Measuring Instructions for IEF-Werner Toothed Belt Axes

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1 General information on toothed belt pre-tension

The pre-tension of a toothed belt has the task of ensuring a minimum tensioning force in the empty part of the toothed belt. This is to ensure an interference-free interlock in to the lock washer. For linear drives, the pre-tension always must exceed the circumferential force. The top-most limit for the part load always must consider the rope-tension strength.

Under load, the pre-tension reduces by up to 30% during a brief run-in period. This is the settling of the tension carriers in the toothed belt. No further lengthening will occur later even in permanent operation.

To avoid the necessity of re-tensioning the toothed belt after the run-in phase, the toothed belts are pre-tensioned to a higher value during installation. The target value is thus achieved after the run-in phase.

![Diagram showing frequency vs. basic body length with annotations A and B]

**Figure 1** Example chart for setting the toothed belt

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Span force (set value at initial installation, before starting the run-in phase)</td>
</tr>
<tr>
<td>B</td>
<td>Span force (target value after the run-in phase)</td>
</tr>
</tbody>
</table>
2 Quick Reference Guide TT Line

Observe the Quick Reference Guide supplied with the device (see Figure 2):

![Quick Reference Guide of Arntz Optibelt Group](image)

Figure 2  Quick Reference Guide of Arntz Optibelt Group
3 Measuring process at the module 105

Proceed as follows to measure the belt tension:

(1) Install the new belt.

NOTE This procedure for changing the toothed belt can be found in the operating instructions for the module 105/142.

(2) Move the carriage back and forth manually at least ten times (push the belt down manually several times).

(3) Perform the measurement with the measuring bracket [D] (see also Figure 20, page 20) inserted (see Figure 3).

Observe the following:
- The span length is 300 mm
- It is measured from the center of the deflection pulley to the start of the carriage/measuring bracket

![Figure 3 Performing the measurement at the module 105](image)

A optibelt measuring device
B Vibration excitation tool (Allen key or small soft-face hammer)
C Deflection pulley
D Measuring bracket (Part-No.: 1054168) (see also Figure 20, page 20)
E Carriage
F Vibration excitation at the middle of the toothed belt
(4) Determine the total length of the basic body by measuring.

(5) Compare the determined frequencies with diagram 1 (see Figure 4).

![Figure 4 Diagram 1](attachment:figure4.png)

(6) If necessary, increase the belt tension by turning down the spacer sleeves (see Figure 5, below) step by step until the diagram value is approximately reached.

**NOTE** It must be observed that both spacer sleeves have the same length.

![Figure 5 Spacer sleeves for the belt tension](attachment:figure5.png)

<table>
<thead>
<tr>
<th>A</th>
<th>Spacer sleeves (2x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>End plate</td>
</tr>
</tbody>
</table>
4 Measuring at the easyLINE standard carriage

Proceed as follows to measure the belt tension:

(1) Install the new belt.

**NOTE** This procedure for changing the toothed belt can be found in the operating instructions for the module easyLINE.

(2) Move the carriage back and forth manually at least ten times (push the belt down manually several times).

(3) Perform the measurement (see Figure 6).

![Figure 6](image)

**Observe the following:**
- The span length is 300 mm
- It is measured from the center of the deflection pulley to the start of the carriage
(4) Determine the total length of the basic body by measuring.
(5) Compare the determined frequencies with diagram 2 (see Figure 7).

![Diagram 2](image)

Figure 7  Diagram 2

(6) If necessary, increase the belt tension by turning down the spacer sleeves (see Figure 5, page 6) step by step until the diagram value is approximately reached.

**NOTE**  It must be observed that both spacer sleeves have the same length.
5 Measuring at the easyLINE long carriage

(1) Perform the measurement as with the easyLINE standard carriage (see previous section 4: Measuring at the easyLINE standard carriage, page 7 onwards).

Additionally observe the following:

- For the version with the long carriage, the toothed belt must be fastened with the help of a measuring bracket [A] clamped between the carriage and belt flush with the front edge of the carriage, in order to prevent oscillation below the carriage plate (see Figure 8).

![Figure 8](image)

**NOTE**

The drawing of the measuring bracket can be found in Figure 21, page 21.
6 Measuring at the portal axis

Proceed as follows to measure the belt tension:

(1) Install the new belt.

**NOTE** This procedure for changing the toothed belt can be found in the operating instructions for the module portal axis.

(2) Move the carriage back and forth manually at least ten times (push the belt down manually several times).

(3) Perform the measurement with a parallel pin [Ø6 x 24] inserted (see Figure 9, below and Figure 10, page 11).

![Figure 9: Performing measurements at the portal axis (1)](image)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>optibelt measuring device</td>
</tr>
<tr>
<td>B</td>
<td>Vibration excitation tool</td>
</tr>
<tr>
<td></td>
<td>(Allen key or small soft-face hammer)</td>
</tr>
<tr>
<td>C</td>
<td>Deflection pulley</td>
</tr>
<tr>
<td>D</td>
<td>Parallel pin DIN 6325 Ø6 x 24</td>
</tr>
<tr>
<td>E</td>
<td>Vibration excitation at the middle of the toothed belt</td>
</tr>
</tbody>
</table>
(4) Determine the total length of the basic body by measuring.

