1 Table of Contents

1 Table of Contents .................................................................................................iii
2 General Information ............................................................................................2-1
3 Airplane and Systems Descriptions ...................................................................3-1
  3.1 Engine: Rotax® 912 Series ............................................................................3-1
  3.2 Propeller ........................................................................................................3-2
  3.3 Fuel and fuel capacity ....................................................................................3-2
  3.4 Oil ..................................................................................................................3-3
  3.5 Operating weights and loading (occupants, baggage, fuel, ballast) ..........3-4
  3.6 Structures and Systems Description ..........................................................3-5
  3.7 Carbon monoxide detector ..........................................................................3-9
4 Operating Limitations ......................................................................................4-1
  4.1 Stalling speeds at maximum takeoff weight (VS1 and VS0) ......................4-1
  4.2 Flap extended speed range (VS0 to VFE) ................................................4-1
  4.3 Maximum maneuvering speed (VA) ........................................................4-1
  4.4 Never exceed speed (VNE) ........................................................................4-2
  4.5 Crosswind and wind limitations ..................................................................4-2
  4.6 Service Ceiling ..........................................................................................4-2
  4.7 Load factors ................................................................................................4-2
  4.8 Maneuvers ..................................................................................................4-3
  4.9 Other limitations .......................................................................................4-3
5 Weight and Balance Information ......................................................................5-1
  5.1 Installed equipment list ..............................................................................5-1
  5.2 Center of gravity (CG) range and determination ......................................5-1
6 Performance ........................................................................................................6-1
  6.1 Takeoff distance ..........................................................................................6-1
  6.2 Best rate of climb .......................................................................................6-1
  6.3 Best angle of climb ....................................................................................6-1
  6.4 Cruise speed ..............................................................................................6-1
  6.5 RPM ...........................................................................................................6-1
  6.6 Fuel consumption .......................................................................................6-1
7 Emergency Procedures .....................................................................................7-1
8 Normal Procedures ...........................................................................................8-1
  8.1 Preflight ......................................................................................................8-1
  8.2 Engine start .................................................................................................8-3
  8.3 Taxiing .........................................................................................................8-3
  8.4 Normal takeoff ...........................................................................................8-4
  8.5 Climb ..........................................................................................................8-4
  8.6 Cruise .........................................................................................................8-4
  8.7 Descent .......................................................................................................8-4
  8.8 Before landing ..........................................................................................8-4
  8.9 Normal landing ..........................................................................................8-4
  8.10 After landing ............................................................................................8-5
  8.11 Shut down ................................................................................................8-5
  8.12 Short field takeoff procedure .................................................................8-5
8.13 Balked landing procedure...........................................................................8-5
8.14 Information on stalls, spins and other useful pilot information ..............8-5
9 Aircraft Ground Handling and Servicing.........................................................9-1
  9.1 Servicing fuel, oil and coolant.................................................................9-1
  9.2 Ground handling and tie-down instructions ............................................9-1
10 Required Placards and Markings.................................................................10-1
  10.1 Airspeed indicator range markings .......................................................10-1
  10.2 Operating limitations on instrument panel ............................................10-1
  10.3 Passenger Warning.............................................................................10-1
  10.4 “NO INTENTIONAL SPINS”...............................................................10-2
  10.5 Miscellaneous placards and markings ...................................................10-2
11 Supplementary Information..........................................................................11-1
  11.1 Familiarization flight procedures..........................................................11-1
  11.2 Pilot operating advisories ....................................................................11-1
12 List of amendments.....................................................................................12-1
Appendix 1. Current equipment List.................................................................1
Appendix 2. Variants of instrument panels......................................................2
Appendix 3. Samples of the Weight & Balance and Equipment List...............10
Note: In accordance FAR 21.190 Flight Design has established Aircraft Operating Instructions for the CTSW. The content and format is defined by ASTM standard F2245 and supplemented as deemed necessary by the manufacturer.

2 General Information

Read this before your first flight!

Each pilot must be familiar with the contents of the Aircraft Operating Instructions Manual and abide by all placards, limitations and checklists. Additionally, all Service Directives must be complied with and the Maintenance and Inspections Procedures manual must be used for all maintenance. For maintenance of the Rotax® engine, the BRS emergency parachute system and other installed equipment refer to the original manufacturers’ manuals.

Flight Design CTSWs are delivered worldwide, and comply with a variety of Light Sport airworthiness standards. All configurations are equipped with non-certified engines that meet ASTM standard F2339. Unless otherwise specified, the information given is common to all configurations. Where different, the information is given in the appropriate appendices and supplements.

The Flight Design CTSWs delivered in the U.S.A. are built to conform to the U.S. Light Sport Pilot rules and are intended for Day/VFR use.

This manual is for guidance when operating a CTSW aircraft and is not intended to substitute for any required training received from an appropriately rated flight instructor.

Manufacturer

Flight Design GmbH
Sielminger Str. 65
D – 70771 L.-Echterdingen

Basic description

The CTSW is a conventional two seat high-wing aircraft with three-axis controls. The wings are fully cantilevered, incorporate integral fuel tanks, pushrod actuated ailerons and slotted type flaps that extend downwards for slow speed flight, and reflex upwards for cruise flight. The aircraft is equipped with an all-moving stabilator with a trim tab and tricycle landing gear with a steerable nose-wheel. The primary structures are made of carbon fiber reinforced plastic.
Views and dimensions, inches (mm)

[Diagram with dimensions labeled]
### Geometrical parameters

<table>
<thead>
<tr>
<th>Geometry, mm / inch</th>
<th>Max. length</th>
<th>6214</th>
<th>244.6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Max. height</td>
<td>2165</td>
<td>85.3</td>
</tr>
<tr>
<td>Areas, m² / ft²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wing</td>
<td>9.98</td>
<td>107.4</td>
<td></td>
</tr>
<tr>
<td>Stabilator</td>
<td>1.65</td>
<td>17.75</td>
<td></td>
</tr>
<tr>
<td>Vertical tail</td>
<td>1.32</td>
<td>14.20</td>
<td></td>
</tr>
<tr>
<td>Wing span, m / inch</td>
<td>8.53</td>
<td>335.8</td>
<td></td>
</tr>
<tr>
<td>Aspect ratios</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wing</td>
<td>7.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stabilator</td>
<td>3.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Page Intentionally Left Blank
3 Airplane and Systems Descriptions

3.1 Engine: Rotax® 912 Series

Description

The standard engine is a Rotax 912 UL2, a four cylinder, horizontally opposed, normally aspirated four stroke engine that incorporates air cooled cylinders with liquid cooled heads.

