



**Manual and information to operate the engine FT 180,  
FT220 FT 250**

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## 1.1.Preface.

Thank you for your confidence in the product of Frank Turbine Engine Systems. The turbine jet engine (also known as the jet engine, jet engine or simply the nozzle) is an aircraft engine whose central component is a gas turbine and which is based on the recoil effect of the generated air and exhaust gas flow. Turbine jet engines are characterized by high power and thrust, with comparatively low masses and sizes

## 1.2.Meaning of symbols

	<p><b>General warning!</b></p> <p>Emphasizes indications that must be observed by the user of the engine</p>
	<p><b>General warning!</b></p> <p>Identifies hazards to property and personal injury.</p>
	<p><b>Warning hot surface!</b></p> <p>The engine gets very hot in many places during normal operation! There is a risk of combustion.</p>
	<p><b>Warning of fire!</b></p> <p>The hot exhaust jet can ignite fuels and objects in the vicinity.</p>
	<p><b>Use hearing protectors!</b></p> <p>Since the engine in the near range exceeds the sound pressure of 85 dB, a hearing protection is absolutely necessary!</p>

### 1.3. Warnings and safety instructions

	<p>In the event of improper operation, the manufacturer assumes no liability for: Damage to the engine and to persons in the danger zone.</p>
	<p>In the case of inappropriate operation of jet engines, heavy or deadly risk of injury!</p>
	<p>Its not permitted to exceed the max rpm of the engine</p>
	<p>Staying in the danger area radially to the rotating turbine parts and behind the engine is forbidden.</p>
 	<p>Do not handle hands or objects in the turbine danger zone.</p>



## 2. Guarantee notices

Warranty on our engines is 24 months from the date of sale, valid only with the specified service times after 25 hours of operation and using special Frank turbine oil. Service only by authorized service location in Austria and Germany or Ultimate Jets Cypress, TX 77433.

Warranty claims expire by opening the engine from external person except the service locations.

Warranty claims expire in case of improper use of the engine (exclusively for model aircraft).

We assume no liability for consequential damage caused by an engine malfunction. for correct installation, correct operation, compliance with safety instructions, etc. , we do not have any influence after leaving the engine our factory and cannot assume any liability in the case of damage

## 3. 3. Scope of delivery

- Turbine
- Elektronik ProJET Hornet III, Terminal, IO board
- fuelpump
- fuelvalve (Servovalve)/or Magneticvalve
- clip for pump
- feltpendulum
- engine fixture
- protectionseeve

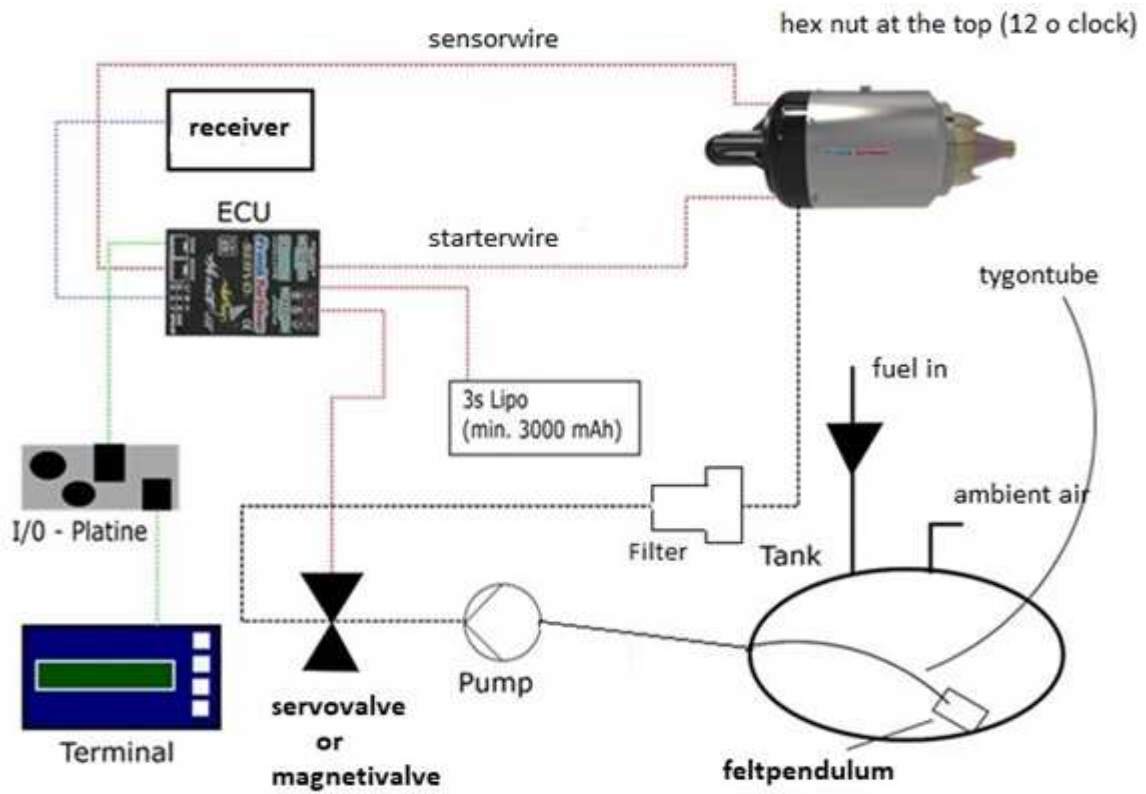
## 4. ECU (Electronic Control Unit)

