PILOT'S OPERATING HANDBOOK

ALTO 912 TG

REVISION 02/2019

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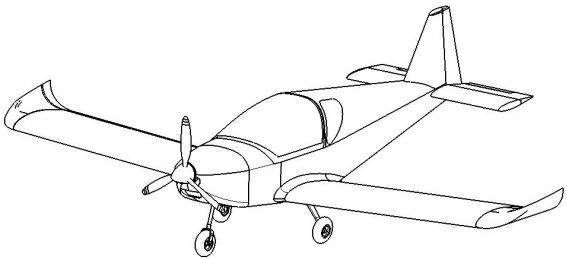

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Aircraft model / modification	**ALTO 912 TG**
Engine model	ROTAX 912 ULS 2
Manufacturer	Direct Fly, s.r.o.
Serial number	**DF 075 / 2017**
Registration number	**XXXXXXXX**
Date of issue	05. 10. 2017

nastavil formátování: zvýrazněné

Airplane complies with the requirements of airworthiness SLZ UL-2 for ultralight aircraft aerodynamically controlled.

Manufacturer – Stamp and signature:

This aircraft must be operated following the instruction and limitation stated in this flight manual.

This flight manual must be kept within reach of pilot during flight

RECORD OF REVISIONS

REVISION	Document Nr.	Valid for pages	Date of issue	Signature

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1. GENERAL

1.1. Introduction

This pilot's operating handbook (POH) is a part of aircraft equipment to provide as much information as possible for safety aircraft operation.

1.2. Certification basis

This aircraft was manufactured according to regulations valid for microlight category and is not corresponding to ICAO standards.
The following regulations were used for testing and certification:

UL-2 – certification requirement for microlight aircraft issued by Light Aircraft Association of the Czech Republic.

1.3. Attentions, warnings and notices

There are used following definitions of warnings in this POH

ATTENTION, WARNING and NOTICE:

ATTENTION: INFORMATION that may prevent danger to the crew and their lives

WARNING: INFORMATION that may prevent damage to the aircraft and its equipment

NOTICE: INFORMATION especially important for the pilot

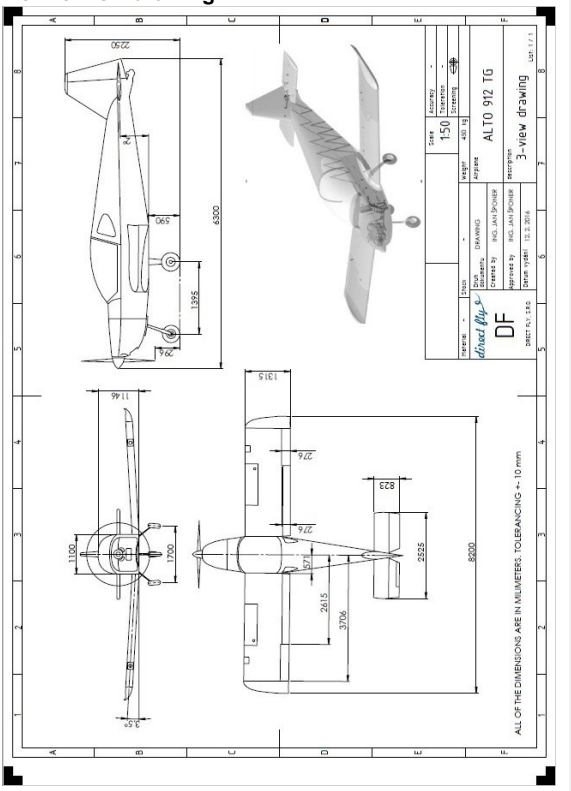
1.4. General information

Direct Fly ALTO 912 TG is an all-metal low wing aircraft with a riveted aluminium structure. Some non-loaded parts such as the engine cowling, wing tips, empennage tips, and wheel covers are made from composite materials. The Alto is powered by the ROTAX 912 ULS engine (100 HP) and FITI ECO Competition, three-blade on-ground adjustable propeller, diameter 158 cm. The two seats are arranged in a side-by-side configuration. The tricycle landing gear features a steerable nose wheel and hydraulic brakes on main wheels. Aircraft is equipped with towing device.

nastavil formátování: zvýrazněné

Wing span	**8,2 m**
Length	**6,3 m**
Height	**2,2 m**
Wing area	**10,5 m^2**
Mean aerodynamic chord (MAC)	**1,315 m**
Maximum take-off weight	**472,5 kg**

1.5. 3-view drawing



2. LIMITATIONS

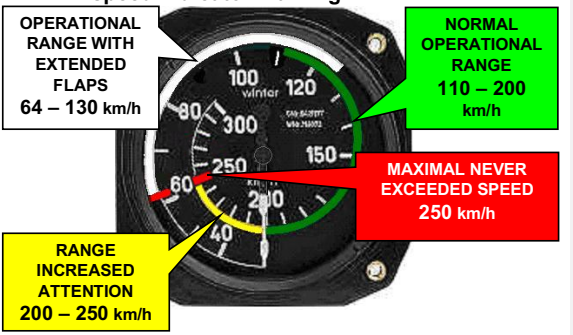
All of speeds stated in this POH are indicated air speeds. For calculation to true air speeds, it is possible to use calibration table, see 5.1.

2.1. Speed limitations

Speed		IAS [km/h]
V_{S0}	Stall speed with extended flaps	**64**
V_{S1}	Stall speed with retracted flaps	**78**
V_F	Maximum speed with extended flaps	**130**
V_A	Maximum manoeuvre speed	**155**
V_B	Maximum gust speed	**170**
V_C	Maximum cruise speed	**200**
V_{NE}	Never exceeded speed	**250**

ATTENTION: Don't use more than 1/3 deflection of control sufaces over MAXIMUM MANOEUVRE SPEED – the aircraft might be overloaded!

