

Operating and Maintenance Instructions

WARNINGS



Before using this equipment, read the contents of EN 529 : 2005 and familiarise yourself with the requirements for respiratory protective devices and their potential effects on the wearer.



Read this Manual together with the User Instructions for the TORNADO face-piece and filters used with T/POWER.



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



In the 'power off' state, little or no respiratory protection is to be expected. This is regarded as an abnormal condition. In the 'power off' state, a rapid build-up of carbon dioxide and a depletion of oxygen within the hood or helmet may occur. In the unlikely event of a blower failure, the wearer should leave the hazardous area immediately and then remove the equipment.



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



DO NOT remove the face-piece 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 face-piece.



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



The use of an intrinsically safe device in an atmosphere for which it is not listed or the use of a non-intrinsically safe device in a flammable or explosive atmosphere may lead to fire or explosion resulting in serious injury or death.



If a TORNADO respirator is used in an explosive or flammable atmosphere, failure to regularly inspect the respirator as described in this instruction, failure to correct damage to the respirator, or the installation of incorrect batteries or substitution of any other components may impair the intrinsic safety of the unit. Impairing the intrinsic safety of the unit may lead to a fire or an explosion which could result in serious injury or death.



DO NOT remove or change batteries in a flammable atmosphere. Batteries must only be removed or changed in an area known to be non-flammable to prevent an explosion that may result in serious injury or death.



DO NOT charge batteries in a flammable atmosphere. Charge the batteries only in an area known to be non-flammable to prevent an explosion that may result in serious injury or death.



Use of the TORNADO respirator with a broken or damaged case or exposed wiring in a flammable or explosive atmosphere may result in a fire or explosion which may cause serious injury or death.



DO NOT use in areas immediately dangerous to life or health.



DO NOT use in stills, tanks and other confined spaces.



DO NOT use in oxygen deficient (<19.5%) or oxygen enriched atmospheres (>23%).



DO NOT exceed the design duration of the battery.



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 between -10°C and +50°C.

TORNADO T/POWER

INTRODUCTION

TORNADO is a powered respirator system which conforms to European Standards EN 12941 and EN 12942. It comprises a blower and a range of batteries, some of which are approved as intrinsically safe for use in explosive or flammable atmospheres EEx ib IIC T3.

As PPE is exempt from the ATEX Directive 94/9/EC, **TORNADO** cannot be approved to this directive. **Scott Health and Safety Limited** have demonstrated compliance with the requirements for use in potentially explosive gas atmospheres by having **TORNADO** approved to EN 50014 : 1977 and EN 50020 : 1977. For potentially explosive dust atmospheres the blower circuit board is low energy and would not present a hazard if exposed. Users should continue to ensure, however, that if the blower suffers any damage to the casing it should be withdrawn from use and replaced.

The **T/POWER** casing is approved for resistance against dust and water ingress to EN 60529 : 1991 Code IP54.

The black **TORNADO** blower is moulded in an anti-static material.

TORNADO 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.

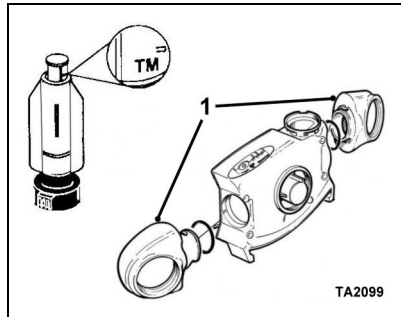


Fig. 1

The following markings appear on the blower and battery and their meanings are described below:



Marking	Meaning
EEx	Electrical apparatus corresponds to one or more of the types of protection which are the subject of the specific European Standards listed above.
ib	Category for the type of protection used, protection concept - intrinsic safety: Limit the energy of sparks and surface temperatures.
IIC	Group of the electrical apparatus: For places with a potentially explosive atmosphere other than Mines susceptible to fire damp.
T3	Temperature class: For electrical apparatus for Group II, having a maximum surface temperature of 200° C.
Ex	Explosion protection mark.