Limitations

<table>
<thead>
<tr>
<th></th>
<th>ROTAX 912 UL2</th>
<th>ROTAX 912 ULS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off performance:</td>
<td>59.6 KW / 81 HP</td>
<td>73.5 KW / 100 HP</td>
</tr>
<tr>
<td>(at 5.800 RPM, max 5 min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. continuous performance</td>
<td>58 KW / 79 HP</td>
<td>69 KW / 95 HP</td>
</tr>
<tr>
<td>(at 5.500 RPM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min RPM before take-off, RPM</td>
<td>4.400</td>
<td>4.500</td>
</tr>
<tr>
<td>Max RPM before take-off, RPM</td>
<td>5.500</td>
<td></td>
</tr>
<tr>
<td>Max cylinder head temperature</td>
<td>120 ºC</td>
<td>248 F</td>
</tr>
</tbody>
</table>

*For a complete description of the engine and limitations see the Rotax 912 Operator's Manual*
3.2 Propeller

For a complete description of the propeller see Operator’s Manual for appropriate propeller

Applicability

<table>
<thead>
<tr>
<th>Propeller Type</th>
<th>CTSW Classic Light</th>
<th>CTSW Classic</th>
<th>CTSW Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuform TXR-65, 2-blade</td>
<td>●</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neuform CR3-65, 3-blade</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Kaspar, 3-blade in-flight adjustable</td>
<td></td>
<td>●*</td>
<td>●*</td>
</tr>
</tbody>
</table>

* - available as an option

3.3 Fuel and fuel capacity

The fuel valve is purely on/off and has to be in the appropriate maximum position. This engine does not have a mixture valve or require leaning.

Fuel specification: Premium Automotive Unleaded per ASTM D 4814, minimum AKI 91 for Rotax 912ULS.
SUPER leaded, DIN 51600, ONORM C 1103
EURO-SUPER ROZ 95 unleaded, DIN 51603, ONORM 1101
SUPER PLUS ROZ 98 unleaded, DIN 51607, ONORM 1100
AVGAS 100 LL.

ATTENTION! AVGAS loads the valve seats with high lead content and forms more combustion chamber deposits and should be used only in case of vapor lock or insufficient octane on auto fuel.

Each wing has an integral fuel tank with a capacity of 65l / 17 U.S. gallons of which 62l / 16.5 gallons are usable.

The total fuel capacity is 130l / 34 U.S. gallons of which 124l / 33 gallons are usable.

For complete fuel specifications see the Rotax 912 Operator’s Manual
3.4 Oil

Only brand-name semi-synthetic or full synthetic 4-stroke motorcycle oil should be used.

<table>
<thead>
<tr>
<th>ROTAX 912 UL2</th>
<th>ROTAX 912 ULS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil, normal operating pressure (below 3.500 RPM)</td>
<td>2.0 – 5.0 bar</td>
</tr>
<tr>
<td></td>
<td>29 – 73 psi</td>
</tr>
<tr>
<td>Oil, min operating pressure (above 3.500 RPM)</td>
<td>0.8 bar</td>
</tr>
<tr>
<td></td>
<td>12 psi</td>
</tr>
<tr>
<td>on very cold start momentarily 7 bar allowed</td>
<td></td>
</tr>
<tr>
<td>Min/max temperature measured at the oil inlet of the engine</td>
<td>50 / 130 ºC</td>
</tr>
<tr>
<td></td>
<td>120 / 266 ºF</td>
</tr>
<tr>
<td>Optimum operating temperature</td>
<td>90-110 ºC</td>
</tr>
<tr>
<td></td>
<td>190-230 ºF</td>
</tr>
<tr>
<td>Oil capacity</td>
<td>3.0 l, min 2.0 l</td>
</tr>
<tr>
<td></td>
<td>6.4 liq pt, min 4.2 liq pt</td>
</tr>
<tr>
<td>Max oil consumption, L per hour / liq pt per hour</td>
<td>0.06 / 0.13</td>
</tr>
</tbody>
</table>

The engine is equipped with a friction clutch to guard against sudden propeller stoppage: for this reason, oils with friction modifiers or additives that favor clutch slippage should not be used.

Diesel engine oils are unsuitable because of their lower temperature tolerances.

For oil change intervals see the Maintenance and Inspection Procedures Manual.

Note: If the engine is primarily run on AVGAS, more frequent oil changes will be required because of possible lead build-up.

For complete oil specifications see the Rotax 912 Operator’s Manual
3.5 Operating weights and loading (occupants, baggage, fuel, ballast)

Operating weights

<table>
<thead>
<tr>
<th></th>
<th>LSA registration</th>
<th></th>
<th>Australia</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USA</td>
<td></td>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>kg</td>
<td>lbs</td>
<td>kg</td>
<td>lbs</td>
</tr>
<tr>
<td>Max. take-off weight</td>
<td>600</td>
<td>1323</td>
<td>544 / 600</td>
<td>1199 / 1323</td>
</tr>
<tr>
<td>Empty plane</td>
<td>314*</td>
<td>693*</td>
<td>303</td>
<td>668</td>
</tr>
<tr>
<td>Typical payload</td>
<td>297</td>
<td>654</td>
<td>241 / 297</td>
<td>531 / 654</td>
</tr>
</tbody>
</table>

* - with BRS 1350 HS

<table>
<thead>
<tr>
<th></th>
<th>BFU / LTF-UL registration</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg</td>
<td>lbs</td>
<td></td>
</tr>
<tr>
<td>Max. take-off weight</td>
<td>472.5</td>
<td>1042</td>
<td></td>
</tr>
<tr>
<td>Empty plane</td>
<td>268</td>
<td>590</td>
<td></td>
</tr>
<tr>
<td>Typical payload</td>
<td>180 / 114.5*</td>
<td>396 / 252*</td>
<td></td>
</tr>
</tbody>
</table>

* - with full tanks

<table>
<thead>
<tr>
<th></th>
<th>BCAR Section S registration</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>kg</td>
<td>lbs</td>
<td></td>
</tr>
<tr>
<td>Max. take-off weight</td>
<td>450</td>
<td>922</td>
<td></td>
</tr>
<tr>
<td>Empty plane</td>
<td>265</td>
<td>584</td>
<td></td>
</tr>
<tr>
<td>Typical payload</td>
<td>185</td>
<td>407</td>
<td></td>
</tr>
</tbody>
</table>