2.2. Airspeed indicator marking



2.3. Engine

ALTO 912 TG is powered by 100HP engine **ROTAX 912 ULS** or 80HP engine ROTAX 912 UL

	Unit	ROTAX 912 UL	ROTAX 912 ULS
Max. take-off power	kW	**59,6**	**73,5**
Max. continuous power	kW	**58**	**69**
Max. RPM (5 min)	RPM	**5800**	
Max. RPM for continuous power	RPM	**5500**	
Max. engine temperature	°C	**115**	**115**
Max. oil temperature	bar	**140**	**130**
Minimal oil pressure	bar	**0,8 below 3500 RPM**	
		2,0 over 3500 RPM	
Maximal oil pressure (only cold engine)	bar	**7**	
Oil pressure – nominal	bar	**2,0 – 5,0**	
Fuel pressure	bar	**0,15 – 0,4**	
Temperature operational range of environment	°C	**-25**	
		+50	

More information can be found in Engine operating handbook for all of versions Rotax 912, delivered with the engine.

ATTENTION:
The pilot must always choose the altitude and flight path so that he could always safe emergency landing in case of engine failure The pilot is fully responsible for the consequences

2.4. Engine instruments marking

Aircraft is equipped by analogue engine instruments.

Critical limits of indicators are:

Engine	Indication	912 UL	912 ULS
Max. RPM	Red	5800	5800
Max. continuous RPM	Yellow	5500	5500
Max. op. engine temperature	Yellow	115	115
Op. oil temperature[°C]	Green	50 – 125	50 – 125
Max. oil temperature [°C]	Red	135	135
Oil pressure, max. [bar]	Red	7	7
Oil pressure, min. [bar]	Yellow	0,8 – 2	0,8 – 2
Oil pressure, normal [bar]	Green	2 – 5	2 – 5

WARNING:
Yellow field limit is reached critical measured values (operation on these values can only be a limited time)

ATTENTION:
A red box / the mark is reached illicit value (operation on these values is prohibited)

2.5. Weight limitation

Following values are only valid for aircraft with minimum equipment necessary for flight. For specific aircraft, the values are stated in weight and balance sheet and on the labels within the cabin.

Engine type		**912ULS**
Empty weight	[kg]	325
Maximum take-off weight (without emergency system)	[kg]	450
Maximum take-off weight (emergency system installed)	[kg]	472,5
Max. crew weight	[kg]	Up to MTOW
Min. crew weight	[kg]	55
Max. weight of baggage	[kg]	15

MAXIMUM CREW WEIGHT (kg) DEPENDING ON THE FUEL AND BAGGAGE						
Filling tanks →	**Fuel gauge reading →**	full	3/4	1/2	1/4	30 min flight
	Amount of fuel in litres →	**92**	**69**	**46**	**23**	**8**
Baggage weight →	Max: 15 kg	**73,0**	**89,5**	**106,0**	**123,0**	**133,5**
	½ : 7,5 kg	**78,0**	**94,5**	**111,0**	**128,0**	**138,5**
	Without baggage	**83,0**	**99,5**	**116,0**	**133,0**	**143,5**

ATTENTION:
Do not exceed these weight limits. Keep in mind the amount of fuel – especiall when there are two people on board – do not exceed the maximum take-off weight

2.6. Centre of gravity

Operational forward limit of c.g.	**25 % MAC**
Operational aft limit of c.g.	**35 % MAC**

For specific aircraft – chapter 6: Weight and balance sheet

2.7. Allowed manoeuvres

Steep turn (max. bank angle 60°)

Input speed for manoeuvres – max. 150 km/h

ATTENTION:
Aerobatics, falls and intentional spins are prohibited.
The maximum bank angle about the longitudinal axis: 60 degrees

2.8. Load factor limits

Flaps retracted	Maximal positive load factor in c.g.	**+4**
	Maximal negative load factor in c.g.	**-2**
Flaps extended	Maximal positive load factor in c.g.	**+2**
	Maximal negative load factor in c.g.	**0**

2.9. Crew

Minimal crew on the board	**1 pilot**
Maximal crew on the board	**2 people**

2.10. Type of flights

ATTENTION:
Only VFR flights in VMC conditions are allowed

ATTENTION:
IFR flights, flights in IMC conditions and flights in clouds are prohibited
Flights in icing conditions are prohibited

2.11. Fuel

2.11.1. Approved types of fuel

Unleaded gasoline **Natural 95**. Standard fuel for gasoline engines, ASTM D 4814 or AVGAS 100 LL.

NOTICE:
When using leaded fuel AVGAS, the wear of engine will increase. Therefore use AVGAS only when no other fuel is available.

More detail information about fuel can be found in Engine operational handbook ROTAX 912 delivered with each new engine or on web pages of Rotax Company.

2.11.2. Capacity of fuel tanks

Capacity of fuel tanks – usable (each wing)	**45,5 litres**
Capacity of fuel tanks – total	**92 litres**
Unusable fuel amount	**1 litre**

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2.12. Other limitations

ATTENTION:
SMOKING ON THE BOARDS IS STRICTLY PROHIBITED

Maximum lateral wind speed	**12 kts** **6 m/s**
Maximum headwind	**24 kts** **12 m/s**

Maximum outside temperature	**50 °C**
Minimum outside temperature	**-25 °C**

Strong rain or extreme humidity can cause decrease aircraft performance.

During flying in extreme humidity or rain conditions, it is recommended increase speed for take-off and landing about 10 km/h.

During take-off or landing at high wind speed it is necessary to increase the speed related to the wind speed and gusts.

