



# Operating Manual

Hammer Jet v1 Dryer & Cleaner





<b>EU Declaration of Conformity</b> .....	3
Annex 1 to EU Declaration of Conformity .....	4
Nameplate .....	5
<b>Safety Instructions</b> .....	7
Obligations.....	7
Hazard and danger zones.....	8
Intended use .....	8
Misuse .....	9
<b>Disclaimer</b> .....	10
<b>Introduction</b> .....	10
Hammer Jet Dryer & Cleaner .....	10
<b>Product Overview</b> .....	11
Display “Operation Hours & Time to Service” .....	12
Display “Ready to Start” .....	12
Display “Idle” - Ready to use .....	13
Display “Low Power Setting” .....	13
Recommended elevation for optimal drying speed .....	14
Display “High Power Setting” .....	14
Accessories and Spares .....	15
<b>Operation</b> .....	16
Safety Instructions.....	16
Before start-up.....	17
<b>Safety Stop</b> .....	18
Power-up and start-up.....	19
Shut down and Cooling.....	22
Parking, transport and storage .....	22
Dismantling the turbine module from the chassis .....	23
Installing the turbine module .....	25
Charging the Hammer Jet .....	28
Filter Removal .....	29
Cleaning the turbine compartment .....	31
Display shut down .....	32
Re-fuelling .....	32
Filter inspection and change .....	33
<b>Technical Data</b> .....	34
Dimensions.....	34
Warning Signs .....	36
<b>Troubleshooting</b> .....	37
Off conditions .....	37
<b>Maintenance and Service</b> .....	38
Turbine module compartment .....	38
Filter cover .....	38
Overview of recommended maintenance and service .....	39
Wheel inspection and replacement .....	39
<b>Storage &amp; Transportation</b> .....	40
<b>Wastedisposal</b> .....	40



## EU Declaration of Conformity

The undersigned, representing the following manufacturer:

<b>Applied Turbine Technology ApS</b>
<b>Østager 2, 6400 Sønderborg, Denmark</b>

hereby declares that:

<b>Machine type no. 10000-40-80</b>
-------------------------------------

is in conformity with all relevant provisions of the following EC directive(s):

DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery The EMC Directive 2004/108/EC
--

Person authorized to collect technical data and make them available to the relevant authorities:

<b>Name</b>	<b>Address</b>
<b>Mike Claudi Kühl</b>	<b>Østager 2, DK-6400 Sønderborg</b>

The machine's design has taken the standards and specifications referenced in Annex 1 of the EU Declaration of Conformity into consideration.

Sønderborg, April 12, 2020

Brian Ellegaard Andersen  
CEO



### Annex 1 to EU Declaration of Conformity

References to standards and specifications used for the Declaration of Conformity:

Harmonized standards:

Number	Version	Title
DS/EN 60204-	2006	Safety of machinery – Electrical equipment of machines – General requirements
DS/EN ISO 13849-1	2006	Safety of machinery – Safety-related parts of control systems – General principles for design
ISO 12100	2011	Safety of machinery – General principles for design. Risk assessment and risk reduction.

Other standards:

Number	Version	Title

Other specifications:

Number	Version	Title



### Nameplate

The Hammer Jet is provided with a name plate according to the requirements stated in the Directive 2006/42/EC placed on the “End Blinder” plate next to the charging port.

The nameplate is showing the CE and EAC (Russia) symbol as well as the website of the manufacturing company (for contact information etc).

The nameplate is also showing some important product information such as:

- TYPE: Model number of the product
- S/N: Serial number, a unique product number
- Year: Year of manufacturing
- LWA: Sound level in dB at less than 1m distance from the noise source.



The Hammer Jet has an A-weighted max sound power level of 108 dBA around the machine and **103 dBA at the operators’ position**, at its max performance. The LWA is here not directly related to an environmental noise level as weighted average of the different work steps during machine operation. It is the maximum sound pressure which the operator will experience when using the machine at 100% performance level.

This choice of LWA was made to ensure proper health protection even when the machine is used above its intended use.

Level of noise (dB A)	Maximum daily exposure time
85	8 hours
91	2 hours
97	30 minutes

When persons are exposed to excessively loud environments (85 dB or more), hearing protection is required to prevent noise-induced hearing losses. The table to the left is showing the acceptable noise levels without hearing protection during a maximum daily exposure.

It is required that the operator of the Hammer Jet is using relevant hearing protection to prevent work induced hearing losses.



In the United States hearing protection is by law assigned a single number rating, NRR, which is an abbreviation for a Noise Reduction Rating. Hearing protection is available with NRR ratings from 0 to 30.

The required NRR level of a hearing protection is an estimate of the exposed daily noise level dose, which then can be converted to an 8-hour Time Weighed Average called TWA. The following table shows the required NRR rating for the hearing protection dependent of the average machine usage a day.