Loading

<table>
<thead>
<tr>
<th></th>
<th>LSA registration</th>
<th>BFU / LTF-UL registration</th>
<th>BCAR(S) registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum weight per seat</td>
<td>118 kg 260 lbs</td>
<td>100 kg 220 lbs</td>
<td>100 kg 220 lbs</td>
</tr>
<tr>
<td>Maximum baggage weight per side</td>
<td></td>
<td>25 kg 55 lbs</td>
<td></td>
</tr>
<tr>
<td>Minimum single pilot weight</td>
<td>54 kg 120 lbs</td>
<td>70 kg 155 lbs</td>
<td>55 kg 122 lbs</td>
</tr>
<tr>
<td>Maximum fuel weight</td>
<td></td>
<td>93 kg 205 lbs</td>
<td></td>
</tr>
<tr>
<td>Minimum fuel weight</td>
<td>9 kg 20 lbs</td>
<td>8 kg 18 lbs</td>
<td>13 kg 29 lbs</td>
</tr>
</tbody>
</table>
3.6 Structures and Systems Description

Fuselage
The fuselage of the CTSW is made of multiple layers of carbon fiber and aramid (Kevlar®) laminated over a dense foam core creating a sandwich structure. The cabin can resist loads from all sides. This provides superior pilot and passenger crash protection and low structural weight.

Wings
The cantilevered wing of the CTSW plugs into 4 hard points at the top of the cabin for attachment to the fuselage. The overlapping spars resist lift loads. The main spar caps are solid carbon fiber wrapped with S glass fibers over a dense Rohacell core. The wing “skin” is a carbon fiber sandwich. The ribs are molded carbon fiber and bonded into place.

Wingtips
The wingtips of the CTSW are highly developed drooped type. They reduce stall speed, improve stability and low speed control of the CTSW.

Fuel system
Fuel is gravity fed to the engine from two integral wing tanks. The total capacity is 130l / 34 U.S. gallons. The usable fuel quantity is 124l / 33 U.S. gallons.
The operation of the fuel valve does not allow the ignition key to be inserted unless the fuel valve is in the “ON” position.

Electric system
The Rotax 912 series of engines are equipped with a “Lighting Coil” type alternator and a rectifier-regulator that converts and regulates the output of the alternator to a nominal 13.5V – 14.2V 250W (roughly 18A).
The battery for the electric starting system is 12V sealed, AGM type.
The dual ignition system is a CDI (capacitive discharge).

Landing gear
The landing gear of the CTSW is of the tricycle type. The nose wheel is steerable through a direct link to the rudder pedals. The main gear legs are heavy duty machined aluminum rods.

Brakes
Hydraulic disk type, actuated through a handbrake lever. Parking brake is set by simultaneous use of the brake lever and parking brake valve.

Control surfaces
The movable surfaces of the CTSW are of aramid-foam-aramid, carbon-foam-aramid, carbon-foam-carbon sandwiches with carbon fiber spars and attachment points.
Rudder
The rudder is of a conventional type and it is aerodynamically balanced and is operated through foot pedals and cables.

Stabilator
The stabilator is an all-moving type stabilizer with a counter-weight and anti servo/trim tab. It is actuated through a flexible push pull cable connected to the dual control sticks.

Ailerons
The Frise type ailerons are controlled with push pull tubes and rod bearings and droop automatically with selection of the flaps.

Flaps
The flaps are of the slotted type, and a pre-selector switch is used to position the flaps from -6° (or -12° for CT-LSA Australia) to +40°. The position of the flaps is indicated on the control panel. The flaps are protected by limit switches at the end limits.

Pitch Trim
Pitch trim is activated through a control wheel located adjacent to throttle quadrant, and acts upon trim tab on the stabilator.

Aileron Trim
Aileron trim is activated through a control wheel located on the console between the pilot seats.

Rudder Trim System
Rudder trim is activated through a control wheel located on the cabin bulkhead above the console and between the pilot seats.

BRS Parachute system
Rocket deployed emergency parachute system. The system is actuated through the red “T” handle located on the cabin bulkhead between the pilot seats. The T handle is secured on the ground with a tagged safety pin. The pin is removed for flight operations. To deploy the parachute, the T handle is pulled out fully to the stop.

Autopilot
Autopilot is an optional equipment. The available autopilots are Digiflight II Series.
- CT Pilot 1 Axis, Digiflight II FP basis (Aileron, later upgrade possible);
- CT Pilot 2 Axis, Digiflight II FP basis (Aileron & Stabilizer, later upgrade possible);
- CT Pilot 2 Axis + vertical speed, Digiflight II FP VS basis (Aileron & Stabilizer with vertical steering).
For a complete description and operating information of the autopilot see Operating Handbook for Digiflight II Series autopilots, TruTrak Flight Systems.
CTSW Classic Light Standard Instrument Panel*

Symbolic notations

1 Ignition lock / start  
2 Fuel valve  
3 12V outlet  
4 Switch panel  
5 Flap position indicator  
6 Flap circuit breaker  
7 Flap switch  
8 Main circuit breaker 30A  
9 Main circuit breaker 25A  
10 Air speed indicator  
11 Three pointer altimeter  
12 Circuit breakers  
13 Slip & bank indicator  
14 Cabin heating  
15 Carburettor heating  
16 Cockpit light  
17 Instrument light

* - instrument panels can be chosen from the list (please see Appendix 2) with accordance to the list of the instruments from the Customer Order
Control Quadrant

Flap position indicator

Ignition switch and starter
3.7 Carbon monoxide detector

Every CTSW aircraft (starting S/N: 07-11-21) is equipped with Carbon Monoxide (CO) Detector. The owner (pilot) is responsible to watch the date on the detector and when necessary – replace it. The owner (pilot) is also responsible to mark the date when install the new one.

Condition – Color: Normal – Yellow, Caution – Green, Danger – Dark Blue. The Quantum Eye is a multi-level Carbon Monoxide Detector. It provides a visual indication of carbon monoxide contamination. Each detector is packaged in a protective bag that when opened activates it. Once activated the minimum product lifetime is 18 months.
Adhesive backing allows it to be easily mounted in the cockpit or any clearly visible surface.

