

PPLN Clip, Oven and Temperature Controller User Guidelines

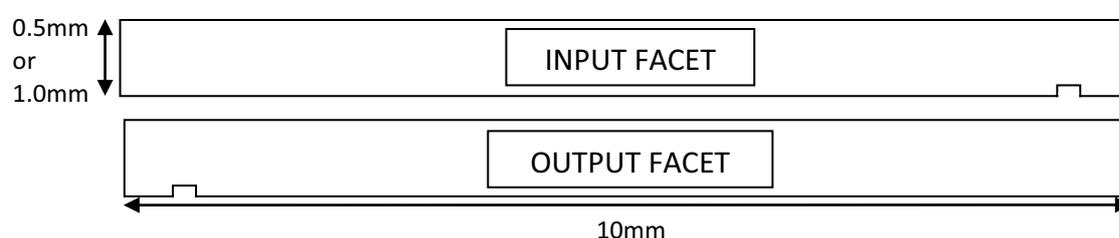
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Covesion offers several components which allow complete wavelength conversion solutions to be constructed. The **PPLN Clip**, in which PPLN crystals are mounted, is designed to allow easy handling and mounting of the crystal within the oven. The **PPLN Oven** permits operation of the PPLN crystal at elevated temperature, allowing temperature tuning and minimisation of photorefractive damage. The **OC1 Temperature Controller** is designed to offer optimum temperature control of the PPLN crystal within the oven. The following document describes the recommended operational procedures for the various components.

PPLN Clip

Covesion's PPLN crystals are supplied mounted in clips, consisting of a clip body, an ITO coated glass spacer, and the clip springs. The design of the clip ensures that the crystal is held in place precisely and as such can simply be mounted in a PPLN oven. Under no circumstance should the user attempt to remove the crystal from the clip. If unmounted crystals are required, then these can be obtained directly from Covesion Ltd.



The crystals are marked with an alignment groove on underneath, see the diagram above. For mounted 10, 20 and 40mm crystals, the serial number is scribed on the side of the clip and the crystal alignment mark is also on the same side. In the case of the 1mm crystals this can be obscured by the clip, therefore please note the serial number is scribed on the input facet side of the clip. The gratings within a crystal increase in period the closer they are to the alignment groove, i.e. period increases from left to right with respect to the input facet.

Users must take care not to mark the optical facets of a PPLN crystal during handling. If the optical facet does become contaminated during use, then it can be wiped with a cotton bud soaked in Isopropanol (IPA), although care must be taken not to damage antireflection coatings that are present.

PPLN Oven

Covesion's PPLN oven is designed for optimum operation of PPLN crystals at elevated temperatures, and also offers a convenient and accurate method of mounting and aligning optical crystals within an optical train.



Figure 1. Oven top removal



Figure 2. PPLN clip installation

The oven top is removable using a 2mm hex driver to take out the two retaining bolts (or four in the case of the PV40). Then slide the top in the vertical direction to remove the insulation and expose the heater (shown in figure 1). The PPLN Clip sits on top of the heater, locating on the dowel pins. When installing a PPLN Clip ensure that it is safely located on the dowels, and is sitting flat on the heater thus ensuring maximum heat transfer to the clip (shown in figure 2).



Figure 3. Oven top replacement

When replacing the oven top, check that the recess for the cable is on the correct side. It must also be ensured that the spring pins, which push the clip onto the heater, locate properly and will not be damaged as the top is pushed on. As the oven top is relocated gently push down towards the heater and tighten the retaining bolts (shown in figure 3). Do not use excessive force to tighten the retaining bolts, otherwise thread damage may occur making it impossible to fasten the oven top.

The PPLN oven can be operated in a number of different configurations, which through the removal of insulation allows increased access to the PPLN crystal, however a decrease in oven efficiency and stability will occur. The oven can be operated without the oven top in place, this can be achieved by following the removal procedure outlined above. If greater access to the PPLN crystals optical facets is required, then the end plates of the oven can be removed. The end plate is removed by using a 1.5mm hex driver to take out the three retaining bolts. When replacing the end plates, a similar degree of care must be taken as is associated with the removal and replacement of the oven top, excessive force applied to the retaining bolts may result in damage to the oven.



Figure 4. Oven configurations

The oven can therefore be operated in one of four configurations; fully insulated (recommended), top off only, end plates off only, and top and end plates off (all configurations shown in figure 4). Care must be taken not to touch hot components when the PPLN oven is operated in any state other than the recommend fully insulated configuration.

The PPLN oven utilises a 12-24V 3.6-15W element and a PT100 resistance temperature sensor, which are cabled and connected to a plug for convenient connection to the OC1 temperature controller. The variable power rating of the heater allows the heating characteristics to be tailored to the specific oven being using, for example 3.6W produces stable operation for a fully insulated PV10 (oven suitable for crystals of length 10mm and below) but for an uninsulated PV40 (oven suitable for crystals of length 40mm and below) up to 15W may be required in order to produce suitable operating parameters. The PPLN oven offers a stability of $\pm 0.01^{\circ}\text{C}$, when used with

Covesion's OC1 controller and when the oven is fully insulated. The maximum continuous operating temperature for the PPLN oven is 210°C, with an absolute maximum temperature rating of 220°C. The PPLN oven and any PPLN crystals should not be heated or cooled at a rate greater than 25°C/min. Exceeding maximum operating temperature or ramp rates can result in oven or crystal damage. The OC1 controller is tuned such that it does not exceed the maximum ramp rate when heating the PPLN clip, crystal and oven. The maximum OC1 set temperature is 200°C.

Operating Parameters

Maximum Operating Temperature	PPLN Clip + Crystal	210°C continuous 220°C max
	PPLN Oven	210°C continuous 220°C max
Maximum Ramp Rate	PPLN Clip + Crystal	25°C/min
	PPLN Oven	25°C/min
Operating Voltage (Power)	PPLN Oven	12V (3.6W)
		18V (8.3W)
		24V (15W)

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