TWA exposure		Operator				
Working	hours	1	2	3	4	
Work exposure (100% Machine performance level)	dB(A)	103	103	103	103	
TWA dose	dB(A)	89	93	96	98	
NRR protection rating		15	23	29	33	
dBA reduction	$(NRR-7)/2$	4	8	11	13	
Requirement	dB(A)	85	85	85	85	

In this table the LWA value is used in the calculation of the TWA dose as a “worst case”, although the operator normally would operate the machine at lower performance level because the marking equipment often is limiting the overall operation.

The highest **NRR rating** for earplugs is 33, and the highest available **NRR rating** for earmuffs is 31. These values reflect the **level** of noise **protection** available for each device when worn alone. Combining earplugs with earmuffs can offer an **NRR protection level** of 36.

The environmental exposure will depend on how the work is done. It is possible to work below an environmental sound pressure LWA of 108, if that is needed, but it will require that the machine is operated below 50% of the maximum possible.



# Safety Instructions

## Obligations

### **Obligations of the Operator/manager:**

The Hammer Jet must only be operated by personnel with the following knowledge:

- Are aware of the basic workplace safety information and accident prevention regulations.
- Have been instructed and trained in working with the Hammer Jet.
- Have read and understood this operating manual.

### **The operator is obliged to as follows:**

- To ensure that the required service and maintenance is performed according to the instructions laid out in this operating manual.
- To keep all the warning pictograms on the machine in a legible state.

If you still have queries, please contact the representative or manufacturer.

### **Obligations of the Operator:**

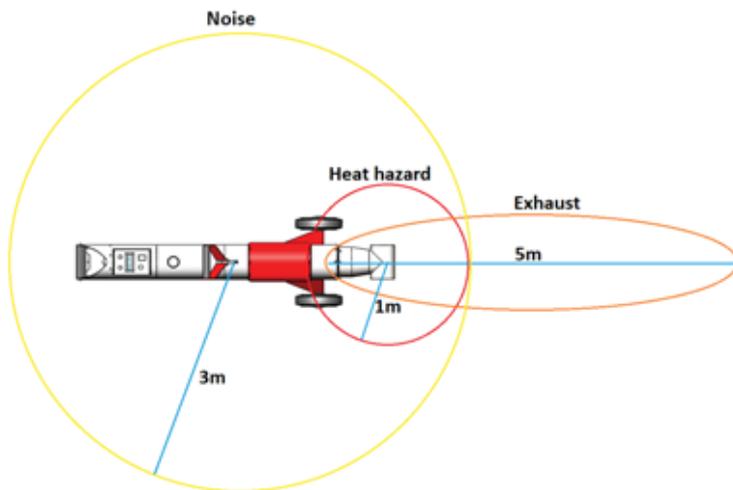
Before starting work, all operators are obliged to as follows:

- To comply with the basic workplace safety instructions and accident prevention regulations.
- To read and understand the operating section of the operating manual.
- To use the required personal protective equipment, when working with the Hammer Jet.
- To read the section "Warning symbols and other labels on the machine" in this operating manual, and to follow the safety instructions represented by the warning symbols, when operating the machine.
- To get the required work training.

If the operator discovers that a function is not working properly, he must eliminate the fault immediately. If this is not the task of the operator or if he does not possess the appropriate technical knowledge, then he must report this fault to his superior (supervisor).



## Hazard and danger zones



The hazard and danger zones are illustrated in the above figure.

Each hazard zone requires its own protection measures:

- The NOISE zone requires protection to avoid loss of hearing ability.
- The EXHAUST zone, where the use of safety glasses are required.
- The HEATING zone, where use of safety shoes are required.

## Intended use

The Hammer Jet intended use is for outdoor drying and cleaning of roads, runways, concrete areas or other areas of non-flammable surfaces.

The product is using the exhaust from a micro jet turbine to dry and clean the surfaces and should not be used on surfaces covered with sand or gravel as well as waste of or close to flammable materials.

The product is intended to be operated by a professional construction worker according to the guidelines in the instruction manual using the required PPE's.

***When operating the Hammer Jet hearing protection is mandatory. In restricted work areas with limited air exchange respiratory protection or a limited use can be necessary to apply.***

A backup operator needs to be present, where oncoming traffic is not shielded from the working area or on roads in short range visibility areas.



During turbine operation, always ensure that the outlet air from the nozzle opening freely can get out. Do not cover and do not put the nozzle opening in such way that the air flow is hindered.

## Misuse

The product Hammer Jet should not be used indoor, since the jet turbine is using fuel and the exhaust emission could be toxic.

As soon as the turbine engine is warming up or running the machine needs to be moved in order not to leave unintended hot spot marks on the ground.

Bystanders should be kept behind the machine when working, or at a safety distance of 5m away from the nozzle cover in the working direction. The exhaust can lead to ejection of debris such as dust, sand or small gravel, which can lead to eye injuries.

Examples of intended use:

- Drying and cleaning prior to **road marking**
- Drying and cleaning prior to **crack repair and joint sealing** on roads, runways, aprons etc.
- Drying and cleaning prior to **line and tape marking/removal**
- Drying and cleaning prior to **paving on concrete and asphalt.**

This Operating Manual utilise the following safety signs. Follow these safety signs carefully since failure to comply may cause personnel injuries or irreparable damage to the equipment.