Operating temperature range is from 41° to 100 ° F (5° C to 38° C), relative humidity (RH) range from 25 to 90% RH.
Sensor Regeneration: from caution – 2 hours, from danger – 6 hours.

Note: This information is for examination only. For details please refer to the manufacturer website www.QGinc.com.
4  Operating Limitations

4.1  Stalling speeds at maximum takeoff weight (\(V_{S0}\) and \(V_{S1}\))

\(V_{S0}\): Stalling speed or the minimum steady flight speed in the landing configuration.
\(V_{S1}\): Stalling speed or the minimum steady flight speed obtained in a specific configuration.

<table>
<thead>
<tr>
<th>Flaps</th>
<th>(V_S)</th>
<th>(44 \text{ KCAS (49 KCAS)} )</th>
<th>(81 \text{ km/h CAS (90 km/h CAS)} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6° (-12°)</td>
<td>(V_{S1})</td>
<td>(42 \text{ KCAS} )</td>
<td>(77 \text{ km/h CAS} )</td>
</tr>
<tr>
<td>40°</td>
<td>(V_{S0})</td>
<td>(39 \text{ KCAS} )</td>
<td>(72 \text{ km/h CAS} )</td>
</tr>
</tbody>
</table>

4.2  Flap extended speed range (\(V_{S0}\) to \(V_{FE}\))

The White arc on the airspeed indicator is from \(V_{S0}\) to \(V_{FE}\), flaps 15°.

\(V_{FE}\): Maximum flap extended speed.

<table>
<thead>
<tr>
<th>Flaps</th>
<th>(V_{FE})</th>
<th>(100 \text{ KCAS} )</th>
<th>(185 \text{ km/h CAS} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
<td>(V_{FE})</td>
<td>(80 \text{ KCAS} )</td>
<td>(148 \text{ km/h CAS} )</td>
</tr>
<tr>
<td>15°</td>
<td></td>
<td>(62 \text{ KCAS} )</td>
<td>(115 \text{ km/h CAS} )</td>
</tr>
<tr>
<td>30°</td>
<td></td>
<td>(62 \text{ KCAS} )</td>
<td>(115 \text{ km/h CAS} )</td>
</tr>
<tr>
<td>40°</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3  Maximum maneuvering speed (\(V_A\))

\(V_A\): Design maneuvering speed (above this speed only 1/3 of max. deflection may be given, full or abrupt deflection of the control surfaces may cause structural failure).

<table>
<thead>
<tr>
<th>USA registration</th>
<th>LSA registration</th>
<th>BFU / LTF-UL registration</th>
<th>BCAR Section S registration</th>
</tr>
</thead>
<tbody>
<tr>
<td>km/h</td>
<td>km/h</td>
<td>km/h</td>
<td>km/h</td>
</tr>
<tr>
<td>kts</td>
<td>kts</td>
<td>kts</td>
<td>kts</td>
</tr>
<tr>
<td>(V_A, \text{ CAS})</td>
<td>182</td>
<td>98</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td>193</td>
<td>104</td>
<td>193</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>164</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>89</td>
</tr>
</tbody>
</table>
4.4 **Never exceed speed** (\(V_{NE}\))

\(V_{NE}\): Never-exceed speed.

<table>
<thead>
<tr>
<th>LSA registration</th>
<th>USA</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{NE}, CAS)</td>
<td>268(^2)</td>
<td>145(^2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BFU / LTF-UL registration</th>
<th>km/h</th>
<th>kts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{NE}, CAS)</td>
<td>276(^3)</td>
<td>150(^3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BCAR Section S registration</th>
<th>km/h</th>
<th>kts</th>
</tr>
</thead>
<tbody>
<tr>
<td>(V_{NE}, CAS)</td>
<td>280</td>
<td>151</td>
</tr>
</tbody>
</table>

1 - Without rescue system;
2 - With BRS 1350 HS.
3 - With BRS 1050.

4.5 **Crosswind and wind limitations**

The maximum demonstrated crosswind is 30 km/h / 16 knots.

**CAUTION!** Due to the light operating weights and low minimum flight speeds of Light Sport Aircraft, operations with surface winds in excess of 46 km/h / 25 kts should not be attempted.

4.6 **Service Ceiling**

The Service Ceiling is the maximum altitude at which a climb rate of 100 ft/min / 30 m/min can be achieved. For the CTSW it is 4,250 m / 14,000 feet.

Note: An aircraft must be properly equipped and the pilot appropriately certificated for operations above 10,000 feet / 3,000 m.

4.7 **Load factors**

The maximum maneuvering limit load factor is:

- + 4 g / -2 g Flaps up
- + 2 g / -0 g Flaps down
4.8 Maneuvers
Aerobatics, including intentional spins are prohibited.

4.9 Other limitations
Flight in to known icing is prohibited.
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5  Weight and Balance Information

5.1  Installed equipment list

Please see the Appendix 1.

5.2  Center of gravity (CG) range and determination

Method for determining the Basic Empty Weight

Place the aircraft level on three suitable scales. (If only one scale is available, use leveling blocks and make separate measurements at each gear location). The aircraft leveling reference is the top of the console (tunnel) that runs between the pilot seats.

Note the following measurements:

G1: The weight found at the nose wheel location
G2: The combined weight found at the main wheel locations.

a: 35.63 in. / 905 mm - the distance from the leading edge of the wing to the nose wheel.
b: 58.07 in. / 1475 mm - the distance from the main gear location to the nose wheel location.

The Basic empty weight is the total of weights found at G1 and G2

\[ G_1 + G_2 = G \]

Using the following formula, find the Empty Center of Gravity location of the aircraft.

\[ \frac{(G_2 \times b) - a}{G} = X \]

X - The distance from the leading edge of the wing to the Cg location

Using the weights found on the scales and the weight and balance sheet determine the Basic Empty Weight.

Complete the Weight & Balance and Equipment List.

Determining the Weight and Balance

Using examples (see Appendix 3), find the loaded center of gravity location. Using the center of gravity envelope, plot the loaded center of gravity.
Page Intentionally Left Blank
6 Performance

The performance figures are based on sea level, standard atmospheric conditions and a gross weight that depends on your local certification rules.

