

RLD & RLU System matching

Overview

The RLE system is supplied with a 'laser unit', matched to either one or two 'detector heads'. Renishaw perform an optimising process known as "system matching" to configure the detector head to a specific laser unit. This application note explains the purpose of this process and the requirement for maintaining the same RLD/RLU configuration.

Detailed Description

Due to manufacturing tolerances the optical power output from any RLU laser fibre is not predictable and will not necessarily be the same as that from another RLU laser fibre. This applies equally to the two fibres of a dual axis system as it does from one RLU laser to another. A label showing the supplied RLD serial numbers is affixed to the rear of the RLU laser unit. Additionally, each fibre and detector head cable is fitted with a colour coded marker indicating which is Axis 1 (yellow marker) or Axis 2 (red marker).

Since the signal strength obtained is directly proportional to the optical output power from the fibre, each RLU laser unit is matched to either one or two RLD detector heads with which it will be used prior to shipping to make a complete RLE fibre optic laser encoder system. The matching process is designed to give the best chance of achieving 100% signal strength (equivalent to 1V measured on the appropriate signal strength output pin on the AUX I/O connector).

Renishaw strongly recommends that the RLD(s) that are supplied with the RLU are kept with that RLU to ensure optimal performance. The consequences of changing the RLD connected to a RLU or fibre will include:

- Low signal strength (below the acceptable threshold) will trigger a beam low error and the axis status LED will appear continuously amber.
- High signal strength (exceeds 120%) will trigger a beam saturation error and the axis status LED will appear continuously amber. It may also cause interpolation errors if using the digital quadrature outputs.
- Low signal strength will make system alignment difficult, especially at longer distances.
- Excessive DC offset (figure 1) and unequal sine and cosine levels (figure 2) will cause non-linearity errors (also known as interpolation error or sub-divisional error or SDE).

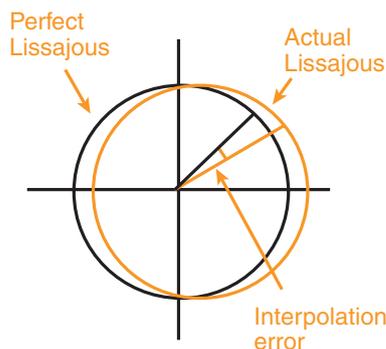


Figure 1- DC Offset

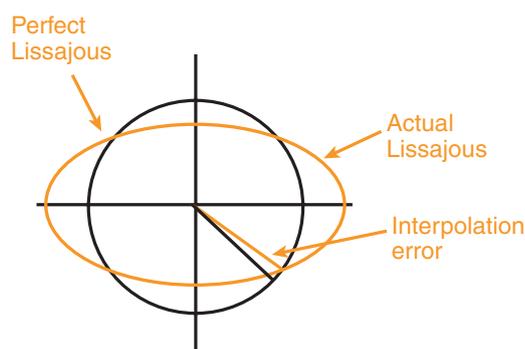


Figure 2- Unequal Signal Levels

For more information please visit www.renishaw.com/lasercalsupport

Summary

System matching of RLU and RLD is essential to ensure correct system performance. For this reason it is also essential that RLD heads are not moved from one system to another, doing this will require the heads to be matched to the new laser unit.

Caution

Under normal circumstances there should be no requirement to adjust the gains of the RLD. Adjustments to the RLD can cause system performance errors as described on the previous page. Only perform adjustment to the RLD's if the engineer has been correctly trained in the procedure and is authorised to do so.

In the unlikely event of a RLD detector head malfunctioning, ideally the replacement RLD should be matched to the RLU laser unit by adjusting its signal gain and therefore ensuring optimal performance. Detailed instructions for adjustment of a RLD are provided in the RLE installation guide (M-5225-0568, section B.4 on pages 64 – 66). However, it should be remembered that adjustment of the detector unit gain is a skilled task. Incorrect setting of these potentiometers can stop the position feedback and beam-obstruct detection system from working correctly. This may result in generation of invalid position feedback signals without the usual error signal output, and may cause open loop motion of the axis.

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