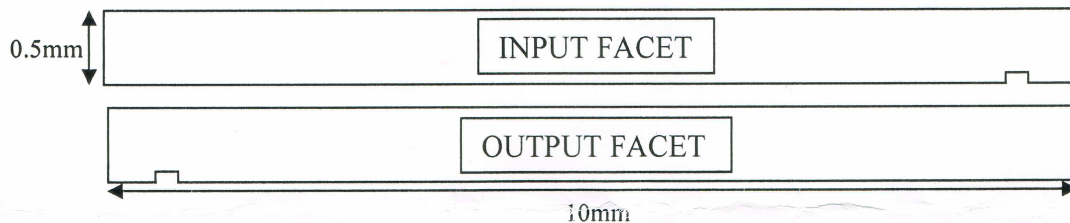


PPLN Clip, Oven and Temperature Controller

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 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 an alignment body, a window and retaining 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.



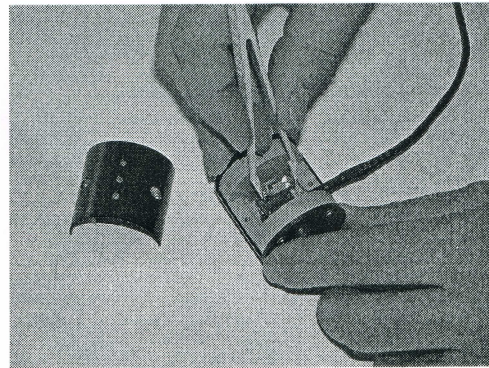
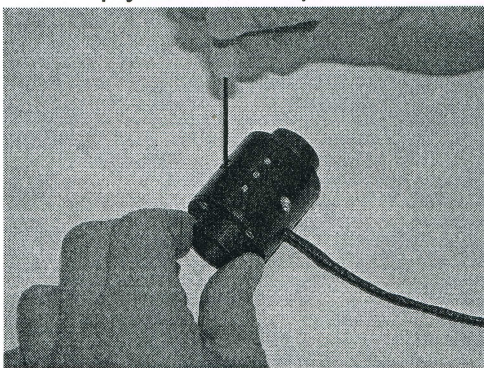
The crystals are marked with an alignment groove on underneath, see the diagram above. In the case of the 1mm crystals this can be obscured by the clip, therefore please note the serial number is scribed on the input facet side of the clip. The gratings within a crystal increase in period the closer 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. The oven can be mounted using 25mm diameter optics mounts or microscope objective mounts (requires alternative mounting plates).

The top of the oven is removable using a 2mm hex driver to take out the two retaining bolts, and then simply 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 two dowels. 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).

When replacing the oven top ensure that the spring pins, that 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 the cable towards the heater, this ensures that the heater and sensor cable do not foul the lid, tighten the retaining bolts and release pressure on the cable (Shown in figure 3). During oven top replacement it is vital that cables do not become trapped between the top and bottom of the oven, if this occurs damage may result. Do not use excessive force to tighten the retaining bolts, otherwise thread damage may occur making it impossible to fasten the oven top.

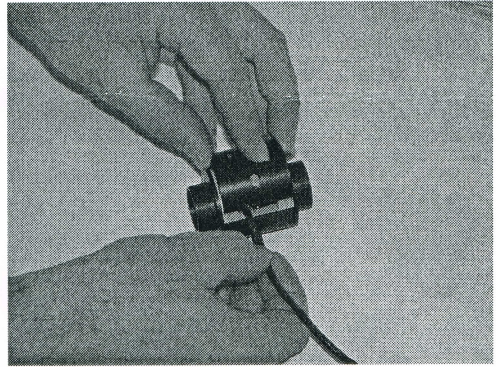


Figure 3. Oven top replacement

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 mounting plates and associated insulation can be removed. The mounting plate is removed by using a 1.5mm hex driver to take out the four retaining bolts; removal of the insulation is then possible by using a 2mm hex driver to take out the two retaining bolts (shown in figure 4). When replacing the mounting plates and insulation, 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 or cable trapping may result in damage to the oven. The oven can therefore be operated in one of four configurations; fully insulated (recommended), top off only, mounting

