

Variable 3-Disc Indicating Gauges

Determination of true size effective

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perfection

FRENCO

Principle of Function

Circumferential backlash measuring instruments have three composite profile discs. The two outer discs are rigid while the middle disc can be easily rotated by means of spring force. This causes a change in the tooth position, which is shown by a dial indicator or an inductive probe.

The measuring instrument is set to zero using a composite setting master, which embodies the limit of an effective spline. The distance of rotation is then shown in comparison to the setting master. The actual position of the effective spline within the tolerance zone can now be assessed.

This value allows the stability of the manufacturing process with regards to the overlay of individual geometry errors to be monitored.

To analyse the mounting forces, the effective spline, as measured with this instrument, must be combined with the actual dimensions.

FRENCO also offer software for this purpose. It determines the difference between actual and effective and offers important information with regard to the

- quality of the gearing
- overlay of individual form errors

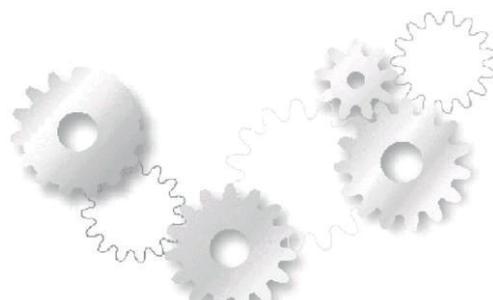
Circumferential backlash measuring instruments are always offered with setting master and check master to verify the shown distance of rotation. This is to ensure the plausibility of the results.



IVD – For internal splines



AVD – For external splines

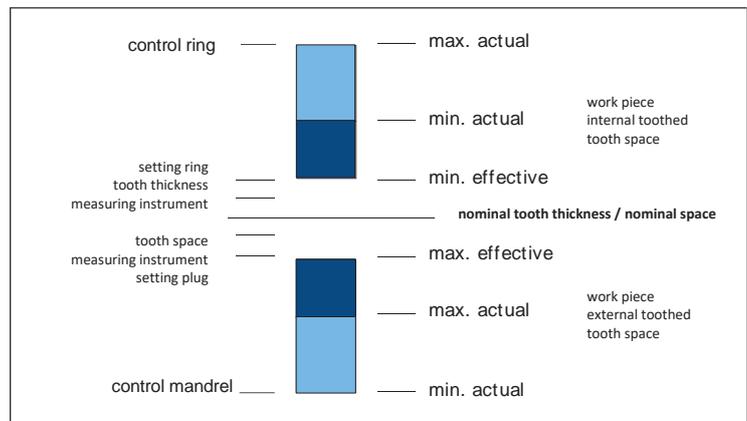
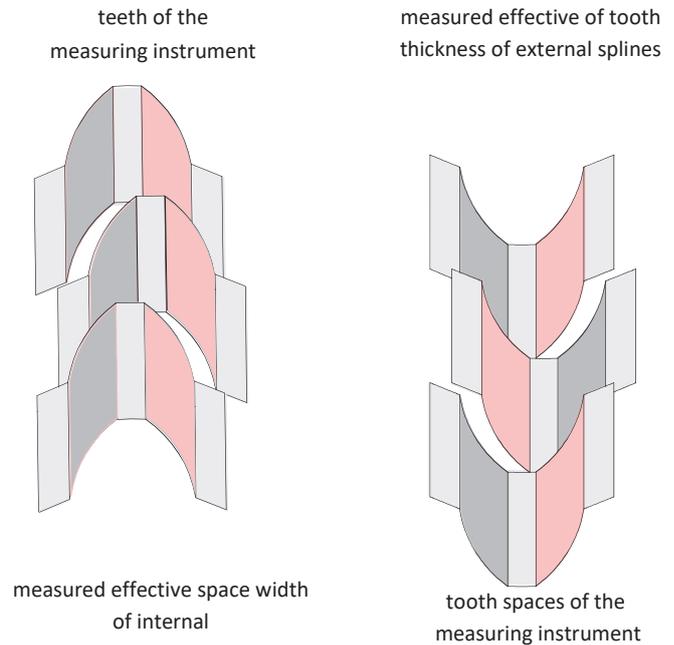


A static go gauge only gives information whether the work piece is inside the effective spline or not. Variable 3-disc indicating gauges indicate the real dimension of the effective spline.

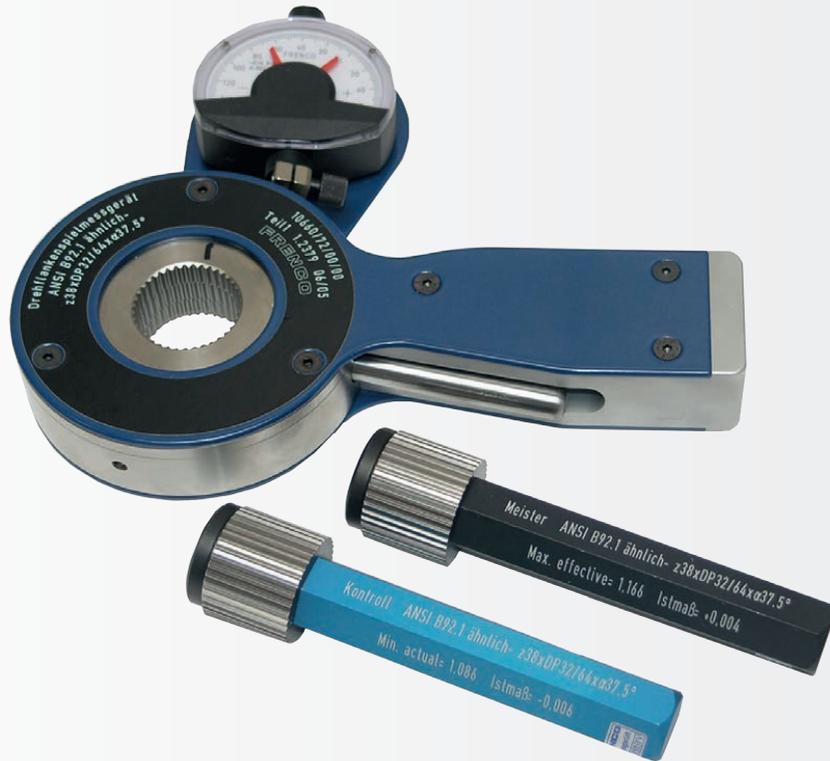
There to a dial indicator or an inductive transducer measures the torsion travel of the middle disc. An absolute measurement conclusion can be made, if the dial indicator was set to zero with an exact setting master before the measurement. This composite setting master is redundant exact at the allowed, effective limit dimension.

If the dial indicator amplitude is zero by inspecting the work piece after setting to zero, this conforms the condition of a barely operating go gauge. Every further pointer amplitude greater than zero indicates the difference between the effective spline and the acceptable tolerance limit.

Because of the dial indicator measuring the difference at the pitch circle diameter as a bend line, the indication refers to the tooth thickness / tooth space at the pitch circle. When the dial indicator displays a value less than zero for internal splines or a value greater than zero for external splines the acceptable effective limit is not kept and a go gauge could not be coupled. Such work pieces are to be rejected. This situation certainly only appears when the tooth thickness of the backlash-measuring instrument is smaller than the go gage. That is exactly how such instruments are designed.



Internal gears and splines		External gears and splines	
max. actual	Limit of permitted space width at single measurement	max. effective:	Limit of effective tooth thickness by accumulative measurement
min. actual REF	Reference limit	max. actual REF	Reference limit
min. effective:	Limit of effective space width by accumulative measurement	min. actual:	Limit of permitted tooth thickness at single measurement



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