4. LEVEL MEASUREMENTS

Typically in the hydrogenerator plant, the components that need to be leveled precisely and for which the use of the electronic level is appropriate are the thrust bracket, the shaft coupling flange, the thrust block, and any shell bearing seating flange.

When reading on a flat horizontal surface, we have the option of taking a reverse reading for every reading. If the zero setting is accurate, every reverse reading should be approximately the same value as the first reading but with opposite sign. For each pair of readings, we take the normal reading less the reverse reading and divide by two to obtain the absolute slope of the surface. The use of reverse readings is an option to obtain higher accuracy but is not needed for every application.

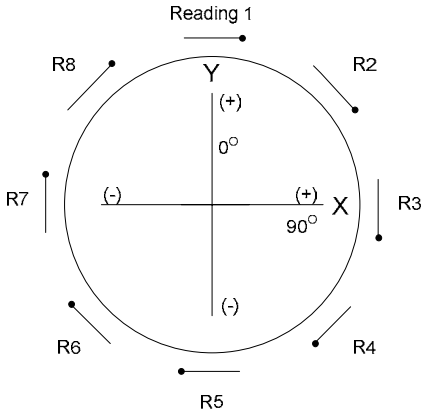
For level readings, the surface should be clean and stoning is sometimes required to remove irregularities on the surface. The level is put down on the surface and slid into position. Then the contour of the level should be marked in order to be able to recheck the reading or for optionally taking the reading with the level in the reverse position.

4.1 Method with level in radial axis

Four readings can often be sufficient to confirm the inclination of one component, but more accurate results can be obtained with 8 readings. The calculations with 8 readings can be done in the same way it was done in the example of section 3.3 for the shat verticality. It is important that the level instrument always have the same side towards the center of the component.

4.2 Method with level in tangential axis

Here is an example with 8 readings taken on a circle with the level in the tangential axis. Sometimes the machined surface is not wide enough to set the level in the radial axis but it can be used in the tangential axis. The level should be positioned the same way for all readings as indicated by the dot on the figure below.



Reading No.	Reading (mm/m)
1	-0.020
2	0.014
3	0.040
4	0.042
5	0.020
6	-0.014
7	-0.040
8	-0.042
Verticality Y:	0.040 mm/m
Verticality X:	0.020 mm/m
Resultant:	0.044 at 27°

It can be demonstrated that the following formulas apply for the case with 8 tangential readings.

Y = (0.707*R2 + R3 + 0.707*R4 - 0.707*R6 - R7 - 0.707*R8) / 4
X = (-R1 - 0.707*R2 + 0.707*R4 + R5 + 0.707*R6 - 0.707*R8) / 4