Measuring Signal Processing

HEIDENHAIN linear, rotary and angle encoders operate on the principle of photoelectrically scanning very fine gratings. These encoders normally produce sinusoidal scanning signals with levels of approximately 11 μA_{PP} (current signals) or 1 V_{PP} (voltage signals). The subsequent electronics first interpolates the scanning signals and then converts them into square-wave pulses (digitizing).

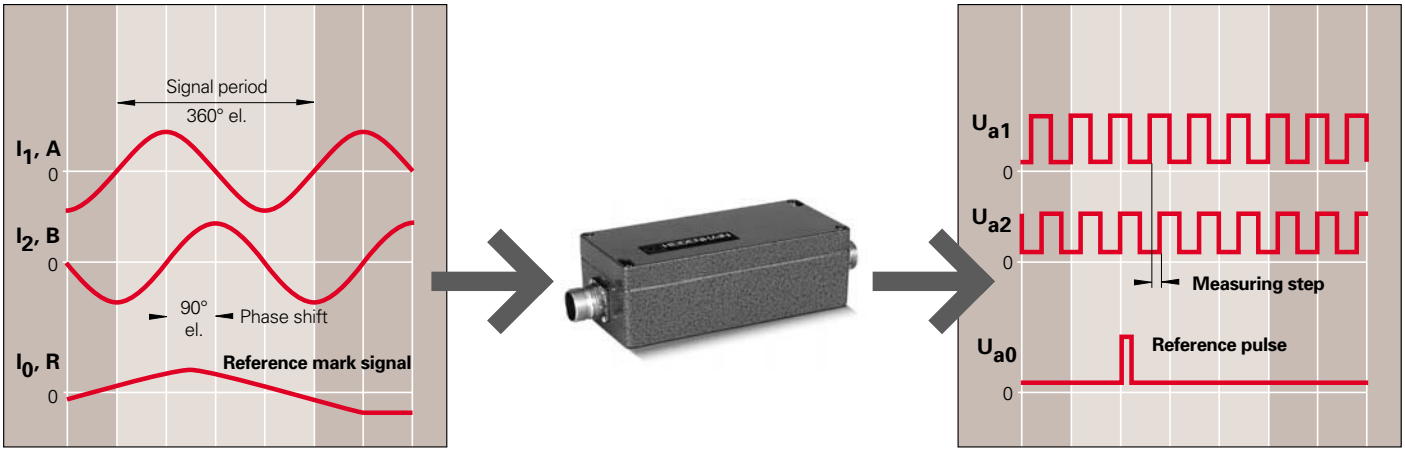
The interpolation and digitizing circuitry is either integrated in the NC control (e.g. a HEIDENHAIN TNC) or display unit (e.g. an ND or POSITIP from HEIDENHAIN), or is available as a separate unit of the **EXE** type (for current signals I_1, I_2 and I_0) or **IBV** type (for voltage signals A, B and R).

EXE and IBV units deliver two square-wave pulse trains U_{a1} and U_{a2} plus a reference pulse U_{a0}.

Within one signal period, each of the four signal edges of U_{a1} and U_{a2} can be used as a counting pulse.

The distance between two subsequent edges of U_{a1} and U_{a2} is one measuring step. For example, after 5-fold interpolation this distance is 1/20 of a grating period (see the following example).

Example: With 5-fold interpolation of the measuring signal and the usual 4-fold evaluation of the square-wave pulses in the subsequent electronics, a linear encoder with a grating period of 20 µm can provide a measuring step of 1 µm.



Scanning signals

EXE or **IBV** interpolation and digitizing electronics

Measuring signals after 5-fold interpolation and digitizing

The inverse signals $\overline{U_{a1}}$, $\overline{U_{a2}}$ and $\overline{U_{a0}}$ have been omitted from the illustration to improve clarity.