In addition, the blower and battery are marked with the month and year of construction.

In use, filtered air from the **TORNADO** blower is delivered via a hose to the face-piece and exits through the face-seal 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 (shown as 1 in *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.

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

* According to EN 529 : 2005

Please consult the face-piece User Manual for classification of the device.

Note:

- TH3/TM3 PSL filters are suitable for all types of particulate hazards including dust, mist and fume of all types, radioactive dusts, bacteria and viruses.
- Please contact **Customer Services** at **Scott Health and Safety Limited** for more detailed information on filter selection, appropriate maximum use concentration levels and relevant local legislation.

The correct face-piece 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 **Customer Services** at **Scott Health and Safety Limited**.

LIMITATIONS TO USE

- This product must only be used by trained persons fully aware of prevailing workplace hazards.
- Some **TORNADO** systems are for use in potentially explosive atmospheres but must only be considered as intrinsically safe if both the battery and blower are marked as such.
- Wind speeds in excess of 2 metres per second may affect the degree of respiratory protection expected from the equipment.

TORNADO T/POWER





The following filters are available for use with **TORNADO**:

Code	Filter Type	Colour Code	Application
TF200	TH1/TH2/TH3/TM2/TM3 A2 (Gas)	Brown	Organic gases and vapours with a boiling point above 65°C
TF203	TH1/TH2/TH3/TM2/TM3 K1 (Gas)	Green	Ammonia and organic ammonia derivatives
TF210	TH1/TH2/TH3/TM2/TM3 A1 B1 E1 (Gas)	Brown, Grey and Yellow	As TF200 plus inorganic and acid gases and vapours
TF220	TH1/TH2/TH3/TM2/TM3 A2 PSL (Combined)	Brown and White	As TF200 plus solid and liquid particulates
TF223	TH1/TH2/TH3/TM2/TM3 K1 PSL (Combined)	Green and White	As TF203 plus solid and liquid particulates
TF230	TH1/TH2/TH3/TM2/TM3 A1 B1 E1 PSL (Combined)	Brown, Grey/ Yellow & White	As TF210 plus solid and liquid particulates
TF233	TH1/TH2/TH3 A2 B2 E2 K2 Hg PSL (Combined)	White, Red, Green, Yellow, Grey, Brown	As TF230 plus Ammonia, organic ammonia derivatives and Mercury Vapour - Maximum 50 hours for Hg.
PF251/2	TH1/TH2/TH3/TM2/TM3 PSL (Particulate)	White	Solid and liquid particulates, including: dusts, mist, fumes, fibres, bacteria and virus
PF251/SUPER	TH1/TH2/TH3/TM2/TM3 PSL (Particulate)	White	As PF251/2. 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.
	The markings on these filters in relation to EN 12941 and EN 12942 must not be confused with markings on a filter relating to any other standard.
	This product must only be used with Protector-branded filters manufactured by Scott Health and Safety Limited. The use of any other filters will negate the approval and will be likely to reduce the level of protection provided.

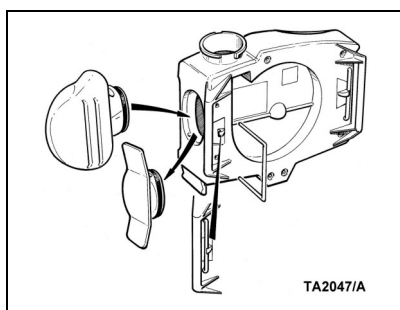


Fig. 2

1. Configure the blower by adding or removing filter adaptors (see 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 are in good condition and clear of contaminant.
9. Screw the filter firmly home until the tab on the base of the filter passes over the protrusion or 1st Mark on the blower body or filter adaptor (shown as 1 in Fig. 3). Continue until the filter is finger tight. DO NOT OVERTIGHTEN. DO NOT allow the tab to pass the 2nd Mark (shown as 2 in Fig. 3).