6.1 Takeoff distance

<table>
<thead>
<tr>
<th></th>
<th>600 kg</th>
<th>472,5 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-off distance over a 15 m / 50ft obstacle</td>
<td>232 m / 760 ft</td>
<td>186 m / 610 ft</td>
</tr>
</tbody>
</table>

6.2 Best rate of climb

At weight 600 kg and flaps 0°: \( V_Y = 154 \text{ km/h} / 78 \text{kts} \)

6.3 Best angle of climb

At weight 600 kg and flaps 0°: \( V_X = 122 \text{ km/h} / 66 \text{kts} \)

6.4 Cruise speed

Propeller type: Neuform, 2 blade, 1650 mm dia.
Propeller blade incidence at 3/4*r: 27 deg

<table>
<thead>
<tr>
<th>Cruise speed at 75% power</th>
<th>600 kg</th>
<th>472,5 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6° (-12°)</td>
<td>205 km/h / 112 kts</td>
<td>205 km/h / 112 kts</td>
</tr>
</tbody>
</table>

6.5 RPM

Minimum Idle: 1400
Static: 4700
Normal climb: 4800
Maximum: 5800 (5 min)
Max. continuous: 5500
Normal cruise: 4200 – 5200
Cruise @ 75%: 5200

6.6 Fuel consumption

<table>
<thead>
<tr>
<th>Fuel consumption in l/h / U.S. gal/h</th>
<th>Rotax 912 UL2</th>
<th>Rotax 912 ULS</th>
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</thead>
<tbody>
<tr>
<td>at take-off performance</td>
<td>24,0 / 6,3</td>
<td>27,0 / 7,1</td>
</tr>
<tr>
<td>at max. continuous performance</td>
<td>22,6 / 5,6</td>
<td>25,0 / 6,6</td>
</tr>
<tr>
<td>at 75% continuous performance</td>
<td>16,2 / 4,3</td>
<td>18,5 / 4,9</td>
</tr>
</tbody>
</table>
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7 Emergency Procedures

Engine failure

The first action in case of engine failure is to lower the nose and to establish best glide speed: 115 km/h / 63 kts. If the failure occurs during takeoff, it is often best to attempt a landing straight ahead and under control rather than try to turn and return to the runway. The next action should be to identify a field for landing, taking into consideration obstacles, field length, and wind direction. Maintain a minimum speed of 115 km/h / 63 kts at 15° flaps until final approach. Before touchdown, select flaps 40°.

If there is sufficient time and the failure can be identified, an engine restart while in safe flight altitude may be attempted. If the restart is successful it may be possible to proceed to a suitable landing area and perform a precautionary landing.

In case of fire shut off the engine:

- Shut off the fuel valve;
- Turn off the ignition;
- Slip away from the fire if possible;
- Land as soon as possible.

The Emergency Parachute System (BRS)

The BRS system may be used at a variety of altitudes and airspeeds. Situations that might warrant its use may include:

- A loss of control in Instrument Meteorological Conditions
- A structural failure
- A collision in flight
- An irrecoverable spin
- Pilot incapacitation
- Jammed flight controls
- Engine failure over hostile terrain

If possible, before activating the BRS shut off the engine and tighten the seatbelts. To activate the system, pull the T handle all the way to the stop.

**CAUTION!** The operator of a CTSW must be thoroughly familiar with the contents of the BRS Manual and abide by all instructions and limitations within.

Overturn on land

- Carefully unfasten the seat belts and lower yourself first, then your passenger.
- Be careful of any spilled fuel – there may be a fire hazard!
- Leave the airplane immediately.
Failure of the Dynon EMS

Failure of the Dynon EMS (if equipped) does not directly endanger continuation of flight. With a completely failed EMS system the engine data can no more be surveyed by the pilot. To avoid damages to the engine the flight can be continued, but operation should be limited to moderate RPMs (equalling maximum 185 km/h / 100 kts cruise speed at flaps fully negative). Aerotow or banner tow shall not be done with this failure. Ongoing flights to a qualified service station are allowed with the limitations named before. Before such a flight due care has to be given to oil and coolant quantity checks before the flight.

Flap control failure

If failure of the flap control occurred, proceed a suitable landing area and perform a precautionary landing. Use instruction for the flap manual operation.

Instruction for the flap manual operation

1) To activate the manual operation of the flap control printed circuit board (PCB), do as follows.

   a) Turn the flap control switch by 180° with reference to 15° position to illuminate the LED display VD1 and central segments of the automatic operation indicator (provided the processor is in proper working condition).

   This is to notify that the manual operation is switched on and the automatic operation is switched off. The control system is in the stand-by mode.

   b) When the flap control switch is turned by 180° with reference to 30° position, the flaps start to retract (flaps move up)
Located on the plate of the electric mechanism MT-10 is the limit switch which has the function to limit the movement of flaps. This corresponds to the maximum up deflection. When the flaps move, the LED display VD2 illuminates.

c) When the movement of flaps has been accomplished, the control switch should be reset to a neutral position (see item 1, a).

d) When the flap control switch is turned by 180° with reference to 0° position, the flaps start to extend (flaps move down). At this point, the LED display VD3 illuminates. The limit switch located on the MT-10 has the function to limit the movement of flaps.

e) Intermediate flap position (for instance 0°, 15°, 30°) is to be selected by sight according to the position of flaps with respect to the wing. To set the flaps in intermediate positions, if necessary, ensure that flaps move up or down as far as the required position. After that, stop the movement of flaps by setting the flap control switch in a neutral position (item 1, a).

2) To activate the automatic operation, set the switch in one of the designated positions (-6° (-12°), 0°, 15°, 30°, 40°), accompanied by an indication at the display corresponding to the selected position. The movement of flaps in these positions is to be stopped automatically. To change the settings of the automatic operation, if necessary, comply with the instructions “Setting-up of flap positions”.

