TITLE : Permacool 1060 Thermostatic Oil Bypass Valve

APPLICABILITY : **Rotax 91x series engines**
Mod Type : **New build & Retro-fit**

1. Introduction

The fitting of a thermostatic oil bypass valve between the engine and the oil cooler offers the following benefits:-

1) Quicker initial engine warm-up.
2) Overcooling in cold weather is prevented.

This modification describes the installation of the Permacool 1060 thermostatic oil bypass valve. The valve opens up a path for the oil to flow around the engine while mostly bypassing the oil cooler. As the oil temperature reaches 82°C, the thermostat begins to move a piston allowing more oil through the oil cooler. At 88°C the thermostat is fully open and all the oil flows through the oil cooler.

The valve must not be fitted without reference to the aircraft manufacturer and adherence to any detailed instructions they may have. DO NOT install this valve if a) the oil cooler is installed inverted (with the connections at the bottom) or b) the oil cooler is mounted vertically and the outlet hose cannot be connected to the upper fitting. See Figures 5 and 6.

2. Parts List

Qty	Part No.	Description	Source
1	Permacool 1060	Thermostatic valve	ConAir Sports Ltd Wayland House, Station Fields Fenny Compton Southam, CV47 2XD tel 01295 771088 www.conairsports.co.uk
1	Oil hose	Oil hose as required	
4	3/8in NPT fittings	Fittings with bore ≥ 9mm	
4		Hose clamps	

List of related Drawings / Photo's

Drawing No.	Title / Description	Issue
Figure 1 & 2	Installation diagram for horizontal and vertical mounted coolers	1
Figure 3	General view of disassembled valve	1
Figure 4	Example installation in a Europa aircraft	1
Figures 5 & 6	Examples of unsuitable installations	1

Action

3.1 Installation Overview. See any instructions provided by the aircraft manufacturer. Disconnect the aircraft battery. Given the rigidity of the oil pipes it is not essential to firmly mount the valve to the aircraft structure. If loosely mounted, it is essential to ensure that the valve is not allowed to move sufficiently to contact any surrounding structure. Mount the valve clear of fuel hoses & other temperature sensitive components. In extreme cases the valve's body could reach a temperature of 150°C.

3.2 Oil hoses. Remove the oil hoses and clamps referring to any aircraft manufacturer's instructions.

3.3 Thermostatic Valve Due to it's position in the oil circulation system any debris left in the valve could damage the oil pump before being trapped by the oil filter. If the valve was supplied by ConAir Sports Ltd it should have a certificate indicating that the valve has been opened, cleaned and all internal burrs removed. If no certificate accompanies the valve or it was obtained from any other source the valve must be opened, deburred, cleaned and reassembled. See Figure 3. You will need circlip pliers to do this. Lightly oil the bore as the valve is reassembled. After cleaning and reassembly, screw on the four (3/8in NPT) hose fittings using Loctite 2701 or Loctite 648. Angled or Banjo type fittings are usually too restrictive to ensure

adequate oil flow. The minimum bore of fittings should be 9mm (or equivalent cross sectional area) without sharp bends. If the suitability of the fittings is questionable a suction measurement on the oil inlet close to the oil pump should be carried out in accordance with the Rotax installation manual.

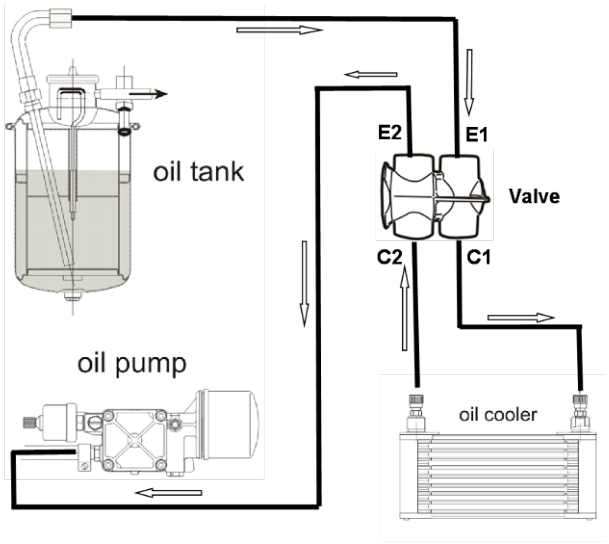

Figure 1 Installation for HORIZONTAL cooler

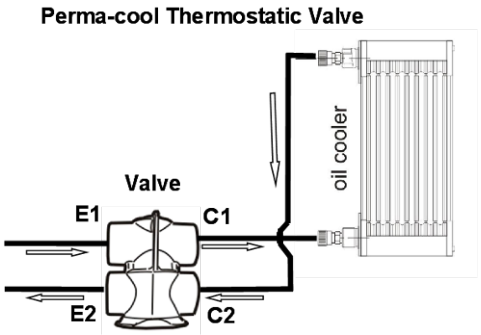

Figure 2 Installation for VERTICAL cooler

3.4 Connections. See Figures 1 & 2 and connect the valve as follows:-
a) Connect C1 with the inlet hose to the oil cooler
b) Connect C2 with the outlet hose from the oil cooler
c) Connect E1 with the suction hose from the oil tank
d) Connect E2 with the suction hose to the oil pump