### **WARNING**

#### **Personal injury / mortal danger**

A usage situation of a technical nature or similar that may cause personal injury or mortal danger.



### **CAUTION**

#### **Damage to machine or accessories**

A usage situation of a technical nature or similar that may cause damage to the machine or its accessories.



**ATTENTION****Important information**

A usage situation of a technical nature or similar that is very important.

**INFORMATION**

The product without operational disturbances. Provides useful tips and recommendations as well as information about the efficient use.

## Disclaimer

All specifications and instructions in this document conform to the rules and provisions in the EU Machinery Directive 2006/42/EC and Directive 2004/104/EC.

**INFORMATION**

This Operating Manual is subject to change without prior notice.  
Contact [info@zirocco.dk](mailto:info@zirocco.dk) to request new editions of the Guide.

**The warranty will be voided if the product is damaged for one of the following reasons:**

- Non-compliance with the instructions in this Operating Manual
- Use of the product for a purpose it is not designed for
- Natural wear or tear
- Incorrect installation performed by the owner or a third party
- Mechanical or technical alterations
- Use of unauthorized spare parts
- Non-compliance with the maintenance instructions or lack of maintenance within the prescribed service intervals.
- Use of safety button.

## Introduction

### Hammer Jet Dryer & Cleaner

- A small and versatile jet turbine dryer, cleaner and heater. The lightweight and compact design makes it easy to always have on site for many tasks within different industries. The Hammer Jet is easy to operate and to deploy even on uneven surfaces.
- Independent and convenient machine operation as there is no need for a compressor or bottled gas supply.



- The Hammer Jet is equipped with a gas turbine which operates on standard diesel type EN590 mixed with 5% ATT turbine oil. The Hammer Jet does not use LPG, which makes its use possible also in populated areas.
- Only hot air - no open flames (a requirement for operations many airports etc.)
- Drying and cleaning speed up to 2.5 km/h depending on the surface and weather conditions and nozzle width.

## Product Overview

 <p>Hammer Jet in the dedicated transport box with the 15 cm standard nozzle</p>	<p>Handle w/two-step throttle</p> 	<p>Filter holder for the turbine inlet air</p> 
	<p>Display, start, stop &amp; power setting buttons</p> 	
	<p>Refuelling point &amp; fuel cap &amp; lifting handle</p> 	

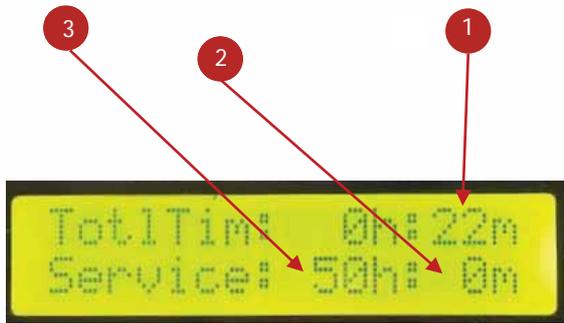


Figure 1

### Display "Operation Hours & Time to Service"

- This information appears app. 1 second after activation of the display button with a duration of app. 2 seconds.

- 1) Total Operating hours and minutes on the installed turbine module
- 2) Next service time in hours and minutes for the installed turbine module

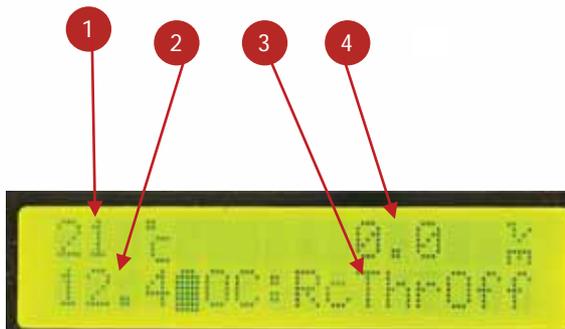


Figure 2 - Display

### Display "Ready to Start"

- This information appears app. 5 seconds after activation of the display button.

- 1) Nozzle air temperature
- 2) Battery Voltage (Must be higher than 11.2V before start-up)
- 3) Last off condition
- 4) RPM (x1000)

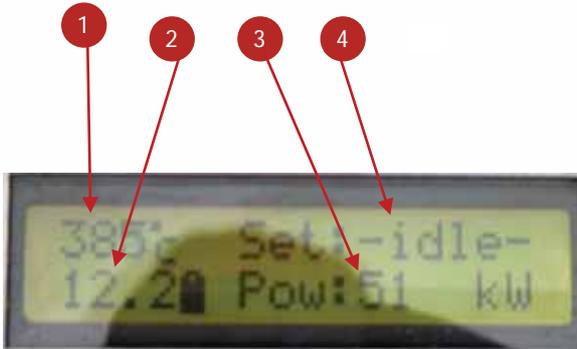


Figure 3 - Display

### Display "Idle" – Ready to use

- This information appears app. 10-15 seconds after activation of the start button.