2.13. Labels

REGISTRATION PLATE	
Registration number:	**N-56842DV**
Manufacturer:	**Direct Fly, s r.o.**
Type/Name:	**ALTO 912 TG**
Serial Number/Year of Manuf.:	**DF 075 / 2017**
Empty weight:	**325 kg**
Maximal take-off weight:	**472,5 kg**

OPERATIONAL DATA AND LIMITATIONS		
Registration number	N-56842DV	
Empty weight	325	kg
Maximum take-off weight	472,5	kg
Maximal useful load	147,5	kg
Maximum baggage weight	10	kg
Min. pilot weight	55	kg
Never exceeded speed	250	km/h
Maximal cruise speed	200	km/h
Maximum speed in gust	155	km/h
Max. speed with extended flaps	130	km/h
Stall speed in landing configuration	64	km/h

MAXIMUM CREW WEIGHT (kg) DEPENDING ON THE FUEL AND BAGGAGE						
Filling tanks →	**Fuel gauge reading →**	full	**3/4**	**1/2**	**1/4**	30min flight
	Fuel amount in litres →	92	69	46	23	8
Baggage weight →	Max: **10** kg					
	½: 5,0 kg					
	Without luggage					

This product is not subject to approval Civil Aviation Authority of the Czech Republic and is operated at own risk of the owner. Intentional spins, falls and aerobatic are prohibited.

ENGINE REVOLUTION

Maximal (max 5 min)	**5800 RPM**
Maximal continuous	**5500 RPM**
Idle	**1400 RPM**

46 **litres**

Natural 95

min. MON 85 RON 95

Baggage

max.

10 kg

pneu 180 +20 kPa

3. NON-STANDARD PROCEDURES

This section presents procedures for non-standard situations which can occur during operation of aircraft.

Non-standards situations because of aircraft or engine failure are highly improbable if you perform pre-flight check list and maintenance in accordance with aircraft and engine manufacturer's recommendation.

3.1. Engine failure and emergency landing

3.1.1. ENGINE FAILURE DURING TAKE-OFF RUN	
THROTTLE	***IDLE***
IGNITION	***OFF***
MASTER SWITCH	***OFF***
WHEEL BRAKES	***AS NEEDED***

3.1.2. ENGINE FAILURE DURING TAKE-OFF	
SPEED	***120 km/h***
SELECTION OF LANDING PLACE	***Under 150ft – in flight direction, if it is possible Above 150 ft – choose suitable place for landing –the best in direction of runway or the closest suitable place without obstacles***
IGNITION	***OFF***
FUEL VALVE	***CLOSE***
FLAPS	***EXTEND AS NEEDED AND TRIM***
MASTER SWITCH	***OFF***
SEAT BELTS	***FASTEN***
WHEEL BRAKES	***AS NEEDED WHEN TOUCH DOWN ALL OF WHEEL***

3.1.3. ENGINE FAILURE DURING FLIGHT	
SPEED	***125 km/h***
TRIM	***TRIM AS NEEDED***
LANDING PLACE	***CHOOSE SUITABLE PLACE***

Check, if the ignition were not be switched off or if the fuel valve will not be closed or changed – and continue (related to your height above ground) with engine starting in accordance with Chapter 3.2.1. or emergency landing in accordance with 3.1.2.

3.1.4. CARBURATOR ICING	
SPEED	***130 km/h, min 120 km/h***
THROTTLE	***CHANGE THE REGIME TO AVOID THE POWER LOSSES***
ALTITUDE	***CHANGE THE ALTITUDE TO AVOID ICING CONDITIONS***
CARBURATOR HEATER	***OPEN (if installed)***
ENGINE POWER	***INCREASE SLOWLY TO CRUISE REGIME AFTER 1-2 MINUTES If the power will not be retrieved, land on the closest airfield or continue in accordance with 3.1.2.***

3.2. Engine starting during flight

3.2.1. ENGINE STARTING DURING FLIGHT	
SPEED	***130 km/h***
MASTER SWITCH	***ON***
FUEL VALVE	***OPEN TANK WITH MORE FUEL (CHECK)***
FUEL BOOST PUMP	***ON (IF INSTALLED)***
CHOKE	***ON (ONLY FOR COLD ENGINE)***

THROTTLE	***IDLE** (WITH CHOKE)* ***1/3 THROTTLE** (WITHOUT CHOKE)*
IGNITION	***ON***
STARTER	***START UP***

If there is no possibility to start up the engine (discharged battery), increase the speed to 150-170 km/h in order to spin the propeller, to start up the engine. In case of unsuccessful start up, perform the emergency landing in accordance with 3.1.2.

ATTENTION:
Height loose for start up the engine during flight is about 600 ft

3.3. Fires

3.3.1. ENGINE FIRE ON THE GROUND	
FUEL VALVE	***CLOSE***
THROTTLE	***FULL***
IGNITION	***OFF***
MASTER SWITCH	***OFF***
COCKPIT	***LEAVE THE COCKPIT***
FIRE DAMAGE	***CHECK***

ATTENTION:
Do not perform next fligt until the reason of fire has been found and removed.

3.3.2. ENGINE FIRE DURING TAKE-OFF	
THROTTLE	***IDLE***
FUEL VALVE	***CLOSE***
EMERGENCY LANDING	***IN ACCORDANCE WITH 3.1.2.***

AFTER STOP THE AIRCRAFT	
IGNITION	*OFF*
MASTER SWITCH	*OFF*
COCKPIT	*LEAVE THE COCKPIT*
FIRE DISTINGUISHER	*USE (IF INSTALLED)*
FIRE DAMAGE	*CHECK*

3.3.3. ENGINE FIRE DURING FLIGHT	
FUEL VALVE	*CLOSE*
THROTTLE	*INCREASED TO FULL*
SPEED	*INCREASE – TRY TO EXTUINGUISH FLAMES BY BLOWING OR LEFT/RIGHT SIDESLIP. DO NOT EXCEED V_{NE}*
LANDING PLACE	*AIRPORT OR SUITABLE PLACE FOR EMERGENCY LANDING*
IGNITION	*OFF*
SPEED	*125 km/h*
FLAPS	*EXTENDED AS NEEDED AND TRIM*
MASTER SWITCH	*OFF*
SEAT BELTS	*FASTEN*
EMERGENCY LANDING	*IN ACCORDANCE WITH 3.1.2.*
AFTER STOP THE AIRCRAFT	
COCKPIT	*LEAVE THE COCKPIT*
FIRE DISTINGUISHER	*USE (IF INSTALLED)*
FIRE DAMAGE	*CHECK*
ATTENTION: **Do not try to start-up the engine again after extinguish the fire**	

ATTENTION:
Do not perform next fligt until the reason of fire has been found and removed.

