unit to one side and complete any personal hygiene.
5. The unit must be cleaned before being stored, use a damp cloth to remove dust from all surfaces, or a brush for awkward areas. Ensure that the LED indicators are clean and clearly visible. All cleaning/decontamination must be completed by trained, responsible persons, care must be taken that no harmful dusts can be inhaled or ingested while this work Is completed.
6. Make absolutely certain that no contaminant falls into the blower inlet fan housing whilst the filter is being removed. Do not immerse any part of the equipment during the cleaning procedure. In particular, water must not be allowed to enter the fan housing, hose or facepiece, as this will cause contamination which will be difficult to remove.

7. Clean using a clean lint-free cloth moistened in water and allow to dry in a well ventilated area; do not use radiant heat. DO NOT USE A DRY CLOTH as this may cause the body to acquire and store a static electrical charge.
8. Recharge the battery. Batteries must only be charged in a clean dry atmosphere away from direct sources of heat within the recommended storage conditions and NEVER in a potentially explosive atmosphere.

Before charging the battery, ensure that the charger and mains voltage are compatible. Connect the charger to the battery via the concentric plug and switch on at the mains. The red LED on the charger should illuminate and remain illuminated throughout the charging period.

Protector recommend that the High Capacity battery is charged for 16 hours and the Medium Capacity battery is charged for 8 hours. Optimum performance with new battery packs is achieved after they have been cycled three times. To maintain the optimum performance **Protector** recommend that the battery pack is fully discharged approximately once every fifty uses.

STORAGE

When not in use the equipment should be stored in a clean, dry environment, away from direct heat sources between –10ºC and 30ºC, at a humidity of less than 65% RH.

INSPECTION/MAINTENANCE

The following components should be checked daily when **TORNADO** is in regular use.

1. Inspect the facepiece seal(s) for any signs damage, or excessive distortion.
2. Check the integrity of the head harness, bed fixing and webbing.
3. Condition of the hose, which should have no cuts or cracks.
4. Condition of the blower, particularly the threads and the filter sealing face(s).
5. Flowrate, using the appropriate indicator.
6. Visually check the exhalation valve, where fitted, by removing the cover and inspecting the valve for distortion, cuts or cracks.
7. Condition of the visor – scratched visors may obscure vision and are a potential hazard.

Damaged or defective part must be replaced with genuine **Protector** spares (see listing). Use of other spare parts is likely to degrade the performance of the equipment and will invalidate the warranty. All replacements should be noted in the service record.

Note:

The filter seals used in the blower and the filter adaptors are similar in appearance but are not interchangeable. In order to assist identification the filter adaptor seals are moulded in red.

Fit filter seals so that the part number is against the blower body or adaptor.

An inadequate flowrate may be caused by any one of the following faults, which should be checked in turn: Clogged filter, split hose, battery charge low, equipment fault in the blower, battery or charger.

If a faulty battery, fan unit or charger is suspected, the complete unit must be returned to a **Protector Respiratory** service centre, complete with a decontamination certificate and a note detailing the faults.

T/POWER is not user serviceable. Maintenance must be performed by authorised Protector Respiratory Centres who have the necessary test equipment to ensure that all repairs are completed safely and re-certified.

Regardless of usage, each unit requires a documented monthly inspection of all aspects relating to safety. This should be carried out by a trained, responsible person. Records may be entered in the section at the end of this manual, or separately if this is more convenient. Records should be maintained throughout the life of the equipment and should be stored for 5 years thereafter.

SPARES

Item No. (Fig. 1)	Part No.	Description
1	034.152.99	Adaptor retainers (2)
2	054.230.99	Connector 0 ring (5)
3	054.204.99	Adaptor 0 ring (1 0)
4	034.156.99	Filter seal – red (1 0)
5	034.027.99	Filter seal – Black (5)
6a	TOR/BATT/M	4 hour capacity NiCd battery
6b	TOR/BATT/H	8 hour capacity NiCd battery
7	TOR/ADAPT	Filter adaptor (2)
8	ECWB	Waistbelt
9a	TOR/BC/UK	Battery charger (UK 3-pin plug)
9b	TOR/BC/EUR	Battery charger (European 2-pin plug)
9c	TOR/BC/SM	Smart battery charger (UK / EU / Aus)
10	BAG/PPR	Holdall

GUARANTEE

All TORNADO products are guaranteed free from any faults in materials or workmanship. Should any such fault develop within 12 months of purchase, **Protector** will replace the unit without charge.

The warranty covers the repair or replacement of faulty components only and Protector will not under any circumstances be liable for any kind of consequential loss, or damage. In addition, Protector cannot guarantee any of its products which have been damaged due to accident, abuse, alteration, misuse, or incorrect or inadequate maintenance procedures.

NOTIFIED BODIES

prEN12941 and prEN12942	Inspec Certification Ltd (Number 0194), Upper Wingbury Courtyard, Wingrave Aylesbury, Buckinghamshire, HP22 SLO, UK
Iintrinsic safety Certificate No. Ex 97D2159X	Sira Certification Service (Number 011) South Hill, Chiselhurst, Kent, BR7 5EH, UK