Do not install the oil hoses with small radius bends. Do not over tighten the hose clamps

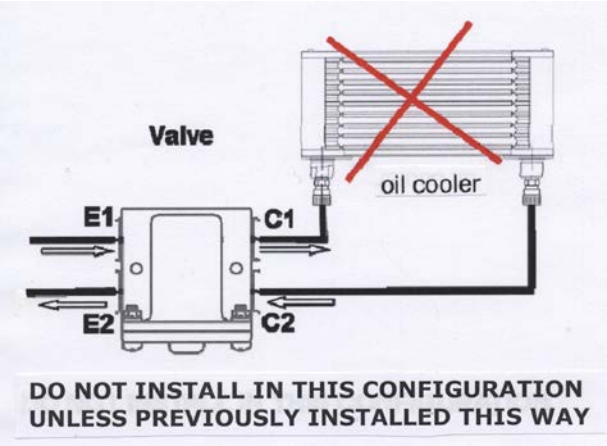

Figure 3. Inverted oil cooler may only be used if oriented this way before installing valve.

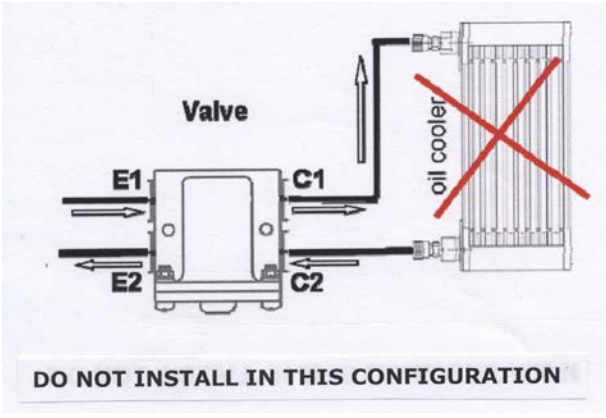

Figure 4. Unsuitable down flow

3.5 Fill and purge oil system. Refer to the current issue of the Rotax instructions SI-27-1997 “Oil level check” and SI-04-1997 “Venting of lubrication system”.

4 Weight and Balance

	Weight (lb/kg)	CG (in/mm)	Moment (lb.in)
Existing A/C			
+/- Weight Change	+1 lb (0.5Kg)		
Post Mod A/C			

Amend the aircraft weight and balance schedule accordingly.

5 Flight Test and Special Instructions

5.1 Before the modified aircraft may be flown, a suitable LAA inspector must check the installation, including that the valve has been correctly re-assembled after checking that the internals were free from contamination, paying particular attention that the circlip is properly seated within its groove. When satisfied, the inspector will make an appropriate logbook entry, including the modification number SM12793 and sign a Permit Maintenance Release (PMR).

5.2 Conduct a flight including a 5 minute continuous climb at best rate of climb speed, V_Y and at full throttle. Do not allow engine to exceed limits. Monitor the oil temperature throughout the flight and record the maximum. Some oil will always flow through the oil cooler so if the oil cooler is oversized the oil temperature may still struggle to reach optimum operating levels. If oil temperatures fails to exceed 80°C contact ConAir Sports Ltd for advice on how to proceed.

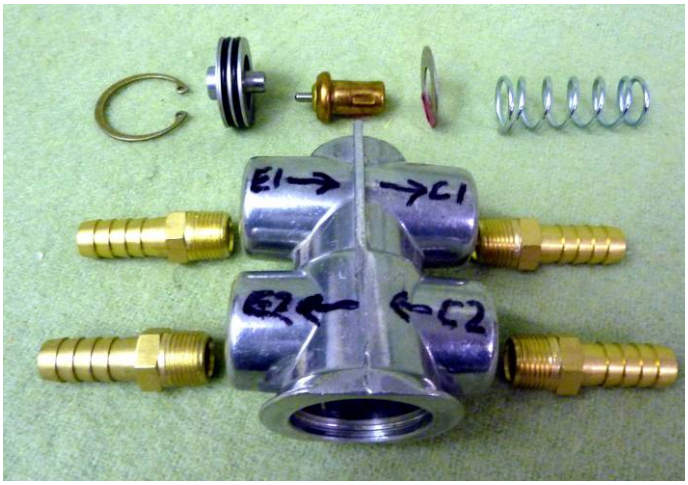

Figure 5 Disassembled valve


Figure 6 Example of valve installation in a Europa aircraft.

Approved:	F Donaldson B.Tech C.Eng FRAeS Chief Engineer	Signed:	FRDon