- 1) Nozzle air temperature
- 2) Battery voltage (Must be higher than 11.2V before start-up)
- 3) Power output
- 4) Throttle set point

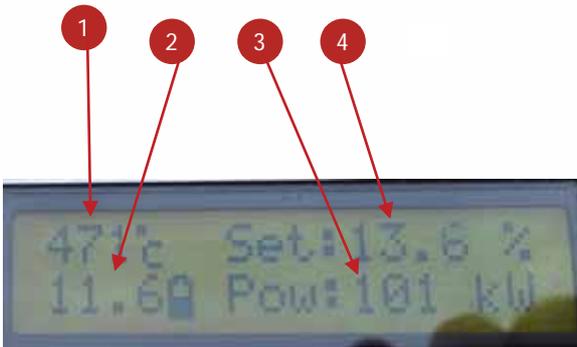


Figure 4 - Display

### Display "Low Power Setting"

- 1) Nozzle air temperature
- 2) Battery voltage (Must be higher than 11.2V before start-up)
- 3) Power output
- 4) Throttle set point

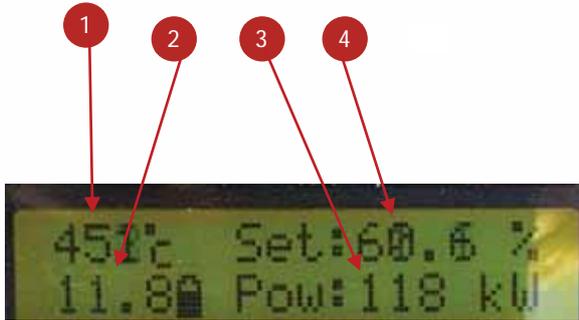


Figure 5 - Display

### Display “High Power Setting”

- 5) Nozzle air temperature
- 6) Battery voltage (Must be higher than 11.2V before start-up)
- 7) Power output
- 8) Throttle set point

### Recommended elevation for optimal drying speed



Figure 6 – Nozzle opening position for optimal drying speed.

- 1) Keep the nozzle opening 1-2 cm above the surface to get optimal drying speed.  
**Do not force the nozzle opening into the surface, because this will stop the outlet of the air flow from the nozzle opening and can cause damage to the turbine.**
- 2) For slower but wider drying width, then elevate the nozzle opening few cm more



## Accessories and Spares

Item	Description	Order no.
Battery Charger for Hammer Jet 90-265V assembly (EU plug)	3A, 12.6V	12000-130
Battery Charger for Hammer Jet 90-265V assembly (US plug)	3A, 12.6V	12000-135
Hammer Jet Air Filter (HS 84213100)	For replacement minimum every 10 hours of operation	5000-65
Battery Pack for Hammer Jet	LI-PO 11,1 V, 4500 mA	4000-450
Fuel Cap	Fuel tank cap	5000-425
Labels: ATT	Logo	9000-30
Label: Heat	Warning sign	9000-20
Label: Hearing protection	Warning sign	9000-10
Turbine oil	ATT Turbine oil	7000-80
200 mm Wheel for Hammer Jet	Ø200 mm	5000-430
A50H v1 Hammer Jet Turbine Module (HS 8411810090)	Turbine incl. Flange and nozzle (must be complete when returned for service)	12000-100
Hammer Jet v1 Chassis stand-alone (HS 8411810090)	Hammer Jet v1 without the turbine module	10000-40-80-1
Hammer Jet Main Transport Box (dimensions: 1423x463x553 mm)	Protection box for daily use, transport, storage, and shipping	8000-40
Hammer Head Nozzle 15/20cm (HS 8419900000)	Standard nozzle (delivered with the product) is 15 cm, however on request wider nozzles can be delivered	14010-10



## Operation

Hammer Jet may only be operated by personnel, who have read and understood this Operating Manual.

Relevant product training could cover the following subjects:

- Operation of the Hammer Jet
- Fuel mix and refuelling procedures
- Maintenance procedures, hereunder air filter replacement
- Turbine module replacement
- Machine safety
- Transport and storage

### Safety Instructions



#### **WARNING**

##### **Fire hazard**

Do not use the Hammer Jet indoors or close to flammable material.

##### **Hot exhaust air/safety distance**

The outlet temperature next to the turbine is 350 to 550°C. Keep a distance of at least 5 m from the machine during operation.

##### **Hearing and eye protection**

The personnel in the immediate vicinity of the Hammer Jet must use hearing protection and safety goggles, when operating the Hammer Jet.



#### **CAUTION**

##### **Fuel**

Use Exxsol D80 or Shellsol D70 petroleum/Kerosene along with 3 % ATT Turbine oil (7000-80) in the mixing ratio 1 to 30. (20 litres of fuel to 0.6 litre of ATT Turbine oil).

When utilizing US Gallons, the mixing ratio is 0.6 litre ATT Turbine Oil to 5 US Gallons of Kerosene

##### **Nozzle**

Always check the nozzle for damages, cracks or constrictions before use.

