

TECHNICAL NOTE TN-07

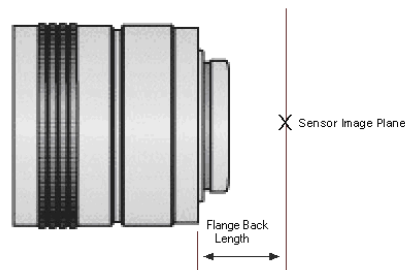
Problem	How to check and adjust back focal length (BFL) of the enhanced series spectrograph?	Date	8th of July 2015
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1. Introduction

Most machine vision CCD and CMOS cameras do have standard C-mount to attach objective lens. SPECIM spectrographs use the same mount type.

- The back focal length is the distance from last lens surface to detector
- Flange back length is the distance of mechanical mounting surface to detector and is defined to be 17.526mm.

Due to manufacturing tolerances all CCD cameras do have a small difference in their C-mount flange back length and also the lens back focal length (BFL) varies from lens to lens. The BFL can also change due to adding an order-blocking filter (OBF)* or adding or removing a NIR blocking filter. This results in a change in optical path length between spectrograph and CCD. If the BFL is not within specified tolerances it may cause a situation where spectral and spatial images are not properly focused at the exactly same image plane.



2. How to check BFL

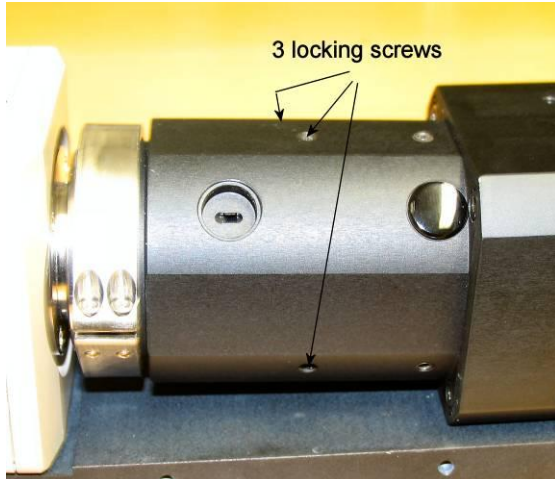
Best way to verify that BFL is ok is to use a light source with narrow spectral peaks like spectral calibration lamp or standard fluorescent lamp.

- Place the lamp very close to the input slit and without the objective lens attached. The whole numerical aperture of the spectrograph should be filled. If integrating sphere is available the measurement can also be done using a objective looking inside the sphere.
- If the BFL is correct the observed spectral line widths are within specified spectral resolution values (refer to test report shipped with the spectrograph). If the BFL is erroneous the line widths are much broader than specified values.

Second indication of wrong BFL is that the front objective is not able to make a good focus either to infinity or to the closest distance marked to the objective (or specified by the objective manufacturer). However, this is not always a problem related to the spectrograph but could also be a faulty objective. Therefore this method is not as reliable as the first one.

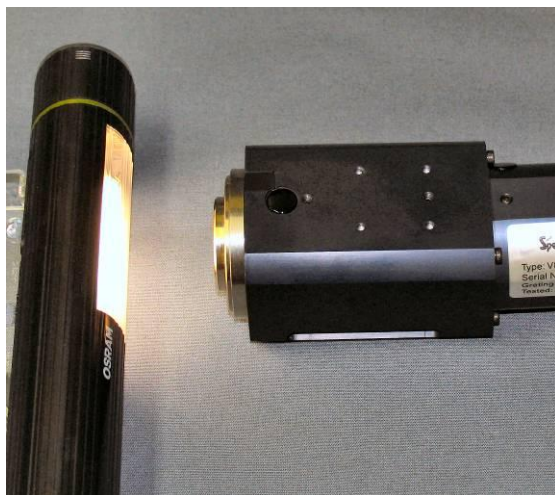
*See technical note 2: Use of order blocking filter (OBF) with ImSpector

3. BFL adjustment



Loose the hex locking screws (3 pcs) from positions shown in image. Note: one screw not seen in this photo. It is situated symmetrically 120° from the other two.

Tool required: M2.0 hex screwdriver



Position the spectrograph in front of the spectral source (or integrating sphere illuminated using spectral lamp).

Fill the whole numerical aperture.

Lamp shown in the image is Osram Dulux Mobile.



Spectrograph should be in horizontal position for adjustment.

Adjust the spectral peaks to their narrowest width / highest intensity value. Use a narrow tool to move the focusing lens back or forth from the focusing groove.

After adjustment tighten locking screws.