The HORNET-III is a control system which manage all important turbine parameters during operation. It avoids to high increasing and decreasing of rpm during the time of operation and regulates the rate of acceleration dependent on exhaust temperature during throttle movement.

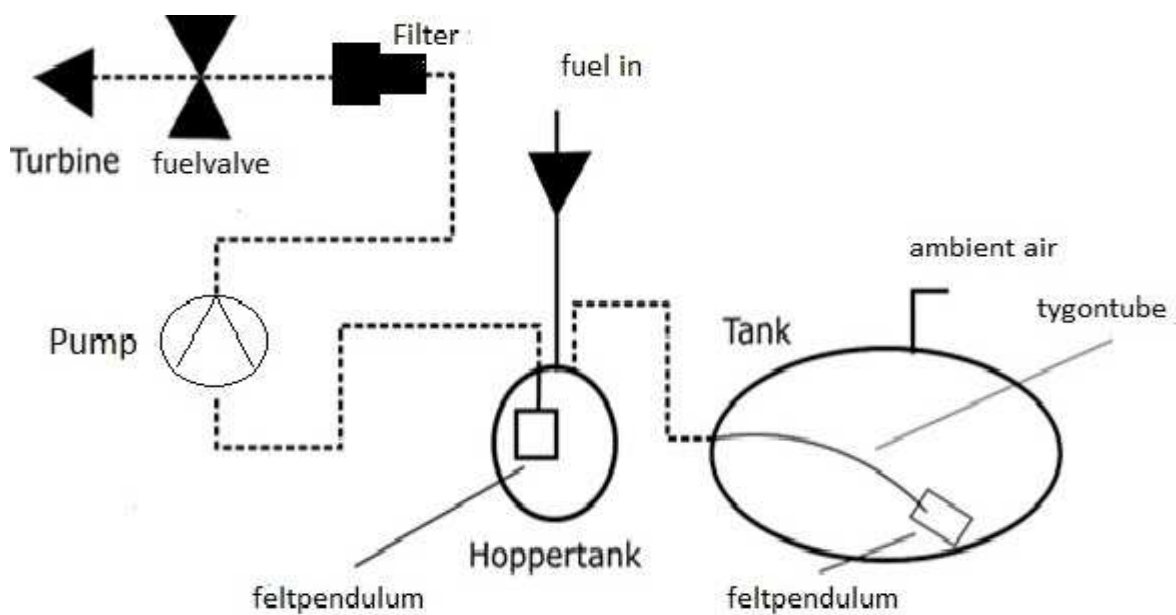
We recommend to use a "motor stop "switch to set the ECU on standby or turn off the engine.

