Using the fiber optic interface with a Spectrum One NTS

The Hellma fiber optic interface (L1240059) can be used with a standard Spectrum One NTS that has an internal DTGS detector. This document describes the installation, preliminary checks and operational guidelines for the interface equipped with a Hellma 0.5 mm or 1.0 mm transmission probe.

Routine remote liquids testing can be performed using a PerkinElmer fiber interface clamp, together with a Hellma fiber interface (L9001122), connected to Hellma NIR 600 micron fibers (L9001121) and Hellma liquids transmission probe (L9001120), and a PerkinElmer modified sample compartment baseplate.

Installing the fiber optic interface for the first time

1. Connect the fiber pair to the Hellma fiber probe and to the Hellma cuvette-style interface.
   Ensure the fibers are pushed fully in the interface before tightening the clamp screws.

2. Fit the Hellma interface into the PerkinElmer clamp, taking care not to stress the fibers.
   The interface is held into the clamp at a angle of approximately 45 degrees, as shown in Figure 1.

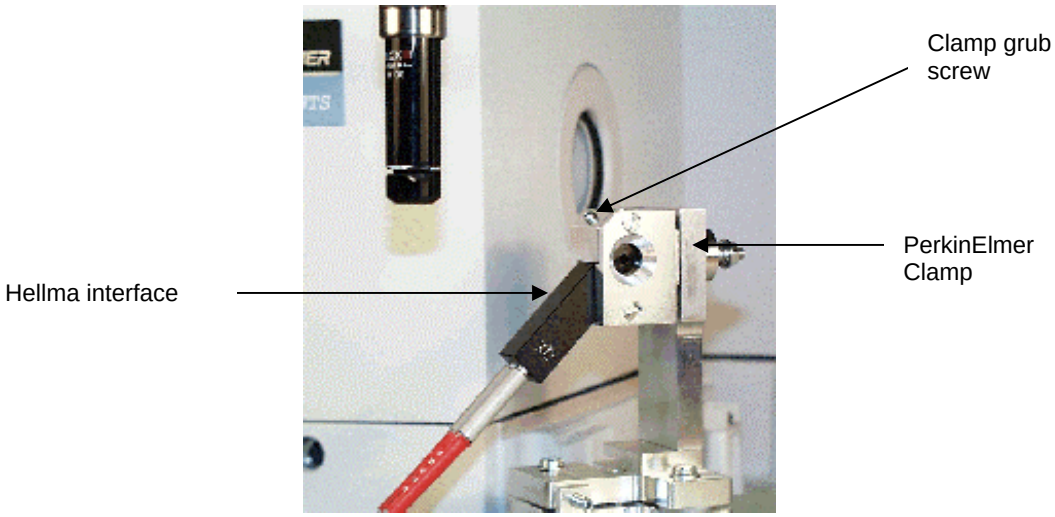

Figure 1 Hellma interface fitted into the PerkinElmer clamp

3. To secure the Hellma interface in position, tighten the grub screw using the hexagonal wrench provided.

4. Once fitted, remove the whole assembly from the sample compartment and visually check that the input lens of the interface is located at the center of the input aperture of the clamp.

PerkinElmer™ instruments.

Post Office Lane, Beaconsfield, Buckinghamshire HP9 1QA, England
Tel. Beaconsfield +44(1494)676161
Fax: +44(1494)679331

5. Replace the assembly in the sample compartment.
6. Start **Spectrum** software.
7. From the Setup menu select **Instrument**.
8. Select the Accessory tab.
9. Select **User defined**.
   A drop-down list of user defined configurations is enabled.
10. From the drop-down list select **Fiber probe**.
11. Click **Apply**.
12. Close the Spectrum One NTS Scan and Instrument Setup dialog but do not close Spectrum.
13. Place a white card over the window to the detector.
    This is the window on the right-hand side of the sample compartment.
14. Note the position of the image of the output beam on the card.
    The image should be circular and approximately 12 mm in diameter.
15. If necessary, use the hexagonal wrench provided to adjust the image until it coincides with the center of the window.
    There are two adjustment screws on the PerkinElmer clamp, one moves the beam in the horizontal direction and the other moves the beam in the vertical direction, as shown in Figure 2.