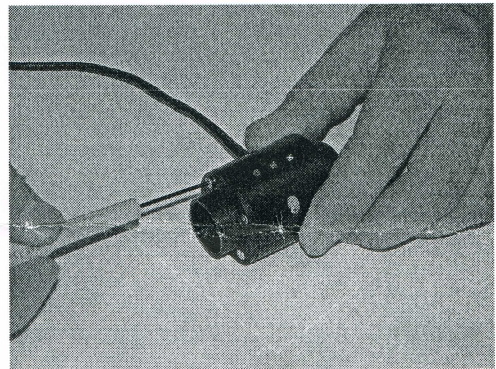
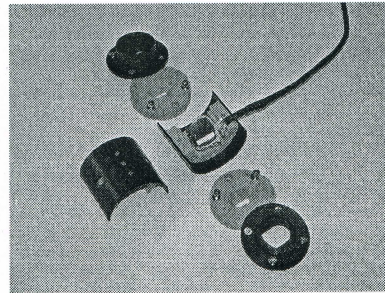
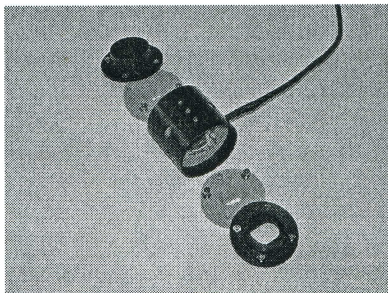
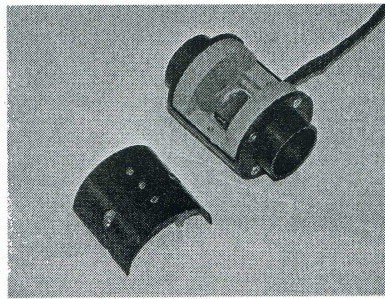
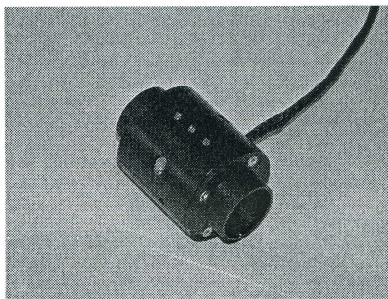


Figure 4. Mounting plate removal





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plates/insulation off only, and top and mounting plates/insulation off (all configurations shown in figure 5). 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 thermometer, these are cabled and connected to a plug for convenient connection to the 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 $\pm 0.1^{\circ}\text{C}$, with used with a suitably tuned Temperature Controller, the correct supply voltage 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 $10^{\circ}\text{C}/\text{min}$. Exceeding maximum operating temperature or ramp rates can result in oven or crystal damage.

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	$10^{\circ}\text{C}/\text{min}$
	PPLN Oven	$10^{\circ}\text{C}/\text{min}$
Operating Voltage (Power)	PPLN Oven	12V (3.6W) 18V (8.3W) 24V (15W)

PPLN Clip Assembly Instructions

Covesion supplies its standard PPLN crystals mounted in clips, for ease of use and an added degree of robustness. Covesion cannot take responsibility for the longevity or performance of crystals that have not been mounted by Covesion staff. However, the following instructions outline how customers may use the clips to mount non-Covesion crystals.

The PPLN clip consists of three main components; the clip body, an ITO coated glass spacer, and the clip springs. The components are supplied in two sample boxes. The first contains the clip body with clip springs fitted. The second contains an ITO coated glass spacer, with the ITO surface face down.

To mount a crystal in the clip;

- Completely remove the clip springs by unfastening the screws.
- The crystal should then be placed in the clip body, and the ITO coated glass spacer placed on top of the crystal. The ITO coated surface should be in contact with the top surface of the crystal, this reduces any charge build up due to thermal cycling.
- The clip springs should then be replaced carefully, with equal force being applied via both screws at anyone time. With all the screws tightened there should be sufficient force on the springs to hold both the spacer and crystal in place. Please ensure the crystal is securely held before moving the clip.

The clip is designed to hold crystals that are 10mm wide and 0.5mm thick, with a length of 1mm, 10mm, 20mm or 40mm depending upon the specific clip used. Attempting to mount crystals of other dimensions will result in damage to the crystal or clip, or may lead to a crystal being insecurely mounted.

If you require any further advice on crystal mounting, please contact Covesion directly by either e-mailing sales@covesion.com or calling +44 (0)1794 521638