## Connection of engine

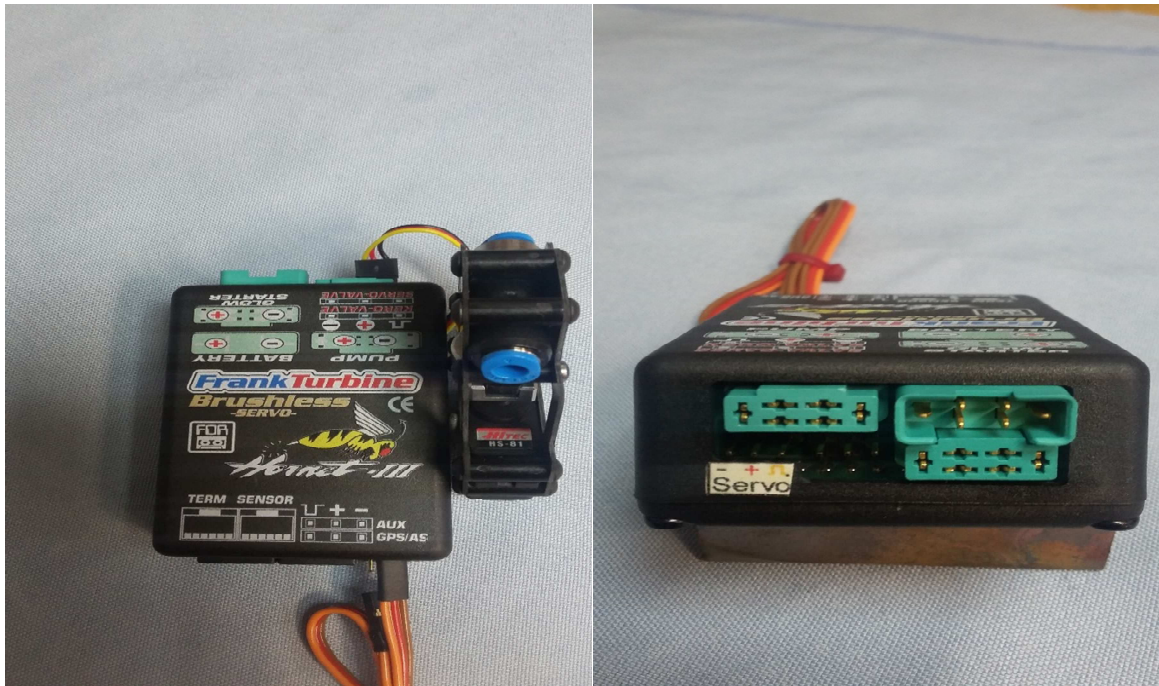
### Connection with one main fuel tank



### Connection with hopper fuel tank



Connection of the servo valve brushless ECU / HS 81Servo



Connection of servo valve Servo ECU / Master Servo



The servo valves can be set in their positions in the synchronization menu 2. Make sure that the servo is never under load or blocked.



Connection of the magnetic valve (Kero Valve Pin)





## 4.1. Fuel supply

Pay the utmost attention to your tank system! A wrong design causes turbine shutters or flame outs. Keep suction lines as short and as thick as possible and do not install quick connectors there. Pressure lines can be equipped with quick connectors, and these cables should also be kept as short as possible. Pay attention to short and thick vent lines in glasfiber tanks. Always use a felt pendulum in the main tank. Attention, the felt can be laid by fungi and the pump can reach its performance limits. Each component of the fuel supply has a flow direction. This is marked with an arrow on the component. The filter in the fuel system must be installed after the pump and before the turbine to protect it from contamination. There is no additional filter necessary if hopper tank already has a filter. For filter in hopper tanks use metal sintering filters with a small resistance. Due the many years of experience of our test pilots, we recommend only one main tank with an oval shape similar to an egg and a special soft pendulum tube from the company "Jautsch" with felt pendulum. This tank system is a good solution for most common jets if no extreme aerobatic flight is performed. If you use bag tanks, use only fixed glued connections, no quick connectors, they may suck air. Make sure that your bag tank cannot lie around the felt pendulum and shut off the fuel supply. Festo quick connectors are not permitted for the suction line. Dirt in the pump supply causes immediate blocking the fuel pump, especially at brushless pumps. Only use 100% clean fuel. We assume no liability for faulty turbines, models etc. which are caused by blocked pumps due to polluted fuel. Another good solution of the tank system is offered by the company "Intairco" with their hopper tanks. It is mandatory to use 6mm tube lines for the pump suck lines. Do not exceed a maximum length up to the pendulum of 20 inch. (complete suction line max 20 inch) Try do install the fuel pump in area of enough cooling air. Take care of right position for the venting. It must be placed in area with enough excess pressure. Some aircrafts produce a hypotension near the wings or the fuselage.

## 4.2. Power supply

Only use a 3S LiPo battery with a minimum capacity of 3000 mAh for the power supply of the drive system. The battery must be connected directly to the ECU (do not install a switch in the circuit!). Connect the landing gear, thrust tube and the engine to ground. Static charges can occur without grounding, which can cause an ECU reset and stops the engine.