3.3.4. FIRE INSIDE THE COCKPIT (ELECTRIC FIRE)	
VENTILATION	***OPEN ALL VENTILATION TO REMOVE THE SMOKE FROM CANOPY. IT IS POSSIBLE TO OPEN THE CANOPY LITTLE BIT***
CIRCUIT BREAKERS	***SWITCH OFF ALL INDISPENSABLE CIRCUIT BREAKERS***
LANDING	***AS SOON AS POSSIBLE***
AFTER STOP THE AIRCRAFT	
FIRE DISTINGUISHER	***USE (IF INSTALLED)***
FIRE DAMAGE	***CHECK***

3.4. Gliding

Optimal gliding speed	**125 km/h**
Glide ration (for 125 km/h)	**1:8,5**

3.5. Precautionary landing

3.5.1. PRECAUTIONARY LANDING	
LANDING	***CHOOSE SUITABLE LANDING PLACE, EVALUATE DIRECTION AND SPEED OF THE WING, EVALUATE SURFACE, ROUGNESS AND OBSTACLES***
LANDING PLACE INSPECTION	***LOW PASS 125 km/h NEXT TO THE LANDING PLACE AT 150 ft AGL (RECOMMANDED) AND EVALUATE THE PLACE OF LANDING***

LANDING	*NORMAL PROCEDURE 4.9.*
AFTER STOP THE AIRCRAFT	
FUEL VALVE	*CLOSE*
MASTER SWITCH	*OFF*

3.6. Landing with puncture

Perform normal approach procedure and landing, keep the puncture wheel above the ground during landing as long as possible via using the aileron (or elevator for front wheel puncture).

3.7. Landing with damaged landing gear

Perform normal approach procedure and landing, keep the puncture wheel above the ground during landing as long as possible via using the aileron (or elevator for front wheel puncture).

3.8. Vibration or other problems with power unit

3.8.1. Vibration

a) Set engine RPM to power when the vibration are minimal
b) Land as soon as possible, consider out landing, especially when the vibration is increased.

3.8.2. Loose of oil pressure

a) Reduce engine power and land as soon as possible (before the engine is failed), consider out landing.

3.9. Unsuspected icing condition

3.9.1. UNSUSPECTED ICING CONDITION	
THROTTLE	*INCREASED OVER THE CRUISE POWER SETTING*
BEARING	*OPPOSITE OR DIFFERENT – TO AVOID THE AREA WITH ICING CONDITIONS*
ALTITUDE	*CLIMBING, IF IT IS POSSIBLE*

3.10. EXTREME GUST

3.10.1. EXTREME GUST	
SPEED	***REDUCE TO 140 – 150 km/h***
SEATBELTS	***FASTEN***
FREE OBJECTS	***SECURE***

3.11. Electric systems fails

If the charge battery indicator indicates: switch off all of the unnecessary electrical equipment to let the battery power only the essentials equipment.

3.12. Falls and unintentional spins recovery

Fall or spin should not occur during standard flight.

ATTENTION:
Aerobatics, intentional falls and spins are strictly prohibited

3.12.1. Fall recovery

- Decrease the pitch of the nose by pushing the stick – to get higher speed
- Gradually increase the engine power

ATTENTION:
Loose of altitude in level flight caused by stall is 150 – 200 ft / 50 – 60 m

3.12.2. Spin recovery

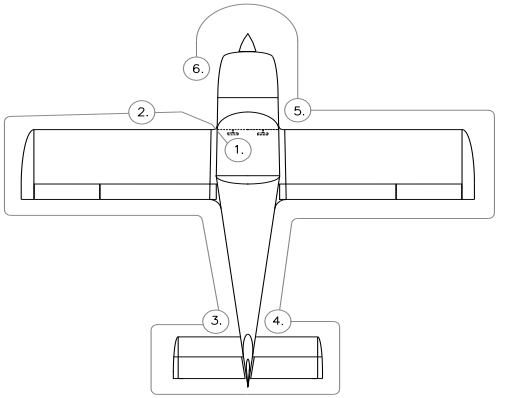
ATTENTION:
Flight charecteristics of the aircraft in the spin were not tested. Following description of the procedure is general and only for INFORMATION

3.12.2.1. SPIN RECOVERY	
THROTTLE	***IDLE***
AILERONS	***NEUTRAL***
RUDDER	***AGAINST ROTATION***
STICK	***PUSH***

When the rotation is stopped, move the rudder to neutral position and make the airplane to straight level flight.

4. NORMAL PROCEDURES

4.1. Pre-flight checklist



4.1.1. COCKPIT	
MASTER SWITCH	***OFF***
IGNITION	***OFF***
UPHOLSTERY MOUNTING	***CHECK***
SEATBELTS	***CHECK***
INSTRUMENTS AND EQUIPMENTS	***CHECK***
STICK CONTROL	***CHECK FREE CONTROL***
RUDDER CONTROL	***CHECK FREE CONTROL***
RUDDER CABLES	***CHECK TENSION AND FREE CONTROL***
THROTTLE	***CHECK FREE CONTROL***
WHEEL BRAKES	***CHECK THE FUNCTION***
CANOPY PLEXI AND RAILS	***CHECK***

4.1.2. LANDING GEAR	
LANDING GEAR AND BRAKES	*CHECK*
LANDING GEAR	*CHECK*
FRONT LANDING GEAR CABLE SPRING	*CHECK*
TYRE PRESSURE	*CHECK*