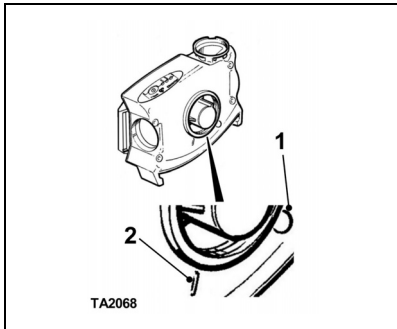


Fig. 3

BEFORE USE

1. Ensure that all parts of the complete equipment have been properly cleaned and 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 ballpoint 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 is not damaged, has been freshly charged and is of the required design duration. The medium capacity battery is for a half shift (4 hours) and the high capacity battery is for a full shift (7.5 or 8 hours, dependant upon the battery type, as listed in the *Spare Parts* table). Slide the battery into the blower, ensuring that both clips are engaged (see Fig. 4).

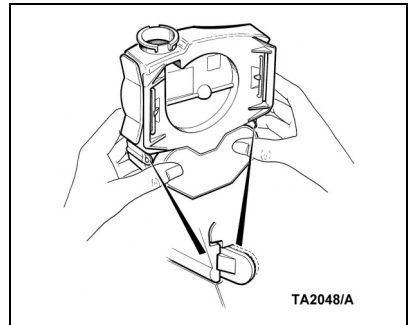


Fig. 4

5. Fit the appropriate filter(s) after checking the filter seals are in good condition. Follow the instructions in *Fitting a Filter*.
6. Check that the hose is appropriate for the type of face-piece 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 face-piece 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.

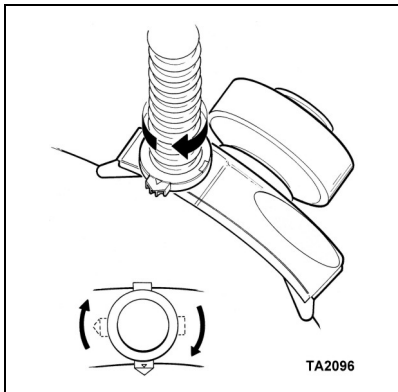


Fig. 5

8. Carry out a flow-rate test:
 - a) Switch on **T/POWER** with the flow-tester correctly fitted. The unit should beep once.
 - b) Check that the float rises completely above the TM line (see Fig. 1).

Note:

The flow-test determines the fact that the minimum flow-rate 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 face-piece, checking that the face-piece, face-seal, 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 and 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 face-piece, twice for an open face-piece.
12. Fit the face-piece 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 air-flow leave the work area immediately and check the equipment and the flow-rate.

AFTER USE

Where the equipment must be cleaned and 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. Remove the face-piece.
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 face-piece, 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.

The battery should become fully-charged in approximately seven hours.

Optimum performance with new battery packs is achieved after they have been cycled three times.

For further details, please refer to the instructions supplied with the charger.

STORAGE

When not in use the equipment should be stored in a clean, dry environment, away from direct heat sources between -10°C and +30°C, 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 face-piece 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. Ensure that the sealing O-Ring on the hose blower connection is present, undamaged and lightly greased.
4. Condition of the blower, particularly the threads, filter sealing face(s) and rubber seals.
5. Flow-rate, 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.

8. Condition of the battery: batteries with cuts or cracks MUST NOT be used and should be replaced immediately.

All rubber parts should be replaced at least annually, regardless of usage. This includes exhale valves, filter seals, sealing O-Rings for the filter adaptors, end plates and the hose connection O-Ring.

Damaged or defective parts must be replaced with genuine **Protector** spares (see *Spare Parts*). 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 flow-rate 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 a sealed, calibrated-for-life unit and contains no serviceable internal parts.

TORNADO T/POWER

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.