##### **Keep under supervision**

Do not power up and leave the Hammer Jet unsupervised.

Do not transport the Hammer Jet before it has cooled down completely.

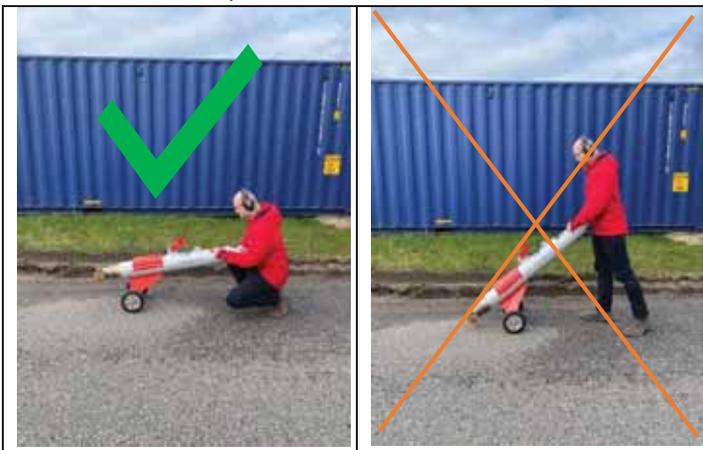
##### **Transport and storage**



Do not transport or store the Hammer Jet before it has cooled down completely (nozzle temperature must be below 50°C/122°F).

Only use the dedicated Hammer Jet Transport Box, when not in use, and for storing and transportation the Hammer Jet. This will shelf the product against dents, dust and dirt. Always keep the Hammer Jet Transport Box clean and tidy.

### Before start-up



- 1) Place the Hammer Jet in **horizontal position** (to ensure proper fuel supply).
- 2) *Do not try to start in any other angles, since this can cause excessive fuel leakage, overheating and malfunction, which may lead to permanent damage.*

Figure 7 - Starting position of the Hammer Jet



- 1) Ensure correct fuel mix and sufficient fuel amount to perform start-up and operation of the turbine.

Figure 8 - Fuel mix and amount





- 1) Prior to start-up, ensure proper charging and battery level of minimum 11.2V.

*Figure 9 – Power level at start-up*

## Safety Stop



*Figure 10 - Safety stop*

- 1) Press the “Stop” button (also used for reset during cooling down) to turn off the Hammer Jet turbine (will enable cooling down).



### Power-up and start-up



Figure 11 - step 1: Start up

- 1) Push the “1” on the “power” button to turn the display on.



Figure 12 – Step 2: Idle mode

- 1) Wait 5-10 seconds until the ECU has started and the display settles with the shown information.



Figure 14 - Step 3: reset the ECU

- 1) Push the “stop/reset” button to reset the display and enable start-up.



Figure 14 - Step 4: Start-up of the turbine

- 1) Push the “Start” button to turn on the turbine.



Figure 16 - Step 5: Idle mode

- 1) Wait 5-10 seconds until the turbine is in idle mode with the shown display indication.



Figure 16 - Step 6: Option “Low” or “High” on the Power button

- 1) Choose between “High” or “Low” throttle on the “Throttle Mode Switch” for activation of the relevant air flow for the task (the higher throttle level, the higher fuel consumption). The two modes are activated in combination with a soft press on the throttle



- 1) Press the throttle button one step to activate either “Low” or “High” power mode (depending on the chosen level on the “Throttle Mode Switch”– see figure 15).
- 2) The relevant displays for “Low” and “High” are indicated in respectively Figure 4 and 5.
- 3) During operation in “Low” or “High” power mode, the level can be changed to either either “Low” or “High” directly by adjusting the “Throttle Mode Switch” (see figure 15) or to full power by pressing fully on the throttle handle button.

Figure 17 – Step 7: “Low” and “High” throttle activation



- 1) Press the throttle handle button two steps (completely) to activate full power mode. Release completely to engage idle mode.

Figure 18 – Step 8: Full power throttle



Figure 19 – Step 8: Full throttle mode



### Shut down and Cooling



Figure 20 – Step 9: Shut down and cooling

- 1) Push the “Stop” button to turn off the turbine and to engage cooling mode. The turbine will immediately shut off and slow down to 0 %, and then start a cooling program (will cool down for app. 7 minutes or until below app. 50°C).
- 2) The shut-down procedure will also be initiated with cooling down, if “0” on the “Power” button is pushed, however then additionally the complete unit will turn off after app. 7 minutes. **It is recommended only to use the “Stop” button to stop the turbine operation.**



Figure 21 – Step 10: Restart of the turbine

- 1) The turbine can be restarted once the display indicates lower than 4.0K RPM by following the steps from figure 12.
- 2) If the Hammer Jet has been completely shut off, then restart by following the steps from figure 10.

### Parking, transport and storage



Figure 22 – Parking, transport and storage

- 1) To avoid damage and contamination of the turbine and other parts, the unit must after use and when cooled down below 50°C/122°F, be stored and transported in the dedicated transport and storage box delivered with the unit.



