

OK, Let's start from square one!

	Speed	(IAS)	Remarks
V_{max1}	Maximum speed with power plant extended and ignition „ON“	125 km/h 67 kt 78 mph	Do not exceed this speed with power plant extended and ignition switched ON
V_{max2}	ignition „OFF“	160 km/h 86 kt 99 mph	Do not exceed this speed with power plant extended and ignition switched OFF
V_{POmax}	Maximum speed for extending / retracting power plant	110 km/h 59 kt 68 mph	Do not extend / retract the power plant beyond this speed range
V_{POmin}	Minimum speed for extending / retracting power plant	90 km/h 49 kt 56 mph	

V_{max1} = Maximum speed with the engine running at full revs. Any faster than this and the limitation you will exceed is the MAX ENGINE RPM permitted (6600rpm). The reason for this limitation is the centrifugal force of the propeller blades. Exceeding this rpm plus safety margin can throw propeller blades from the hub. The Duo also has engine over speed protection in the form of an IGNITION CUT-OUT to prevent this condition.

V_{max2} = Maximum structural load limit of the ENGINE PYLON ASSY against the airflow. With the ignition switched off, we do not have a problem with exceeding max Engine RPM.

V_{POmax} = Maximum structural and electrical current load limit of the Pylon assembly whilst raising the engine. This is also protected by a 7.5 amp circuit breaker on the engine control panel.

V_{POmin} = Minimum speed to maintain control of the glider whilst the engine is being extended or retracted due to aerodynamic drag and change in C of G.

MAX. PERMITTED A.U. WEIGHT (MASS): 1654 lb / 750 kg				Max. permitted speed				
MAXIMUM PERMITTED SPEEDS (IAS) : km/h kt mph				Altitude		V _{NE} (IAS)		
				[m]	[ft]	km/h	kt	mph
Never exceed speed	262.8	142	163	0	0	262.8	142	163
Rough air speed	180	97	112	1000	3281	262.8	142	163
Maneuvering speed	180	97	112	2000	6562	262.8	142	163
Aerotowing speed	180	97	112	3000	9843	253	137	157
Winch launching speed	150	81	93	4000	13123	241	130	150
Landing gear operating speed	180	97	112	5000	16404	228	123	142
For power plant extension/retraction	110	59	68	6000	19685	215	116	134
With ignition ON	125	67	78	7000	22966	204	110	127
Power plant extended speed	160	86	99	8000	26247	192	104	119
PERMISSIBLE MINIMUM SPEED (IAS)				9000	29528	180	97	112
For power plant extension/retraction	90	49	56	10000	32808	170	92	106

Placards in cockpit match the limitation section in flight manual.

CHECK LIST	
EXTENDING AND STARTING THE POWER PLANT	
<input type="checkbox"/>	OPEN fuel shut-off valve
<input type="checkbox"/>	Switch ASI to pitot head in nose
<input type="checkbox"/>	Set speed to 90-100 km/h (49-54 kt, 56-62 mph)
<input type="checkbox"/>	Ignition ON
<input type="checkbox"/>	Only in manual operation: <i>EXTEND</i> power plant
<input type="checkbox"/>	When power plant is fully extended: PULL decompression handle and HOLD
<input type="checkbox"/>	Accelerate to about 100 km/h (54 kt, 62 mph)
<input type="checkbox"/>	RELEASE decompression handle
	WITH ENGINE RUNNING:
<input type="checkbox"/>	Climb at 90-100 km/h (49-54 kt, 56-62 mph)

From the above starting instructions, we see that the recommended speed for starting the engine is **54kts**. From experience, sometimes this is not enough airspeed to keep the engine spinning after releasing the Decompression handle and the engine will stop spinning over. **(THIS IS WHY YOU ABSOLUTELY MUST USE THE MIRROR TO CHECK FOR PROPELLER ROTATION DURING ENGINE START)** It is hard to tell otherwise sometimes due to the extra wind noise with the engine raised.

Starting the engine in flight (continued)

The loss of height, from the moment of extending the engine until it runs, is approx. 40 m (131 ft).

Should the prop stop spinning after the "DEKO"-handle was released, pull it back again, accelerate to a higher speed (approx. 105 km/h, 57 kt, 65 mph) and repeat starting procedure.

The note above from the flight manual is to cover this situation within the EASA Aircraft Certification Parameters.

It is normal to use 65 knots to start these turbo engines. If the engine has not been used for some time or in very cold conditions, you may need to increase speed up to 75 knots to prevent the engine stopping rotation after the Deco Handle is released. (Experience has shown that 54kts is sometimes not sufficient for the engine to keep rotating after DECO release when the engine has not been used for a while) This engine is more demanding than the single seat Turbo gliders in this regard as it has a reduction drive for the propeller.

The engine will not suddenly go above 6600RPM straight from starting. As you hear the engine increasing rpm (confirmed by the tacho reading), You reduce speed back below 67 knots to prevent an engine overspeed situation and settle it on BLUE LINE SPEED OF 51 kts for best rate of climb. If at any time the rpm exceeds 6500 rpm, the ignition cut off will activate until the rpm decreases below 6500rpm. There is also another ignition cut out in the ilec controller that turns the ign off completely at 6900rpm.

In Summary you have 2 hard limitations that MUST NOT BE EXCEEDED.

- 1- 6600 RPM
- 2- 86 Kts with the Engine Extended.

Happy Flying!