4.1.3. POWER UNIT	
ENGINE	*CHECK*
PROPELLER	*CHECK*
COTTER PINS AND LOCKING WIRES	*CHECK*
ENGINE BED AND ITS ATTACHMENT	*CHECK*
EXHAUST SILENCER AND ITS ATTACHMENT	*CHECK*
IGNITION SYSTEM	*CHECK*
FUEL SYSTEM, HOOSES, FUEL BOOST PUMP	*CHECK, PURGE*
COOLING LIQUID AND HOOSES	*CHECK*
AMOUNT OF OIL	*BETWEEN MIN AND MAX*

4.1.4. WING	
WING SKIN AND WINGLETS	*CHECK POSSIBLE DAMAGE*
FLAPS – SKIN, HINGES AND DRIVE	*CHECK*
AILERONS – SKIN, HINGES AND DRIVE	*CHECK FREE CONTROL AND DEFLECTION*
TIGHTNESS FUEL TANKS AND PLUGS	*CHECK*

4.1.5. EMPENNAGE AND FUSELAGE	
TAIL SURFACES – SKIN AND DAMAGE, HINGES AND DRIVE	*CHECK*
TAIL SURFACES	*CHECK FREE CONTROL AND DEFLECTION*
TRIM	*CHECK*
SKIN OF FUSELAGE AND SKID	*CHECK*
TOWING HOOK	*CHECK THE FUNCTION*

4.2. Engine start-up

4.2.1. ENGINE START-UP	
PRE-FLIGHT CHECK	*PERFORMED*
SEATBELTS	*LOCK AND FASTEN*
INSTRUMENTS	*CHECK VALUES, SET*
CANOPY COVER	*CLOSE AND LOCK*
MASTER SWITCH	*ON*
FUEL VALVE	*OPEN (RIGHT OR FULL)*
CHOKE	*OPEN (ONLY FOR COLD ENGINE START)*
THROTTLE	*IDLE FOR COLD ENGINE, ½ THROTTLE FOR WARM*
CONTROL STICK	*PULL*
WHEEL BRAKES	*ON*
PROPELLER SAFETY ZONE	*FREE*
IGNITION	*ON*
STARTER	*ON (MAX 10 SEC. WITHOUT INTERRUPTION, THEN TWO MINUTES COOLING)*
AFTER START-UP THE ENGINE	
OIL PRESSURE	*PRESSURE UP TO 10 SEC*
REVOLUTION	*SET TO IDLE WITHOUT VIBRATION*

INSTRUMENTS	*CHECK INDICATION*
CHOKE	*SLOWLY CLOSE*
FLIGHT INSTRUMENTS AND OTHERS	*SET AND SWITCH ON*

4.2.2. Engine heating

4.2.2.1. ENGINE HEATING	
HEATING UP TO OPERATIONAL TEMPERATURE	*2 min 2000 RPM,THEN INCREASE UP TO 3000 RPM TO HEAT THE OIL TO 50 °C*
PRESSURE AND TEMPERATURE	*IN OPERATIONAL LIMITS*

4.2.3. Engine test run

4.2.3.1. ENGINE TEST RUN	
AIRCRAFT POSITION	*FREE IN FRONT AND AFTER THE ACFT, AGAINST WIND, UP THE HILL*
WHEEL BRAKES	*ON*
CHOKE	*OFF*
FUEL	*RIGHT OR FULL*
FLAPS	*RETRACTED*
CARBURATOR PRE-HEATING	*OFF*
PROPELLER	*MINIMUM AOA*
ELEVATOR CONTROL	*PULL UP*
REVOLUTION	*3850 RPM*
IGNITION	*ALTERNATELY OFF (DECREASE SHOULD NOT BE HIGHER THAN 300 RPM AND THE DIFFERENCE BETWEEN EACH CIRCUIT SHOULD NOT BE HIGHER THAN 120 RPM)*
POWER	*CHECK MAXIMUM POWER, REVOLUTION ABOUT 5000 RPM, DEPENDING ON THE PROPELLER*
THROTTLE	*IDLE 1600 +-100 RPM*

WARNING:
Perform test run only on an airplane wedges secured against movement, rotated against the wind and open space. Keep in mind the safety of others. Do not leave the engine running for longer than necessary, and allow him sufficient cooling before you turn it off.

4.3. Taxiing

Maximum taxiing speed is 15 km/h. Always check the function of wheel brakes when the airplane starts taxiing.

4.4. Normal take-off

4.4.1. Normal take-off	
PEDALS	***FREE MOVEMENT***
STICK	***FREE MOVEMENT***
FLIGHT INSTRMENTS	***SET QNH, CHECK***
SEATBELTS	***LOCK AND FASTEN***
CANOPY COVER	***CLOSE AND LOCK***
TRIM	***NEUTRAL***
WHEEL BRAKES	***OFF***
FUEL VALVE	***RIGHT OR FULL***
FUEL PUMP	***ON, (IF INSTALLED)***
FLAPS	***POSITION I***
CHOKE	***CLOSE***
CARBURATOR PREHEATING	***ACCORDING TO NEED***
HEATING	***ACCORDING TO NEED***
REVOLUTION REGULATOR	***SET FOR TAKE-OFF***
TRANSMITTER	***SET FREQ***
TRANSPONDER	***SET AS NEEDED***
ENGINE INSTRUMENTS	***CHECK THE VALUES***
LIGHTS	***ON***

CIRCUIT BREAKERS	***ON***
IGNITION	***ON***
MASTER SWITCH	***ON***
RUNWAY AVAILABILITY	***CHECK***
TRANSMITTER	***REPORT***
THROTTLE	***FULL***

Increase the throttle to full. Slowly lift-off the aircraft after reaching speed **70-80** km/h by gentle pulling the stick and accelerate after unstick. Do not climb until reach 110 km/h.