## Dismantling the turbine module from the chassis

Tools needed:

- Ratchet/4mm Allen key
- H4 bit/4mm Allen bit



Figure 23 - Tools for dismantling the turbine module

1) Locate the 8 socket head bolts, use the H4 to unscrew them by turning counter-clockwise



Figure 24a- Socket and head bolts



Figure 24b - Unscrewing the socket heads



- 2) Locate the hose locknut, unscrew it by turning counter-clockwise. Remove the fuel hose by pulling it towards the handle, while slightly moving it from side to side.



Figure 25 - Fuel connection

- 3) Locate the power connector and the communication connector. Unplug both



Figure 26 - Communication and power connector



4) The turbine module can now be removed by pulling the nozzle away from the front of the machine.



Figure 27 - Nozzle removal direction

## Installing the turbine module

Tools Needed:

- Ratchet/4mm Allen key
- H4 bit/4mm Allen bit
- Turbine module
- 8 pcs of 5x12mm socket head (4mm allen top)



Figure 28 - Turbine module installation tools

1) Insert the turbine module into the chassis



Figure 29 - Turbine module insertion

2) Secure the turbine with the 8 pcs of 5x12 mm socket head. Make sure to tighten it in a cross directional pattern.

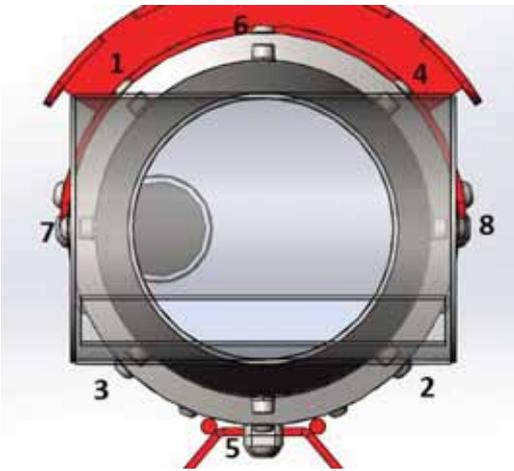


Figure 30 - Screw tightening pattern

2) Reconnect communication and power connectors



Figure 31 - Power and communication connectors

3) Secure the fuel hose with a hose lock nut.



Figure 32 - Loose fuel connection



Figure 33 - Secured fuel connection



## Charging the Hammer Jet

Upon first use, it is necessary to charge the Hammer Jet until fully charged (up to 3 hours - the charger indicates green light - see also the charger manual delivered with the Hammer jet charger). This is also needed after an extended storage period (3-4 weeks).

### **!! ONLY USE THE ATT SUPPLIED CHARGER !!**

- 1) Unpack the charger, and connect the power cable



Figure 34 - ATT Hammer Jet charger

- 2) Locate the charging port, at the top of the Hammer jet



Figure 35 - Charging port



- 3) Tighten the lock nut all the way.



Figure 36 - Secured charging connection

## Filter Removal

Tools required:

- Ratchet/4mm Allen key
- H4 bit/4mm Allen bit



Figure 37 - Filter removal tools

- 1) Remove the 4 screws securing the filter cover (2 on each side), using the H4 bit



Figure 38 - Filter cover screws



- 2) Remove the used filter



Figure 39 - Filter illustration

- 3) Before taking the Hammer Jet into use again, make sure to replace the filter.  
When inserting the new filter, make sure that it is correctly installed into the chassis

**!! WRONG INSTALLATION !!**



**CORRECT INSTALLATION**



Figure 40 - Wrong vs Right installation of the air filter



## Cleaning the turbine compartment

When changing the air filters, make sure to clean the turbine compartment



*Figure 41 - Turbine compartment*



*Figure 42 - cleaning of the turbine compartment*

Use a heavy-duty paper towel for cleaning, to make sure that no debris or smaller pieces from the paper or cloths are left inside the compartment (even small pieces can destroy the turbine during operation).



## Display shut down



Figure 43 – Display shut down

- 1) By pushing the “0” on the “Power” button the display and the entire unit will turn off after app. 7 minutes.

## Re-fuelling



Figure 44 – Refuelling (3.8L/1G)

- 1) Refuel when empty for preparation of the next utilisation of the Hammer Jet. Premix turbine oil and fuel in a separate canister (plastic canisters are recommended). Refill by removing the “Fuel Tank Cap”. Avoid spilling of fuel by utilising e.g. a funnel. After refuelling ensure cleaning and proper installing of the “Fuel Tank Cap”.



## Filter inspection and change



- 1) Inspect daily for intact filter and excess dirt and damage.
- 2) The air filter must be replaced after app. 10 hours of operation or when worn out.
- 3) The air filter can be inspected by lifting of the filter cover after releasing the 4 filter cover bolts (2 pcs on each side).
- 4) The air filter must be replaced if contamination is hindering free air flow to the turbine and/or if worn out in any other way. **Do not operate the turbine without proper air filters installed.**
- 5) Insert carefully the air filter into the filter holder and install the filter cover in order to make the Hammer Jet serviceable.