8 Normal Procedures

8.1 Preflight

A. Cabin

1. Aircraft documents Check
2. Flight controls Free and correct
3. Spar Bolts Installed and secure
4. Ignition Off, key out
5. Electrical equipment Off
6. Radio master Off
7. Master Switch On
8. Flaps Down
9. Master switch Off
10. Fuel Valve On

B. Left side

1. Main gear and tire Check
2. Baggage compartment Secure
3. Antenna Check
4. Aft fuselage condition Check
5. Tie down Remove
6. Vertical Stabilizer Check
7. Stabilator Check
8. Servo tab Check
9. Tie-down Remove
10. Rudder Check

C. Right Side

1. Vertical Stabilizer Check
2. Aft fuselage condition Check
3. Baggage compartment Secure
4. Main gear and tire Check

D. Left wing

1. Flap Check
2. Aileron Check
3. Wing tip Check
4. Wing leading edge Check
5. Pitot tube Check
6. Tie down Remove
7. Fuel cap Secure
8. Fuel tank vent          Aligned
9. Vent manifold           Check

E. Nose

1. Cowling                 Secure
2. Exhaust stack           Secure
3. Nose gear               Check
4. Engine intakes          Clear
5. Landing Light           Check
6. Spinner                 Secure
7. Propeller               Check
8. Cowling                 Secure
9. Oil quantity            Check (follow the Rotax Manual)
10. Fuel                   Drain and Check
11. Static port            Clear

F. Right Wing

1. Leading edge            Check
2. Tie down                Remove
3. Wing tip                Check
4. Aileron                 Check
5. Flap                    Check
6. Fuel cap                Secure
7. Fuel tank vent          Aligned
8. Vent manifold           Check
8.2 Engine start

1. Preflight Complete
2. Parking Brake Set
3. Carburetor heat Off
4. Circuit breakers In
5. Radios and Electrical equipment Off
6. Master Switch On
7. Anti-collision lights On
8. Fuel Valve Open
9. Ignition key In
10. Choke As required
11. Throttle Closed
12. Ignition Switch Start and release
13. Choke Adjust
14. Oil pressure Check
15. Radios Set
16. Flaps Up

8.3 Taxiing

1. Brakes and Steering Check

Before takeoff

1. Parking Brake Set
2. Seat belts Secure
3. Doors Closed
4. Flight Controls Free and correct
5. Flight Instruments Set
6. Choke Off
7. Carburetor heat Off
8. Throttle 3200 RPM
9. Engine Indications Check
10. Ignition Check Left, Right, & Both (max. drop 300 RPM/max diff. 120 RPM)
11. Oil temperature Min 51°C / 124°F
12. Throttle Idle
13. Flaps Set for takeoff
14. Trim Set for takeoff
15. Radios Set
16. Parking Brake Release
8.4 Normal takeoff

1. Flaps 0° to 15°
2. Throttle Full
3. Carburetor heat Off
4. Climb at MTOW:
   - 600 kg 95 km/h / 51 kts flaps 15°
   - 472.5 kg 78 km/h / 42 kts flaps 15°

8.5 Climb

1. Power 5500 RPM (max. continuous)
2. Best angle of climb speed Vx = 66 kts flaps 0°
3. Best rate of climb speed Vy = 78 kts flaps 0°

8.6 Cruise

1. Power Set
2. Engine Instruments Check

8.7 Descent

1. Carburetor heat As required
2. Altimeter Set

8.8 Before landing

1. Seatbelts Secure
2. Airspeed 100 km/h / 54 kts
3. Flaps 15° to 40°
4. Carburetor heat Off

8.9 Normal landing

Flaps as desired, 40° for short field
Airspeed (VFE):

<table>
<thead>
<tr>
<th>Flaps</th>
<th>0°</th>
<th>100 KCAS</th>
<th>185 km/h CAS</th>
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<tr>
<td>15°</td>
<td>80 KCAS</td>
<td>148 km/h CAS</td>
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<tr>
<td>30°</td>
<td>62 KCAS</td>
<td>115 km/h CAS</td>
<td></td>
</tr>
<tr>
<td>40°</td>
<td>62 KCAS</td>
<td>115 km/h CAS</td>
<td></td>
</tr>
</tbody>
</table>
8.10 After landing

1. Landing light Off
2. Flaps Retract

8.11 Shut down

1. Parking brake Set
2. Radios Off
3. Electrical equipment Off
4. Ignition Off
5. Master switch Off

8.12 Short field takeoff procedure

Flaps 15°
Parking brake Set
Power Full
Brakes Release
Rotate 80 km/h / 44 kts

8.13 Balked landing procedure

Power Full
Flaps 15°
Airspeed 110 km/h / 59 kts

8.14 Information on stalls, spins and other useful pilot information

Stalls
The CTSW exhibits conventional characteristics with a slight buffet at the onset of the stall. There is no tendency to roll in a coordinated stall. Directional control should be maintained through use of the rudder. Recovery is also conventional: release pressure on the control stick to reduce the angle of attack. Apply full power, and slowly recover.

Spins
The CTSW is not certified for spins.

In the event of an unintentional spin:
1. Reduce power to idle
2. Center the ailerons
3. Apply rudder in the opposite direction of rotation
4. When the rotation stops, smoothly recover from the resultant dive.
If an unintentional spin is entered and the altitude is such that a safe recovery cannot be made, the ballistic parachute system should be deployed.

**Steep turns**
Enter with coordinated use of rudder and ailerons. Increase pitch and power as necessary to maintain altitude and airspeed. Do not exceed 60° of bank angle.
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9 Aircraft Ground Handling and Servicing

9.1 Servicing fuel, oil and coolant

Fuel
The fuel tanks are equipped with vented fuel caps that are located on the upper surface of the wing. The fuel caps must be in place for flight, with the vents facing forward. A calibrated dip stick, with left tank and right tank indications, is supplied to check the fuel quantity. The aircraft must be grounded during refueling and secured from open flame.

Note: The aircraft finish may be damaged by exposure to fuel; any spills should be immediately cleaned up.

Oil
For an accurate oil measurement:
1. Set the Parking brake.
2. Check the Master switch is off, and the Ignition key is out.
3. Open the top cowling hatch.
4. Open the Oil tank.
5. Turn the propeller in the direction of rotation until you hear a pronounced gurgling sound from the oil tank. This the oil returning from the engine back to the oil tank. If you do not complete this procedure your oil level will read low.
6. Check the oil level. If it is not sufficient, remove the top cowling and add more oil to the tank. Be careful to not overfill.

Coolant
To check the coolant level:
1. Set the Parking brake
2. Check the Master switch is off, and the Ignition key is out.
3. Open the top cowling hatch.
4. Check the coolant level. It should be between min. and max. marks.
5. If it is not sufficient, remove the top cowling, open the cap of the coolant tank and add coolant to fill up the tank.
6. Make sure that no air is inside the cooling system.
7. Close the coolant tank cap.
8. If necessary, add coolant to the expansion tank.