ATTENTION:
Do not take-off when the engine does not work smoothly or runway is not clear

4.4.2. AFTER TAKE-OFF	
INNITIAL CLIMB SPEED	***120 km/h***
RPM AND MANIFOLD PRESSURE	***5500 RPM 27 inHg***
ENGINE INSTRUMENTS	***CHECK THE VALUES***
FLAPS	***RETRACTED ABOVE 150 ft AND SPEED OVER 120 km/h***
TRIM	***TRIM THE AIRCRAFT***

4.5. Climbing

4.5.1. CLIMBING	
THROTTLE	***5500 RPM max***
SPEED	***120 TO 140 km/h***
FUEL BOOST PUMP	***OFF, (IF INSTALLED)***

4.6. HORIZONTAL FLIGHT

4.6.1. HORIZONTAL FLIGHT	
REVOLUTION	*4000 – 5500 RPM*
SPEED	*ACCORDING TO NEED*
ENGINE INSTRUMENTS	*CHECK VALUES*
FUEL VALVE	*CHANGE LEFT OR RIGHT AS NEEDED*

ATTENTION:
Do not forget to use fuel tanks so as to avoid a shortage of fuel for the engine. When both tanks are full or almost full, select right fuel tank. Do not use both tanks simultaneously

4.7. APPROACHING

4.7.1. APPROACHING – DESCENDING	
THROTTLE	*ACCORDING TO NEED*
ENGINE INSTRUMENTS	*CHECK VALUES*
CARBURATOR PREHEATING	*ACCORDING TO NEED*

ATTENTION:
Avoid further operation on idle during the flight, due to undercolling and then losing the power

4.8. DOWNWIND

4.8.1. DOWNWIND	
THROTTLE	*HORIZONTAL FLIGHT*
SPEED	*120 TO 140 km/h*
ENGINE INSTRUMENTS	*CHECK VALUES*
SEATBELTS	*LOCK AND FASTEN*
FLAPS	*RETRACTED*
WHEEL BRAKES	*CHECK FUNCTION*
FUEL	*CHECK AMOUNT, SWITCH TO FUEL TANK WITH BIGGER AMOUNT*
FUEL BOOST PUMP	*ON, (IF INSTALLED)*
CHECK SITUATION ON RWY	*CLEAR*
CHECK SITUATION IN 3. AND 4. TURN	*CLEAR*
TRANSMITTER	*IF REQUIRED*
CARBURATOR PREHEATING	*ACCORDING TO NEED*

4.9. NORMAL LANDING

4.9.1. BASE LEG	
THROTTLE	*DECREASE FOR DESCENDING*
SPEED	*125 km/h*
PROPELLER REGULATOR	*SET TO 5500 RPM*
ENGINE INSTRUMENTS	*CHECK VALUES*
FLAPS	*POSITION I*
TRIM	*TRIM THE AIRPLANE*

4.9.2. FINAL	
THROTTLE	***DECREASE FOR DESCENDING***
SPEED	***110-115 km/h***
ENGINE INSTRUMENTS	***CHECK VALUES***
FLAPS	***POSITION II AND POSITION III, AS NEEDED***
TRIM	***TRIM THE AIRPLANE***
TOUCH DOWN ZONE	***CLEAR FOR LANDING***

4.9.3. Landing

At altitude about 30 ft set throttle to idle. Keep the speed 100 km/h up to the flare. When the aircraft post flare about 1 or 2 ft. above ground, gently pull the stick and speed down the aircraft up to touch down. Try to keep front wheel above ground as long as possible by pulling the stick.

4.9.4. AFTER LANDING	
WHEEL BRAKES	***USE IF NEEDED***
FLAPS	***RETRACT***
INSTRUMENTS	***SWITCH OFF UNNECESSARY***

4.9.5. ENGINE STOP	
THROTTLE	***COOL THE ENGINE AT 2000 RPM***
CIRCUIT BREAKERS	***OFF***
TRANSMITTER	***OFF***
IGNITION	***OFF***
MASTER SWITCH	***OFF***
FUEL VALVE	***CLOSE***
WHEEL BRAKES	***SET PARK BRAKE***
MOORING	***ACCORDING TO NEED***

4.9.6. Post flight inspection

Check the overall condition of the aircraft.

4.10. MISSED APPROACH	
THROTTLE	***GENTLY MAXIMUM***
SPEED	***REACH min 115 km/h BEFORE CLIMBING***
TRIM	***TRIM THE AIRPLANE***
FLAPS	***SET TO POSITION I***
ENGINE INSTRUMENTS	***CHECK VALUES***
FLAPS	***RETRACT AT ALTITUDE 150 ft***
TRIM	***TRIM THE AIRPLANE***
THROTTLE	***Max 5500 RPM***
CLIMBING SPEED	***125 km/h***

4.11. UNDERSTANDING THE FUEL SYSTEM

The fuel system consists of two integral fuel tanks in the wings, from which leads fuel independently (from left or right fuel tank) into the fuel valve, so the pilot must continuously monitor the fuel level and switch between them as needed power management.

The flight with the procurement of fuel tank, which is signalized as low fuel level, is not allowed and is DANEGOURS!

In accordance with engine manufacturer, the fuel system for Rotax 912ULS (100 HP) engine has return hose to the RIGHT fuel tank.

NORMAL USING OF FUEL SYSTEM FOR ROTAX 912ULS ENGINE AND FULL FUEL TANKS:

1) **START-UP THE ENGINE WITH FUEL VALVE SELECTOR SET TO RIGHT FUEL TANK**

2) When the right fuel tank is not full at all, change the valve to left fuel tank and then change as needed. Return fuel hose goes to right fuel tank. For better lateral levelling is better to change fuel tanks during the flight.

3) Return fuel hose feed the fuel back to the right fuel tank (depending on the engine regime), so the pilot must check the amount of fuel continuously and switch to the right fuel tank when is full.

WARNING:
Do not use left fuel tank for the take-off when the right one is full!!!
Return fuel system feed the right fuel tank and if this one is full, it goes through the venting hole out of the aircraft.

5. FLIGHT PERFORMANCE

These flight performance are valid for standard version of aircraft with a maximum take-off weight 472.5 kg for normal flying technique and ISA conditions (sea level, 15 ° C, 1013 hPa). Current performance may be different due to the experience of the pilot, weather and condition of the aircraft.

