

Details of Movement Gauges

INSTRUCTIONS FOR SETTING UP MOVEMENT GAUGES

1. It is useful to have two people to set up the gauges in the first instance. However, a laser level (£40) can be used to provide an approximate line, which will allow the Gauges to be set up by one person (see photograph).



2. The gauges should be placed in locations that can be seen with minimum changes in the set up position or height of the optical level.

3. The optical level should be set up as equidistant as possible and ideally not more than 5m from each gauge.

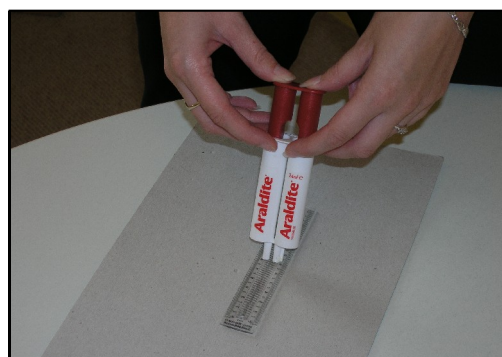
4. For a simple wall at least one gauge should be located on the wall above a foundation that is suspected of moving. Another gauge should be located on an element of wall that is not expected to have moved (e.g. on the other side of a crack). A third gauge could be located on an unrelated reference wall or at an intermediate or removed part of the wall to provide additional data.



5. For more complicated buildings, nine gauges can usually be used to pick up foundation movements in most areas. These can be set up internally or externally usually with a change point. Examples of various layouts are indicated in the Case Studies.

6. The optical level, or the laser, should be used to mark an initial level for each gauge to give the approximate mid-point (60mm) for the gauge height. Do not try to set all gauges at exactly the same (60mm) height as say 3-4mm differences in level helps to identify errors where readings are taken in the incorrect order.

7. The gauges need to be glued in place. Two pack epoxy resins have worked well but offer little scope for filling uneven gaps. Where the wall is very uneven gun applied adhesive may be better. Temporary support is needed from one or two 3mm diameter masonry nails per gauge usually embedded in the mortar. Alternatively screws can be drilled and plugged.



8. The gauges should be as vertical as possible in both directions. The stadia in an optical level is ideal, but is difficult to utilise at acute angles, so a spirit level is useful.
9. If the optical level needs to be moved, a "change point" can be created. The first and second setups can use a common gauge. However, if there is a difference in level or the views are mutually exclusive, it is reasonable to have two gauges a fixed distance apart as a link between the two sets of readings and the second set of readings can then have a new arbitrary datum. This is illustrated in Case Study 2 where two gauges were fixed to the same element of an un-cracked wall on both faces of a quoin stone.
10. Once the glue is dry, the gauges are read using normal levelling techniques, but to one or two decimal places of millimetre.
11. As the gauges will not be absolutely vertical, the position on the gauge must be recorded i.e. Left edge, Right edge or Central graduations



RECORDING

12. A gauge on the wall that is least likely to be moving is given an arbitrary datum level of say 100.00. It is very strongly recommended that collimation and levels are worked out there and then on site, as much time can be wasted back in the office sorting out errors not picked up at the time. If there has been an unrelated change point, the second set of readings could be based on a second datum of say 200.00. Remember it is the change in level that counts, so the real difference across the change point is never needed. This is discussed further under Frequently Asked Questions.
13. It is generally recommended that two or three sets of levels are taken with the instrument re-set up each time.
14. Back in the office, the readings should be entered into a spreadsheet as indicated in the Data Processing sheet. Printouts of the spreadsheet should be taken to site for future readings to identify errors as they occur. Palm top computer simplify the logging of such data. Typical spreadsheet layouts are indicated on the website, "Examples of results layout".
15. Ideally, readings should be taken every week for the first two weeks to identify background noise and thereafter at monthly intervals for six months and then every other month up to 13 or 14 months if possible. As discussed in the Case Studies, the sensitivity of the method means that with experience it might be possible to extrapolate results from just a few weeks to give an initial appraisal of the foundations.