9.2 Ground handling and tie-down instructions

Moving the CTSW

The aircraft can be moved by one person.
1. Check that the parking brake is off.
2. Check that the area around the aircraft is clear of obstacles and people.
3. Push down on the tail boom of the aircraft to lift the nose gear off the ground.
Be careful not to damage antennas mounted on the fuselage’ bottom.

4. Push the aircraft in needed direction.

Tie down instructions

1. Attach tie down lines from the ground to the tie-down rings on the undersurface of the wings.
2. Place the tail boom tie-down strap around the tail boom and secure to the ground with mooring lines.
3. Stop wheels with a wheel chocks.
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10 Required Placards and Markings

10.1 Airspeed indicator range markings

**Aircrafts with LSA registration**

<table>
<thead>
<tr>
<th>Marking</th>
<th>Speed Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>White range (flap operating range)</td>
<td>72 … 115 km/h 39 … 62 kts</td>
</tr>
<tr>
<td>Green range (normal operating range)</td>
<td>81 [91*]..222 km/h 44 [49*]... 120 kts</td>
</tr>
<tr>
<td>Yellow range (caution range)</td>
<td>222 … 269 km/h 120 ... 145 kts</td>
</tr>
<tr>
<td>Red line (never exceed speed)</td>
<td>269 km/h 145 kts</td>
</tr>
</tbody>
</table>

* - with flaps in (-12°) position

**Aircrafts with LTF registration**

<table>
<thead>
<tr>
<th>Marking</th>
<th>Speed Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>White range (flap operating range)</td>
<td>72 ... 115 km/h 39 ... 62 kts</td>
</tr>
<tr>
<td>Green range (normal operating range)</td>
<td>94 ... 245 km/h 51 ... 132 kts</td>
</tr>
<tr>
<td>Yellow range (caution range)</td>
<td>245 ... 260 km/h 132 ... 140 kts</td>
</tr>
<tr>
<td>Red line (never exceed speed)</td>
<td>301 km/h 163 kts</td>
</tr>
</tbody>
</table>

**Aircrafts with BCAR Section S registration**

<table>
<thead>
<tr>
<th>Marking</th>
<th>Speed Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>White range (flap operating range)</td>
<td>61 ... 122 km/h 33 ... 66 kts</td>
</tr>
<tr>
<td>Green range (normal operating range)</td>
<td>74 ... 219 km/h 40 ... 118 kts</td>
</tr>
<tr>
<td>Yellow range (caution range)</td>
<td>219 ... 278 km/h 118 ... 150 kts</td>
</tr>
<tr>
<td>Red line (never exceed speed)</td>
<td>278 km/h 150 kts</td>
</tr>
</tbody>
</table>

10.2 Operating limitations on instrument panel

MAX: RPM 5800, EGT 1616F, CHT 248F, Oil Temp. 266F, Oil Press. 102 psi
or
MAX: RPM 5800, EGT 880ºC, CHT 120ºC, Oil Temp. 130ºC, Oil Press. 7 bar

10.3 Passenger Warning

The warning* “This aircraft was manufactured in accordance with Light Sport Aircraft airworthiness standards and does not conform to standard category airworthiness requirements” is placed on the instrument panel or in a place where a passenger will see it.

* - actual for aircrafts with LSA registration only
10.4  "NO INTENTIONAL SPINS"

The placard “NO INTENTIONAL SPINS” is placed close to the airspeed indicator.

10.5  Miscellaneous placards and markings

Type of Fuel     2 x beside filling cap

<table>
<thead>
<tr>
<th>Fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>MINIMUM 91 Octane Auto Fuel</td>
</tr>
<tr>
<td>or 100 LL AvGas</td>
</tr>
<tr>
<td>17 Gallons Per Side</td>
</tr>
<tr>
<td>(16.5 L max)</td>
</tr>
</tbody>
</table>

Red marking  5800 RPM     Tachometer
Red marking  5 bar         oil pressure gauge
Red marking  130ºC         oil temperature gauge
Red marking  120ºC         water temp gauge (cylinder head)

Oil pressure gauge
max 102 psi 7 bar
min 12 psi 0,8 bar

Throttle     lever box

Choke        lever box

Stabilator Trim     lever box

Brakes       lever box

Flaps        flap indicator
Oil quality

Cowling hatch backside

Circuit Breakers
right side of the central console

Main Circuit Breakers
right side of the Central console

Fuses
Switch panel (Middle Console, depends on panel type)

Main fuses
Instrument panel

Maintenance/packing interval
BRS Manual & Chute placard

Baggage Compartment
Baggage area

**Baggage Compartment**
max. 55 lbs.
25 kg.
each side

Doors
External door side, under the window

**Open Door Thru Vent**
Internal door side, under the window

**OPEN**
Do Not Open Doors In-Flight

**CLOSED**
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11 Supplementary Information

11.1 Familiarization flight procedures

See the Pilot Training Supplement for familiarization procedures*.

* - actual for aircrafts with LSA registration only

11.2 Pilot operating advisories

None at this time.
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## 12 List of amendments

<table>
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<th>Date released</th>
<th>Affected chapters</th>
<th>Affected pages</th>
<th>Approved by</th>
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<td>6; 8</td>
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<td>13; 14</td>
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<td>4 Operating Limitations</td>
<td>15; 17; 19</td>
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<td></td>
<td>10 Required Placards and Markings</td>
<td>36</td>
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<td>2</td>
<td>05-Oct-2005</td>
<td>4.5 Crosswind and wind limitations</td>
<td>15</td>
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<tr>
<td></td>
<td></td>
<td>6 Performance</td>
<td>27</td>
<td></td>
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<tr>
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<td></td>
<td>8.2 Engine starting</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.4 Normal takeoff</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td></td>
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<td>8.5 Best angle of climb speed (Vx)</td>
<td>33</td>
<td></td>
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<td>8.6 Cruise</td>
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</tr>
<tr>
<td>9.1: “3 to 4 times in the direction of rotation, while you hear the air gurgling in the oil tank” changed to “in the direction of rotation until you hear a pronounced gurgling sound from the oil tank. This the oil returning from the engine back to the oil tank. If you do not complete this procedure your oil level will read low.”; “refill the oil tank” changed to “add more oil to the tank. Be careful to not overfill.”</td>
<td>9-1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2: Title “Towing (moving)” changed to “Ground handling”; “Install mooring” changed to “Attach tie down”; “blocks” changed to “chocks”</td>
<td>9-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>29-Apr -08</td>
<td>8.4 corrected</td>
<td>8-4</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 1. Current equipment List