Figure 45 – Filter Inspection and change



## Technical Data

<b>Turbine module:</b>	A50H
<b>Turbine max output:</b>	App. 130 KW
<b>Air flow:</b>	App. 50 m <sup>3</sup> per minute at full power
<b>Temperature:</b>	App. 350-480°C (662-896 °F)
<b>Weight (approx.):</b>	App. 16 kg (35 lbs) without wheels/19.5 kg (43 lbs) with wheels
<b>Drying width (approx.):</b>	5-20 cm (2-8 inch) - delivered with 15 cm/6-inch nozzle
<b>Drying speed (approx.):</b>	Up to 2.5 km/h (up to 1.5 mph)
<b>Fuel specifications:</b>	Exxsol D80 or Shellsol D70 petroleum/Kerosene + 3% ATT Turbine Oil
<b>Fuel capacity:</b>	3.8 L (1 Gallon)
<b>Average fuel consumption:</b>	10-15 L/h (3-4 US Gallons/h)
<b>Battery:</b>	Li-Po 11,1 V, 4500 mAh
<b>Generator:</b>	No – Frequent charging required after app. 1-1.5 hour of operation
<b>Nozzle replacement:</b>	Various nozzles for relevant tasks - change only takes few minutes
<b>Max noise level at 100%</b>	108 dB
<b>Air filters:</b>	1pcs. The filter must be replaced app. every 10 operation hours or when dirty or unserviceable

See order numbers in “Accessories & Spares” above.

## Dimensions

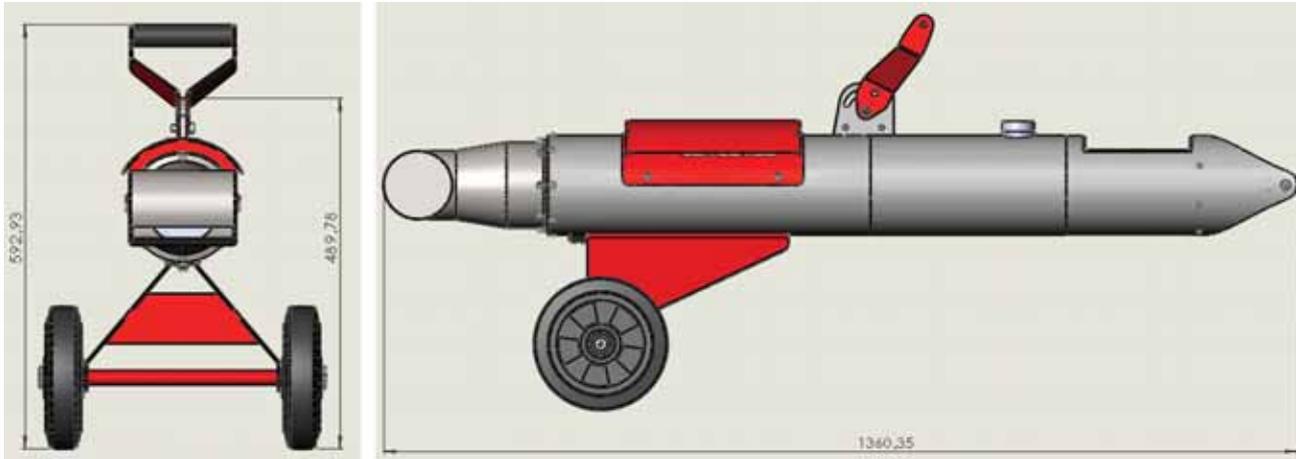


Figure 46 - Hammer Jet Dimensions



Figure 47 - Hammer Jet illustration



## Warning Signs



Figure 48: Heating



Figure 49: Hearing protection

Caution, the nozzle cover can still be warm after the turbine has cooled down.

Order immediately new warning signs if the old ones get damaged. Warning signs can be ordered via ATT or Distributors (see order numbers in “Accessories & Spares” above).