ATTENTION:
Various piloting techniques, as well as set the airplane (eg. Setting propeller) can cause significant differences in the performance of the airplane

5.1. CALIBRATION OF SPEED MEASURING SYSTEM

IAS km/h	50	60	70	80	90	100	110	120	130	140	150	160
CAS km/h	-	63	73	83	93	102	111	120	129	138	147	156

IAS km/h	170	180	190	200	210	220	230	240	250	260	270
CAS km/h	165	174	184	193	203	212	222	232	242	252	262

IAS – indicated air speed, *value which is shown on your airspeed indicator*
CAS – calibrated air speed, *true air speed (0 m ISA) = corrected for instrument and aerodynamic error*

5.2. STALL SPEED

Stall speed are valid for 472,5 kg and horizontal flight.

	indication	Stall speed (km/h IAS)
Flaps retracted		**78**
Flaps - Position for take-off	I	**71**
Flaps – Landing position 1	II	**66**
Flaps - Landing position 2	III	**64**

5.3. TAKE-OFF DISTANCE

(Flaps position I)

Grass surface

Engine	Take-off distance	Total take-off distance up to 50 ft
R 912 UL	**130** m	**292** m
R 912 ULS	**120** m	**270** m

Pavement surface (concrete/asphalt)

Engine	Take-off distance	Total take-off distance up to 50 ft
R 912 UL	**120** m	**277** m
R 912 ULS	**110** m	**250** m

5.4. LANDING DISTANCE

Grass surface

Engine	Total landing distance from 50 ft	Landing distance
R 912 UL	**386** m	**108** m
R 912 ULS	**390** m	**108** m

Pavement surface (concrete/asphalt)

Engine	Total landing distance from 50 ft	Landing distance
R 912 UL	**363** m	**91** m
R 912 ULS	**366** m	**91** m

5.5. CLIMB CAPABILITY

Altitude	R 912 UL	R 912 ULS	Speed to reach the best vertical speed (km/h IAS)
0 ft	**4,05** m/s	**5,2** m/s	**135**
	797 ft/min	**1020** ft/min	
3000 ft	**3,12** m/s	**4,3** m/s	**135**
	614 ft/min	**850** ft/min	

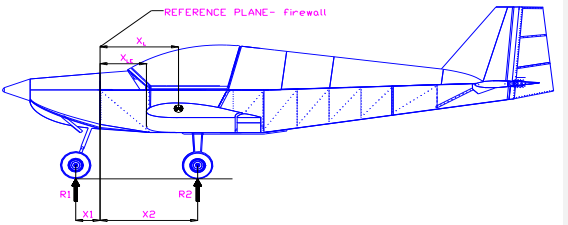
5.6. HORIZ. FLIGHT, RANGE AND ENDURANCE

Rotax 912 ULS 100HP

	RPM	4200	4500	4800	5000	5200	5500
IAS	km/h	136	163	183	199	211	219
CAS	km/h	134	158	176	193	205	213
TAS	km/h	148	160	172	180	188	201
Fuel consumption	litres/h	12,3	14,9	17,5	19,2	21,0	23,6
Endurance	h	7,3	6,1	5,2	4,7	4,3	3,8
Range	km	1080	970	890	840	810	760

6. WEIGHT AND BALANCE

6.1. DETERMINATION OF EMPTY WEIGHT AND C.G. POSITION



The aircraft is weighted on the main wheels - all wheels must have the correct dimensions and inflation. The aircraft is thus in the proper position for standard positioning the centre of gravity. The reference plane is determined by plane of firewall. All the operating fluid must be filled to maximum volume and there remains only unusable fuel in the fuel system. To simplify the work and data collection is drawn Protocol - see Appendices of POH. The following values must be measured:

Reaction on front wheel	R_1	=	XXX	kg
Reaction on left main wheel	R_{2L}	=	XXX	kg
Reaction on right main wheel	R_{2P}	=	XXX	kg

The distance between front wheel axis and reference plane:

X_1 = mm

The distance between main wheel axes and reference plane:

X_2 = mm

Empty weight is computed as follows:

$$M = R_{2L} + R_{2P} + R_1 [kg]$$

The allowable range for empty weight is: 295 – 305 kg
(325 kg with BRS)

C.G. is computed as follows:

$$X_L = \frac{X_2 \cdot (R_{2L} + R_{2P}) - X_1 \cdot R_1}{M} \; [mm]$$

$$X_T = \frac{X_L - 545}{1315} \cdot 100 \; [\%]$$

The allowable range of c.g. position for empty airplane is:

821 – 901 mm behind the reference plane: 21 – 27 % c_{MAC},

The weighing must be performed and registered always when the configuration of the aircraft has been modified:

Date:	Empty weight m [kg]	c.g. position		Performed Date:
		X_L [mm]	X_T [%]	
15.8.2019	325	XXX	XXX	XXX

6.2. DETERMINATION OF WEIGHT AND C.G. POSITION

The correct position of the centre of gravity is secured if the weight limit of the crew, baggage, fuel and equipment are met. (All the limits are defined in section 2 of this manual)

The allowable range for operational c.g. position is:

874 – 1005 mm behind the reference plane: 25 – 35 % c_{MAC},

WARNING:
In the case of installation of non-standard equipment is necessary to determine the actual centre of gravity separate calculation or weighing take-off weight according to the procedure in this section

7. MANIPULATION WITH AIRCRAFT

7.1. PARKING AND MOORING

7.1.1. General

Always protect your aircraft against the motion when it is parked. We recommend to mooring the aircraft in worse weather conditions, or when the aircraft leaving for an extended period of time without supervision (overnight, etc.).

Recommended ground equipment:

- Protection of the pitot probe
- Security set for mooring
- Canopy textile cover, wing textile cover if needed

Pushing or leaning on the control surfaces is prohibited.

7.1.2. Protection of the pitot probe

Probe of pitot-static system must be protected when parking by windproof and pollution protective cover attached. The cover has a red flag.