The current equipment list should be inserted here. Old equipment lists should be kept so that the history of the aircraft is properly documented. They should be marked by hand with the word “INVALID”. The owner of the aircraft is responsible for ensuring that a valid equipment list is available.
Appendix 2. Variants of instrument panels

Symbolic notations

1  Dynon EFIS 100 Flight information system
2  Dynon EMS 120 Engine monitoring system
3  Autopilot CT Pilot 2 Axis (Digiflight II)
4  Air Speed Indicator
5  Altimeter
6  Radio Garmin SL series & Transponder GTX series
7  Radio King KY series & Transponder KT series
8  GPS Garmin 496
9  -
10 Air speed indicator D 80mm
11 Three pointer altimeter D 80mm
12 Variometer D 57mm
13 Slip & bank indicator
14 UMA analogs (RPM meter, Oil pressure, Oil temperature, Cylinder head water temperature, Volt meter*)
15 Hobbs hour counter
16 Trutrack ADI

* - Volt meter excluded on CTSW Classic Light ready to fly modification.
CTSW Classic Light

CTSW Classic Light base instrument panel
CTSW Classic Light additionally equipped with Honeywell Radio and Transponder
CTSW Classic Light additionally equipped with Garmin Radio and Transponder
CTSW Classic

CTSW Classic base instrument panel
CTSW Classic additionally equipped with Autopilot, Nightflight package with TruTrack ADI, Garmin GPS, Radio and Transponder
CTSW Advanced

CTSW Advanced (Dynon) instrument panel
CTSW Advanced additionally equipped with Autopilot, Nightflight package, Garmin GPS, Radio and Transponder
Appendix 3. Samples of the Weight & Balance and Equipment List

Sample of the Weight & Balance and Equipment List for aircrafts with LSA registration

The acceptable empty Cg range is 9.45 to 14.17 inches.
The acceptable empty Cg range is 240 to 360 mm.

### Weight & Balance and Equipment List

<table>
<thead>
<tr>
<th>Weight</th>
<th>Weight &amp; Balance Worksheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>CTSW Classk</td>
</tr>
<tr>
<td>Name</td>
<td>ASI</td>
</tr>
<tr>
<td>Producer</td>
<td>SFMS443</td>
</tr>
<tr>
<td>FAULON GAUGE</td>
<td>-0.12</td>
</tr>
<tr>
<td>Datum</td>
<td>Compass</td>
</tr>
<tr>
<td>Leveling</td>
<td>Top of fuselage tunnel</td>
</tr>
<tr>
<td>Varometer/VSI</td>
<td>S-210-20</td>
</tr>
<tr>
<td>Tachometer</td>
<td>19-519-211</td>
</tr>
<tr>
<td>Radio</td>
<td>Bendix/King</td>
</tr>
<tr>
<td>Oilpressure gauge</td>
<td>N04133V130P070</td>
</tr>
<tr>
<td>Oiltemp gauge</td>
<td>N1211V500F000</td>
</tr>
<tr>
<td>Water temp gauge</td>
<td>N1211V500F020</td>
</tr>
<tr>
<td>Battery</td>
<td>HAWKER</td>
</tr>
<tr>
<td>Rescue system</td>
<td>BR5-0 1300HS</td>
</tr>
<tr>
<td>Fly Dat</td>
<td>Hobbs</td>
</tr>
<tr>
<td>Clock</td>
<td>Batter/King</td>
</tr>
<tr>
<td>Al (Horizontal)</td>
<td>T765ATSO</td>
</tr>
<tr>
<td>Transponder</td>
<td>AR-M601F2</td>
</tr>
<tr>
<td>Turn and Bank</td>
<td>B</td>
</tr>
<tr>
<td>GPS</td>
<td>EXIT 4K450</td>
</tr>
<tr>
<td>Vomimeter</td>
<td>N14110007V060</td>
</tr>
<tr>
<td>Altitude holder</td>
<td>120/2X/260X</td>
</tr>
</tbody>
</table>

### Weight & Equipment List

<table>
<thead>
<tr>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empty weight</td>
</tr>
<tr>
<td>Fuel (53 kg Max)</td>
</tr>
<tr>
<td>Pilot (Min 54 kg Max 118 kg)</td>
</tr>
<tr>
<td>Passenger (Max 118 kg)</td>
</tr>
<tr>
<td>Port Baggage (25 kg max)</td>
</tr>
<tr>
<td>Starboard Baggage (25 kg max)</td>
</tr>
<tr>
<td>Gross (600 kg max)</td>
</tr>
<tr>
<td>Take Off Weight (600 max)</td>
</tr>
</tbody>
</table>

### Flight CG (RANGE 0.337-0.478 m)

<table>
<thead>
<tr>
<th>Weight</th>
<th>Arm</th>
<th>Moment</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg</td>
<td>m</td>
<td>kg/m</td>
</tr>
</tbody>
</table>

### Center of Gravity Limit

- **Reference** gross (kg), tare (kg), net (kg):
  - from G1: 51.2
  - from G2: 274

- **Weight Gc**: 325.2
- CG empty (mm) according to G2/b/c=G=
  - empty CG limits from: 240 to 300
  - Weight CG: 325.2

- **Weighted by**: Khorosan, Ukraine, 12/01/200X

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**Note:**

- **Arm (mm)**
  - a = 835
  - b = 1420

- Fedorun
- Location
- Date
Sample of the Weight & Balance and Equipment List for aircrafts with BFU / LTF-UL registration

<table>
<thead>
<tr>
<th>Weight and Balance and Equipment List</th>
<th>Model</th>
<th>Serial-Nr</th>
<th>Motor-Nr</th>
<th>Weight and Balance Sheet</th>
<th>Technical data according data sheet</th>
<th>Weight and Equipment</th>
<th>C.G position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CTSW</td>
<td>XI-X-2X</td>
<td>4X3415</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
<th>C.G position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>299.8 kg</td>
<td>-200</td>
</tr>
<tr>
<td></td>
<td>172.7 kg</td>
<td>-380</td>
</tr>
<tr>
<td></td>
<td>472.5 kg</td>
<td>-380</td>
</tr>
<tr>
<td></td>
<td>401.3 kg</td>
<td>-380</td>
</tr>
</tbody>
</table>

The acceptable empty Cg range is 240 to 360 mm.