# Troubleshooting

## Off conditions

Code	Value	Explanation
1	R/C Off	AUX switched to Off position or throttle stick and throttle trim moved to the minimum position.
2	OverTemp	Turbine running over temperature. Exceeded high temperature parameter and time out.
3	IgnTimOut	Turbine did not ignite within programmed time interval.
4	AccTimOut	Turbine achieved ignition but did not accelerate within programmed time interval.
5	Acc.Slow	Turbine achieved ignition, but acceleration was less than the programmed value, during startup.
6	Over-RPM	Turbine exceeded the maximum RPM, by 5% and a delay of 0.5 seconds.
7	Low-RPM	Turbine running under the minimum RPM, by 10% and a delay of 3 seconds. Usually triggered by a flame out.
8	BatteryLow	Battery pack is dead. Cell voltage is < 1.0V.
9	Auto-Off	Turbine shut down via the AutoOff sequence, using the AUX channel.
10	LowTemp	EGT dropped below the minimum value. A dislodged EGT sensor can trigger this shut down.
11	HiTempOff	EGT exceeded the maximum range (~950 °C).
12	GlowPlug!	Defective kero/glow plug.
13	WatchDog	ECU processor was locked out usually from static discharge or voltage spike in power supply.
14	FailSafe	Turbine was shut down from a failsafe timeout condition.
15	ManualOff	Turbine was shut off by using the GSU.
16	PowerFail	The power failed to the ECU when the engine was running. This will occur if the power was lost because of a defective battery, connection or if the switch is turned off before the engine is shut-down. Note: If this state is displayed the Info, Min/Max and Statistics menus retain information from the previous run.
17	TempSensor Fail	EGT sensor failed. Note: This could happen only during startup.
18	FuelFail	
19	Rpm2Fail	Second rpm sensor defective, only for 2-shaft engines
20	2nd EngF	Cross check enabled, and shut down was forced due to 2 <sup>nd</sup> engine shut down
21	2nd Diff	Cross check enabled, and shut down was forced due to thrust differential
22	2nd Comm	Cross check enabled, communication error to 2 <sup>nd</sup> engine.



23	No-OIL	Not applicable for PRO engines
24	OverCurr	The electrical current to the engine is too high. Starter may be jammed Kero/glow plug is short circuited
25	No Pump!	There is either no pump connected, or the pump cable is defective.
26	Wrong Pmp	Wrong pump type, see pump configuration in the advanced section of the manual.
27	Pump Err	Communication to pump driver disturbed.
28	No Fuel!	Not applicable for PRO engines
29	LoRpmPmp	Pump driver problem
30	LowRpmFB	Rpm measurement subsystem error
31	!Clutch	Clutch of Starter motor does not disengage
32	EngMatch	Not applicable for PRO engines
33	CAN-Error	Engine has been started up via CAN-Bus, but then the CAN Bus has been disconnected (no commands received)
34	NoRcPuls	Engine has been started up via THR channel, but then the THR signal has been disconnected.
35	RotorBlick	Rotor of engine is blocked
36	Kill Sig	The "Kill signal" was activated, which will turn off the power to the fuel solenoids as well as disable power to the pump(s) via an independent secondary hardware circuit. (See also: pinout of 15pin SUB-D connector)
37	Restart Aborted	AutoRestart was triggered and AutoRestart option is set to "MaxThrottle". However throttle stick was not set to max throttle position by user within 6sec timeout periode → Restart aborted

## Maintenance and Service

### Turbine module compartment

Ensure daily cleaning of the unit and completion of the service check of the turbine module box after maximum 50 hours or once a year. ATT has the only authorised workshop for repair and service checks.

### Filter cover

Inspect the cover daily. Clean and check for any damage or other elements, which can prevent full air inlet and functionality.



If a new turbine module is installed, then ship the replaced turbine module to Applied Turbine Technologies for service etc.

Pack the replaced turbine module into a suitable box with sufficient protection against damages during transport. State your contact details on the supplied shipment label, place the label on the transport box and return the parcel.

### Overview of recommended maintenance and service

Daily	Remarks	Every 10 Hours	Yearly/50 Hours
Clean the entire chassis	Remove dust, dirt, bitumen or other sticking materials	Check for loose bolts etc. And tighten if necessary	
Clean the wheels	If cleaned with water, then dry before installation		
Clean the nozzle	Remove bitumen or other sticking materials		
Check the Air Filters	Replace if dirty or showing signs of tear	Replace the Air Filters	
Turbine Module compartment	Remove any dust and dirt and fuel in the turbine compartment with a dry and clean cloth or		
Turbine Module incl. nozzle	Remove any dust and dirt, and ensure free air opening on the nozzle		Service check at ATT

### Wheel inspection and replacement

The Hammer Jet wheels are subject to extensive heat and wear. It is recommended that they are replaced, as soon as they show signs of damage. New wheels and other spares and accessories can be ordered via our distributors (see more on our website: <https://zirocco.dk/en/distributors> or if distributors are not available via direct order to [info@zirocco.dk](mailto:info@zirocco.dk)



Figure 50 – Hammer Jet wheels



- 1) Dismantle the wheels ( $\varnothing$ 125 mm) of the Hammer Jet with a hex key.
- 2) Install the replacement wheels by using the same tool.
- 3) Check that the wheels are rolling smoothly and that the bolts are tightened properly.

## Storage & Transportation

Store the Hammer Jet in a place with low air humidity and do not expose to dust, dirt, rain, snow and vibrations. The Hammer Jet should be stored in the relevant packaging box from ATT.

Transport only in the original transport box from ATT.

Ensure charging minimum every 3-4 weeks to prevent battery damage

## Wastedisposal

The Hammer Jet should be returned to Applied Turbine Technologies for proper waste disposal.



### **ATTENTION**

#### **Important information**

Do not try to take apart the Hammer Jet yourself. It contains components that need separate treatment in connection with waste disposal.

Prior to returning:

- 1) Empty the machine for fuel.



APPLIED TURBINE TECHNOLOGIES

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**ATT**