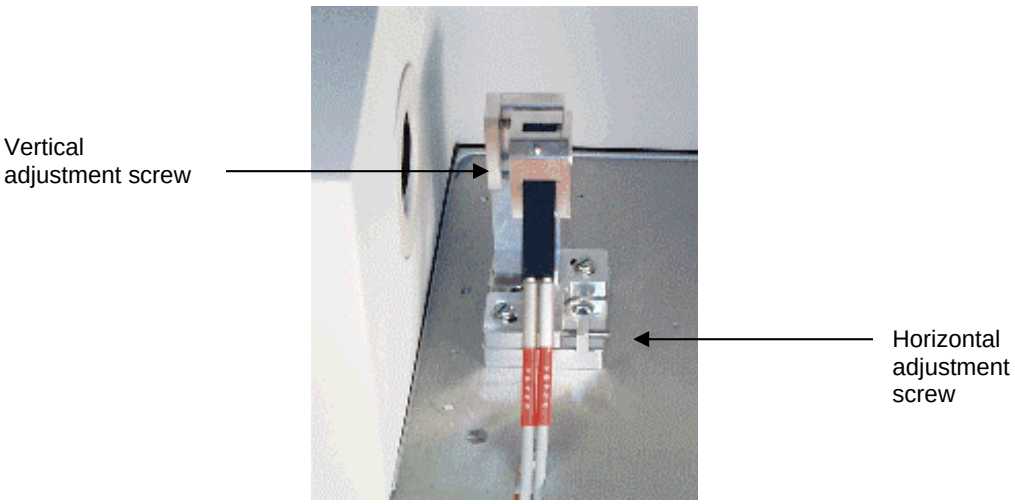

Figure 2 Two adjustment screws

16. Once the beam is centered, remove the card.
17. From Spectrum, select **Monitor** from the Instrument menu.

    The energy bars should be displayed by default. If necessary, click  on the toolbar of the Spectrum One NTS Scan and Instrument Setup dialog.

    With the standard Hellma fibers and probe fitted, the value of the energy should be approximately 1 - 1.5% of the value obtained for an open beam through the sample compartment.

18. If necessary, maximize the energy by adjusting the horizontal and vertical adjustment screws.
    The beam must remain in the center of the window.

19. Click **Exit** to close the Monitor window.

20. Select **Scan** from the Instrument menu.

21. Scan a background spectrum over the range 10000 to 3000 cm^{-1}, using a resolution of 16 cm^{-1}, for approximately 2 minutes.

22. Check that the energy between 3700 and 3000 cm^{-1} is less than 0.5 % of the value of the background maximum.
    If the energy over this range is greater than 0.5% it suggests that the Hellma interface is not correctly positioned, allowing light to travel straight through the interface/clamp mechansim.

23. Unscrew the horizontal clamp situated at the front of the baseplate.
    The clamp is situated over a ⊓ shaped slot that has been machined out of the front edge of the baseplate.

24. Route the fibers through the center of this clamp and through the front slot in the baseplate.

25. Refit the clamp to secure the fibers into position.
    Take care not to overtighten the clamp.

26. Fit the sample compartment lid and close it.
    Keep the lid closed at all times.

27. Clamp the fiber probe into its operational position, ensuring that the fibers are not stressed.

NOTE: *It is advisable to let the fibers 'relax' for an hour after the probe has been clamped into position.*

28. From the Instrument menu select **Scan**.

29. Scan a background spectrum for 1 minute with a resolution of 16 cm^{-1}.

30. Scan a sample spectrum for 1 minute with the same resolution.
    The noise level at approximately 6200 to 6000 cm^{-1} should be less than 0.0003 A peak-to-peak.

Once assembled, the entire system comprising Hellman probe, fibers, interface and PerkinElmer clamp can be left assembled. It can be removed and re-fitted into the sample compartment as a single unit.

NOTE: *It is advisable to re-check the beam alignment after refitting the unit. Re-adjust as necessary.*

Operational Guidelines

- Use a resolution of 16 cm^{-1}.
- Scan times of 1 to 2 minutes for background and sample scans is sufficient for most routine solvent identification applications.
- Take care to route the fibers through the slot at the front of the modified baseplate. Ensure that there are no sharp bends in the fibers before closing the sample compartment lid.
- Leave the sample compartment lid closed at all times.
- Results will be improved by clamping and leaving the probe in a vertical position (tip downwards), as shown in Figure 3.

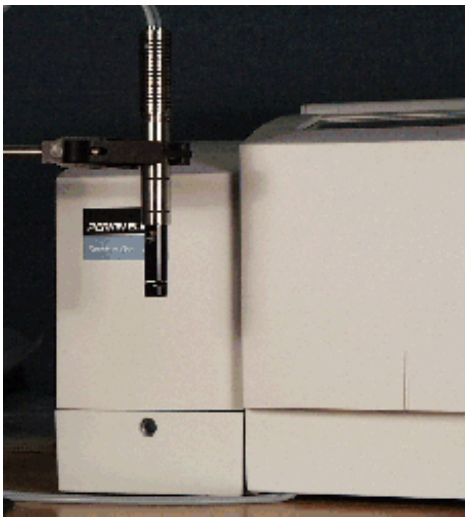

Figure 3 Probe in the vertical position with the tip downwards

- When sampling:
  - Raise the sample to the probe, do not move the probe.
  - Make sure the probe tip is immersed before starting the scan.
  - Make sure that air bubbles are not trapped in the light path at the probe tip.
- Follow the operator's instructions for care and cleaning of the probe.