7.1.3. Mooring

Set for mooring – recommended this minimum equipment:

- 3 mooring hooks
- 2 long a 1 short mooring ropes

Mooring hook should be screwed to the ground and the aircraft should be attached by ropes through these mooring hooks to the stiff parts of the aircraft. It is recommended to mooring the aircraft via landing gear legs and lugs under the ends of wings.

7.2. HANGARAGE

Moving the airplane during hangar parking and so on, it is recommended pushing the empty airplane. Grasp the cone rear of the fuselage at the root of the keel and push it gently down to relieve the nose gear. The aircraft can then be easily controlled by the guidance of the tail. To help others, it is appropriate to push the wing leading edge to backward movement.

7.3. TOWING ON THE GROUND

Towing the aircraft on the ground behind the car is no allowed.

7.4. TYRE PRESSURE

Front landing gear	-	**180 +20**	kPa	/ 26,5 + 3 psi
Main landing gears	-	**180 +20**	kPa	/ 26,5 + 3 psi

7.5. DISASSEMBLING THE AIRCRAFT

7.5.1. Disassembling the wing

In case of wing disassembling, it is necessary to drain the fuel through drain holes under the wings. Additionally prepare a stand or pads for storing the disassembled wings.

For disassembling the wings, three people are needed.

Preparation:

Remove the seat cushions and backrests pilot seats. Dismantle the baggage trunk by unscrewing the fixing screws and pull the trunk out of the fuselage. Dismount caps from the midsection of the beam - the two left and two right at the sides of the fuselage. Remove aerodynamic covers between wing and fuselage and fiberglass over metal strips under the wing.

Disconnect the tube pitot static system - front left seat down.

Disconnect fuel hoses and pipes in front of the wing centre section. When disconnecting substantiate disconnecting place suitable tray to prevent leakage of residual fuel in the fuselage.

Remove the bolts rear hinge wings in the space behind the wall of the backrests.

Remove the nuts (and washers) connecting bolts with wing centre spar (six and six R & L side) and remove bolts connecting the aileron control rod to the lever arm manual control - one each on the left and right. Remove the mounting tape on the sleeves aileron linkage crossing over the sides of the fuselage.

Removing the wing from the fuselage – assistant at the end of the wing relieve the wing and the person at the centre wing section will gradually impact light hammer made from light metal, or via the roller of a softer material sprout bolts connection from the centre wing spar. Alternately, one lower and one upper. For the last couple helper is needed to fully keep the weight wingtip.

Followed by gentle rocking motion at the end of the wings in vertical and horizontal plane, pull up the wing by about 2-3 cm from the centre wing section. Watch pulling pins control flaps and hold the shutter when disconnected its control. Furthermore, disconnect any electrical connectors linking wing - fuselage and check all disconnected routes freedom and leadership. Pull the wing from the imposition of the participation of two persons (front and rear) at the wing root.

Put wing in a rack or on a prepared base. In the case of transport or prolonged storage is needed to blind all hoses, lubricate the connecting points and fix the position of the flaps and ailerons and their control rods.

Disassembling the rudder and horizontal tail

Span of HTU is on the edge of dimension which is allowed to transport the fuselage with connected HTU on the roads.

In case there is a need to disassembled HTU, it is necessary to disassembled the rudder first.

Loosen the turnbuckles rope rudder and elevator in the space between the pilot's seat and tray beneath the baggage compartment - after removing the cover.

Disconnect the cables servo trim and remove its attachment to the rudder and stabilizer.

Rudder dismount after loosening the nut pin down and dismantling joints of control cables to the rudder lever. The upper pin is firmly connected to the rudder - plugged in the bearing.

HTU stabilizer is connected by four bolts. Two of them are on the front spar of VTU and two of them on the aft spar of VTU. They are accessible by removing the cap hole on the right side of the fuselage, under the stabilizer. It is also necessary to remove the cables from the horizontal tail. When all of the nuts are loosen, two persons gently remove the HTU backwards.

8. EQUIPMENT

8.1. INTRODUCTION

This chapter is an integral part of the flight manual for ALTO 912 TG. It describes specific equipment and instrument installation which is used for serial number DF 075 / 2017.

1. Engine Rotax 912 ULS 2, S/N: 9 569 303
2. Additional electric pump
3. Oil Radiator
4. Cooling liquid radiator
5. Airbox
6. FITI ECO COMPETITION, Ground adjustable propeller, 3LR 1580 mm, S/N: 112/2017
7. Emergency equipment system GRS 6/473 SD SOFT B13/R, S/N: 7288-17-4526-8353
8. Two-stick control system
9. Central wheel brake
10. Electric flap, LINAK actuator, Lambert control unit
11. GTX 335 ADS-B Transponder, S/N: 3EE001371
12. Emergency locator transmitter E-04, S/N: 19716
13. Chronometer MD-90
14. Transmitter ICOM IC-A210E, COMM1: S/N: 2301970
15. Transmitter ICOM IC-A210E, COMM2: S/N: 2301971
16. Audiopanel GMA 240, S/N: 1EL002223
17. Seatbelts, 2pcs
18. Digital thermometer PT-6
19. Magnetic compass S/N: 160293
20. Vertical speed indicator BC10-1B S/N: 1851
21. Airspeed indicator BK300, S/N: 2296
22. Altitude indicator 4 FGH 10, S/N: 213032
23. Strobo lights + positioning lights, 2pcs
24. Landing lights, 2pcs
25. VDO fuel gauge L+R
26. Fuel pressure
27. Engine RPM
28. Cooling liquid temperature gauge
29. Oil temperature gauge
30. Oil pressure gauge
31. GPS Garmin AERA 660
32. Fuel valve with start/stop system
33. Garmin GAE 12 Altitude encoder
34. Towing device Evektor-Aerotechnik 764350

nastavil formátování: zvýrazněné

9. TOWING

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10. APPENDIX

- Engine operation manual – created by engine manufacturer
- Weight and balance sheet
- Deflection and levelling sheet