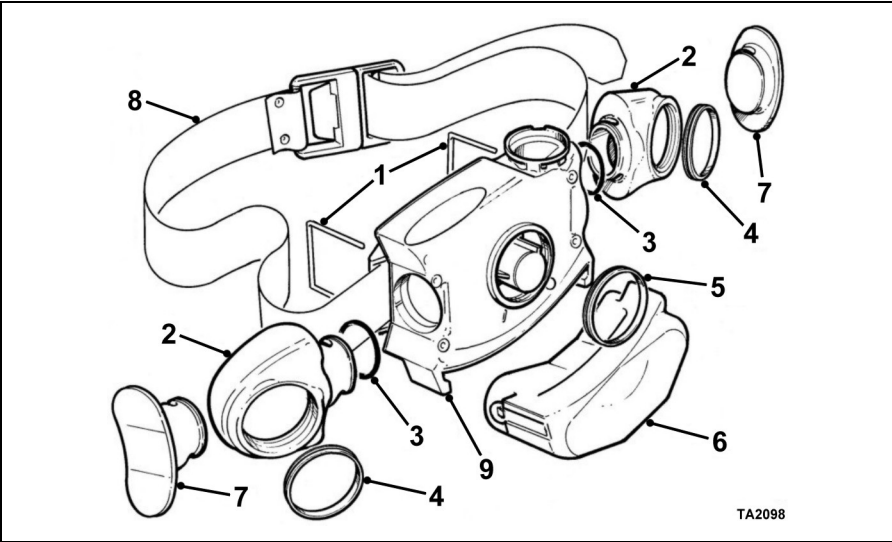
RECORD INSPECTION AND MAINTENANCE DETAILS

Record test and maintenance details on the Inspection and Maintenance Record Sheet provided at the back of this Manual.

Information recorded usually includes:

- Name of employer responsible for the apparatus.
- Make, model number or identification mark of the apparatus, together with a description of any distinguishing features, sufficient to enable clear identification.
- Date of the inspection/maintenance together with the name, signature or unique authentication mark of the examiner.
- Condition of the apparatus, details of any defects found and any remedial action taken.

SPARE PARTS



Item No.	Description	Part No.
1	Adaptor Retainer (Pack of 2)	1022647
2	Filter Adaptor (Pack of 2)	TOR/ADAPT
3	Adaptor O-Ring (Pack of 10)	1028131
4	Filter Seal - Red (Pack of 10)	1022652
5	Filter Seal - Black (Pack of 5)	1022190
6	Battery - 4 Hour Capacity (NiCd)	TOR/BATT/M
6	Battery - 7.5 Hour Capacity (NiMH)	TOR/BATT/LITE
6	Battery - 8 Hour Capacity (NiCd)	TOR/BATT/H
7	Blanking Plug (Pack of 2)	1074357
8	Waist-belt	ECWB
9	Blower Unit Assembly	1070614
-	Flow Tester	PPFI92/ASSY/TOR
-	Smart Battery Charger	TOR/BC/SM
-	Holdall	BAG/PPR

WARRANTY

The products manufactured at our factories in Skelmersdale and Vaasa carry a warranty of 12 months (unless stated otherwise) for parts, labour and return to site. The warranty period runs from the date of purchase by the end user.

These products are warranted to be free from defects in materials and workmanship at the time of delivery. **SCOTT** will be under no liability for any defect arising from wilful damage, negligence, abnormal working conditions, failure to follow the original manufacturer's instructions, misuse or unauthorised alteration or repair.

Evidence of purchase date will need to be provided for any claims arising during the warranty period. All warranty claims must be directed through **SCOTT Customer Services** and in accordance with our sales return procedure.

NOTIFIED BODIES

EN 12941 and EN 12942:

Inspec International Limited (0194)
56 Leslie Hough Way,
Salford,
Greater Manchester,
M6 6AJ,
England.

BSI Product Services (0086)
Kitemark House,
Maylands Avenue,
Hemel Hempstead,
HP2 4SQ,
England.

Intrinsic Safety:

Sira Certification Service (0518)
South Hill,
Chiselhurst,
Kent,
BR7 5EH,
England.

Certificate Numbers:

Ex 95C2060X

Ex 97D2159X