Appendix B release 1.1

1. Occurrence of initial calibration delay time $t_{d,input}$

If there is no input signal (standstill), a new initial calibration is triggered each 0.7s. This calibration has a duration $t_{d,input}$ of max. 300µs. No input signal change is detected during that initial calibration time.

In normal operation (signal startup) the probability of $t_{d,input}$ to come into effect is: $t_{d,input}$ / time frame for new calibration 300µs/700ms = 0,05%.

After IC resets (e.g. after a significant undervoltage) $t_{d,input}$ will always come into effect.

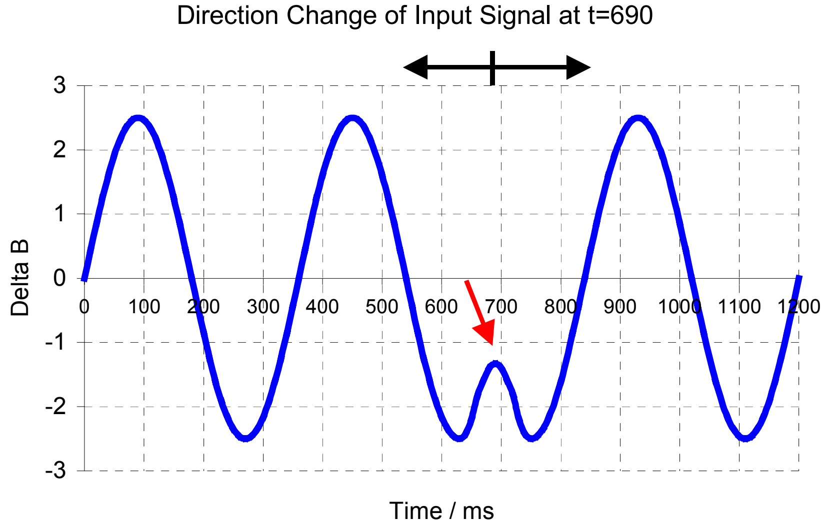
2. Magnetic input signal extremely close to a PGA switching threshold during signal startup:

After signal startup normally all PGA switching into the appropriate gain state happens within less than one signal period. This is included in the calculation for $n_{DZ\text{-}Start}$. For the very rare case that the signal amplitude is extremely close to a PGA switching threshold and the full range of the following speed ADC respectively, a slight change of the signal amplitude *can* cause one further PGA switching. It can be caused by non-perfect magnetic signal (amplitude modulation due to tolerances of pole-wheel, tooth wheel or air gap variation). This additional PGA switching *can* result in a further delay of the output signal ($n_{DZ\text{-}Start}$) up to three magnetic edges leading to a worst case of $n_{DZ\text{-}Start}$=9. Due to the low probability of this case it is not defined as max. value in the data sheet.

(For a more detailed explanation please refer to the document "TLE4941/42 - Frequently Asked Questions").

3. Fast change of direction signal at small fields:

The described behaviour *can* happen when rotation direction is changed in t < 0.7s



A local extreme (maximum or minimum) of the magnetic input signal can be caused during a reversal of rotation direction. In this case the local extreme can be detected by the IC and used for offset calibration. (E.g. a local maximum marked by an arrow in the above diagram.) Obviously the calculated offset value will be incorrect with respect to the following signal. As worst case a duty cycle up to max. 15% to 85% could occur for a few pulses. After a re-calibration, which typically takes place after 2...3 zero-crossings the offset will be correct again and hence the duty cycle also.

As a result of "bad" duty cycle after fast direction reversal the sampling points for direction detection are at unusual signal phase angles also. At small magnetic input signals ($\Delta B < 1.7 * \Delta B_{warning}$) this can lead to incorrect direction information. Duration: max. 7 pulses, in very rare cases (additional PGA transition during calibration similar to 2.) max. 9 pulses.

A local extremum close to the zero-crossing theoretically could lead to distances down to 45µs of two consecutive output pulses at the point of direction reversal as well as a $B_{warning}$ pulse also.

4. Behaviour close to the magnetic thresholds $B_{warning}$, B_{Limit}, (B_{EL})

Real non-perfect magnetic signals and intrinsic thermal noise cause amplitude variations. Very close to the magnetic thresholds a mix of output pulse widths representing the referring magnetic values occur. For similar reasons pulse widths of 90, 180, 360, 720µs can be observed occasionally for single pulses at B_{Limit}.

5. Behaviour close to speed v5 ($f_{EL\text{-}bit}$= ca. 117 Hz)

Signal imperfections like duty cycle and jitter result in a mix of output pulses with and without assembly bit (EL) information. Input signal duty cycles apart from 50% increase the range where both pulse widths appear.

6. Dependency of direction detection on input signal pitch:

The direction detection is optimised for a target wheel pitch of 5mm where it will work down to $B_{warning}$. ($B_{warning}$ and direction detection thresholds meet at 5mm pitch.) For pitches other than 5mm the magnetic input signal has to be increased to compensate for the inevitable signal attenuation.