# OUTPUT SIGNALS

## SINUSOIDAL VOLTAGE SIGNALS 1 VPP

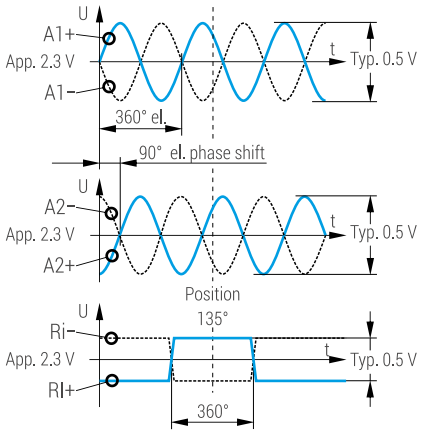
(drawing shows "positive counting direction")

**Power supply:** +5 V ±10 %, max. 140 mA (unloaded)
**Track signals** (differential voltage A1+ to A1− resp. A2+ to A2 −):
Signal amplitude 0.6 Vpp to 1.2 Vpp; typ. 1 Vpp
(with terminating impedance Zo = 120 Ω between A1+ to A1− resp. A2+ to A2−).

**Reference mark** (differential voltage RI+ to RI−):
Square-wave pulse with an amplitude of 0.8 up to 1.2 V; typical 1 V
(with terminating impedance Zo = 120 Ω between RI+ to RI−)

**Advantage:**
- High permissible traversing speed with long cable lengths possible.

Voltage signals (1 Vpp)




## SQUARE-WAVE SIGNALS

(drawing shows "positive counting direction")
With the integrated interpolation electronics (for times -1, -5, -10, -20, -25, -50, -100 or -200) the photoelement output signals are converted into two square-wave signals that have a phase shift of 90°.
The output signals are „differential" via line driver (RS 422). One measuring step reflects the measuring distance between two edges of the square-wave signals.

The controls/DRO´s must be able to detect each edge of the square-wave signals. The minimum edge separation $a_{min}$ is listed in the technical data and refers to a measurement at the output of the interpolator (inside the scanning head). Propagation-time differences in the line driver, the cable and the line receiver reduce the edge separation.

**Propagation-time differences:**

| | |
|---|---|
| Line driver: | max. 10 ns |
| Cable: | 0.2 ns/m |
| Line receiver: | max. 10 ns (referred to the recommended line receiver circuit) |

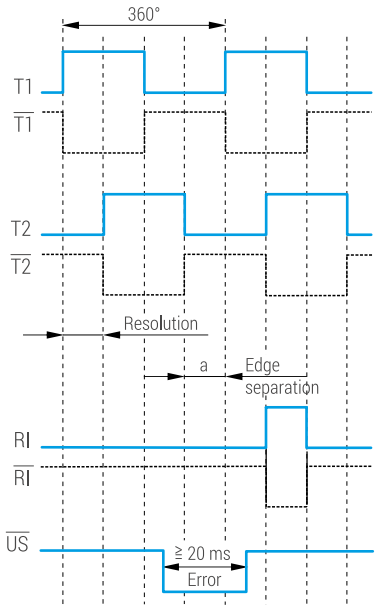
To prevent counting errors, the controls/DRO's must be able to process the resulting edge separation.

**Example:**
$a_{min}$ = 100 ns, 10 m cable
100 ns - 10 ns - 10 x 0.2 ns - 10 ns = 78 ns

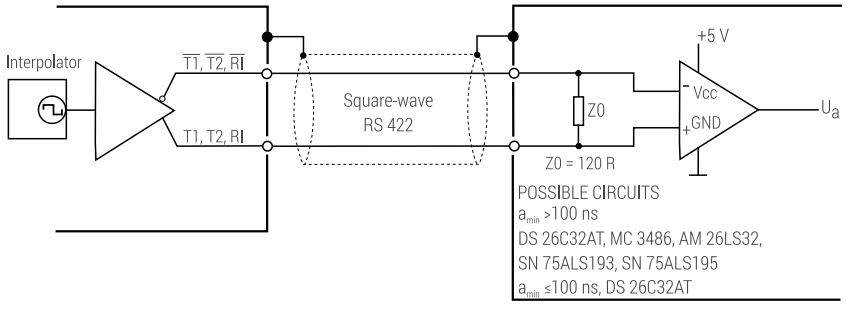
**Power supply:** +5 V ±10 %, max. 160 mA (unloaded)

**Advantages:**
- Noise immune signals.
- No further subdividing electronics necessary.

Square-wave signals „differential"




Recommended line receiver circuit




Counting direction