## 4.3. fuels

The following fuels with their respective oil content are intended for the engine:

- Kerosin (Jet- A1) (4%-5% Öl) prefer if possible.
- Petroleum (4%-5% Öl)
- Ultimate oder V-Power Diesel (2-3% Öl)

Winter diesel is not suitable for our turbines as fuel. Use Ultimate or V Power Diesel, only use diesel from branded petrol stations such as Shell or Aral. Other diesel suppliers often have inferior diesel with a reduced flash point. This leads to bad running behavior of the turbines or to complete failure. Use only the special Frank Turbine Oil. The use of other types of oil can causes bearing damages. A warranty on the ball bearings is provided under the prescribed maintenance time of 25 hours. granted only when using Frank turbine oil





## 5. Engine operation

### 5.1. Fuel input and checks

- a) Check servo valve for closed position (if present)
- b) Feed fuel into the main tank via fuel line.
- c) Pay attention to installation direction of engine , hexagon screw must always be at 12 o'clock.
- d) Check tank ventilation and fuel level
- e) Check the battery for power supply for sufficient charge. ( Only 3S Lipo of Li lo)
- f) Keep fire extinguishers ready in case of fire
- g) Switch on the transmitter and trim to the rear
- h) Connect the battery for the power supply to ECU
- i) Carry out range test
- j) always operate aircraft in a safety way and make sure to perform an unexpected landing maneuver if necessary in the case of engine fail
- k) do not operate the engine at outside temperatures more than 95°F

### 5.2. Start procedure with ECU projet

- a) Motor switch to "ON Position". moving throttle 100%- 0% -100% at a distance of 1 second on the gas truncheon. ( Turbine gets started)
- b) The engine calibrates automatically and accelerates for a short time to calibration speed. After a few seconds, the speed drops to idle speed. Now the throttle can be pushed back into idle position
- c) now engine is ready for operation

### 5.3. Switch off

- a) throttle to idle and trim to OFF position or "Motor Switch" to OFF Position
- b) Engine cools down to 100° C automatically

### 5.4. general Checks

- a) check the felt pendulum or Cleaning
- b) Check ball bearings for unusual running noises
- c) Check for vibration during operation
- d) Connect the terminal every 5 operating hours and check all values for deviation with the test protocol
- e) Pump start voltage must be adapt by the user if necessary. It depends on sea-level altitude. In case of too much flame generation it has to be reduced and in case of failed ignition it has to be increased.
- d) always close the pressure connection at the engine if no smoker tank is in use
- f) last reason for engine shutdown will appear at the terminal display by pushing the arrow down. (before switch off the ECU) this will be for interest in case of unexpected engine failure



## 6. Pumpvalues

### Ullermann DC Pump for FT 180-250:

pumpvoltage start	app. 0,29-0,4 Volt
pumpvoltage idle	app. 0,8 Volt
max.pumpvoltage	app. 6 Volt
max calibrationvoltage	app. 2,0 Volt
correction Factor	app. 1,8
calibration rate	app. 0,43

### Häusl BLDC 25 Pump for FT 250:

pumpvoltage start	app. 0,24-0,3 Volt
pumpvoltage idle	app. 0,85 Volt
max.pumpvoltage	app. 6-7 Volt
max calibrationvoltage	app. 2,0 Volt
correction Factor	app. 1,8
calibration rate	app. 0,4

### Häusl BLDC 21 Pumpe f. FT 180-FT220

pumpvoltage start	app. 0,25-0,35 Volt
pumpvoltage idle	app. 0,6-0,8 Volt
max.pumpvoltage	app. 5-6Volt
max calibrationvoltage	app. 1,9 Volt
correction Factor	app. 1,6 Volt
calibration rate	app. 0,32

### Häusl DC ZP30025SF Pumpe f. FT180-220

pumpvoltage start	app. 0,20-0,3 Volt
pumpvoltage idle	app. 0,5 Volt
max.pumpvoltage	app. 4,0Volt
max calibrationvoltage	app. 1,6 Volt
correction Factor	app. 1,64 Volt
calibration rate	app. 0,32

## 6.1.Maintenance

After 25 hours of operation, the engine must be tested for operational safety by a certified service center for maintenance. Dusty flight conditions and external landings can damage the engine and the maintenance time may be reduced.

Maintenance time under best conditions (no dust, Jet A1 Fuel, constant operating speed) 50 hours