(5) Compare the determined frequencies with diagram 3 (see Figure 11).
(6) If necessary, increase the belt tension by turning down the spacer sleeves (see Figure 5, page 6) step by step until the diagram value is approximately reached.

**NOTE**  
It must be observed that both spacer sleeves have the same length.
7 Messvorgang am Modul 142

Proceed as follows to measure the belt tension:

(1) Install the new belt.

**NOTE** This procedure for changing the toothed belt can be found in the operating instructions for the module 142.

(2) Move the carriage back and forth manually at least ten times (push the belt down manually several times).

(3) Perform the measurement with a parallel pin [D] inserted (see Figure 12, below).

![Figure 12](image)

**Figure 12** Performing the measurement at the module 142

<table>
<thead>
<tr>
<th>A</th>
<th>optibelt measuring device</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Vibration excitation tool</td>
</tr>
<tr>
<td></td>
<td>(Allen key or small soft-face hammer)</td>
</tr>
<tr>
<td>C</td>
<td>Drive set with ball bearing / distance washer</td>
</tr>
<tr>
<td>D</td>
<td>Parallel pin DIN 6325 Ø6 x 50</td>
</tr>
<tr>
<td>E</td>
<td>Carriage</td>
</tr>
<tr>
<td>F</td>
<td>Vibration excitation at the middle of the toothed belt</td>
</tr>
</tbody>
</table>

Additionally observe the following:

- The pin distance from the drive set [C] is approx. 100 mm
- The span length (300 mm) is measured from the centre of the parallel pin to the beginning of the carriage
- Pin dimensions: Parallel pin Ø6 x 50
(4) Determine the total length of the basic body by measuring.

(5) Compare the determined frequencies with diagram 4 (see Figure 13).

![Figure 13 Diagram 4](image_url)

(6) If necessary, increase the belt tension by turning down the spacer sleeves (see Figure 5, page 6) step by step until the diagram value is approximately reached.

**NOTE** It must be observed that both spacer sleeves have the same length.

Proceed as follows to measure the belt tension:

(1) Install the new belt.

**NOTE** This procedure for changing the toothed belt can be found in the operating instructions for the appropriate module.

(2) Move the carriage back and forth manually at least ten times (push the belt down manually several times).

(3) Perform the measurement (see Figure 14).

![Figure 14](image)

**Figure 14** Performing measurements on the module 80/15 (other modules in this section accordingly)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>optibelt measuring device</td>
</tr>
<tr>
<td>B</td>
<td>Vibration excitation tool (Allen key or small soft-face hammer)</td>
</tr>
<tr>
<td>C</td>
<td>Deflection pulley</td>
</tr>
<tr>
<td>D</td>
<td>Carriage</td>
</tr>
<tr>
<td>E</td>
<td>Vibration excitation at the middle of the toothed belt</td>
</tr>
</tbody>
</table>

Additionally observe the following:

- The span length is 300 mm
- It is measured from the center of the deflection pulley to the start of the carriage
(4) Determine the total length of the basic body by measuring.

(5) Compare the determined frequencies with diagram 5 (see Figure 15) or diagram 6 (see Figure 16).

![Diagram 5](image)

Figure 15  Diagram 5

![Diagram 6](image)

Figure 16  Diagram 6
(6) If necessary, gradually increase the belt tension by first loosening the grub screw [D] (used for locking/fixing) and then adjusting the belt tension using the two tension screws [C] (see Figure 17, below) until the diagram value is approximately reached (see diagrams on page 16). Then counter the pressure piece again with the help of the grub screw and secure with Loctite.

**NOTE**  Ensure that the pressure piece is parallel to the end face of the carriage plate.
9 Messvorgang Modul 80/15 ZR10, 160/15 ZR10, 115/42 ZR10

Proceed as follows to measure the belt tension:

(1) Install the new belt.

**NOTE** This procedure for changing the toothed belt can be found in the operating instructions for the appropriate module.

(2) Move the carriage back and forth manually at least ten times (push the belt down manually several times).

(3) Perform the measurement (see Figure 18).

![Figure 18](image)

**Figure 18** Performing the measurement at the module 80/15 ZR10

<table>
<thead>
<tr>
<th>A opitbelt measuring device</th>
<th>B Vibration excitation tool (Allen key or small soft-face hammer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C Deflection pulley</td>
<td>D Carriage</td>
</tr>
<tr>
<td>E Vibration excitation at the middle of the toothed belt</td>
<td></td>
</tr>
</tbody>
</table>

Additionally observe the following:

- The span length is 300 mm
- It is measured from the center of the deflection pulley to the start of the carriage
(4) Determine the total length of the basic body by measuring.

(5) Compare the determined frequencies with diagram 6 (see Figure 19).

![Diagram 6](image)

**Figure 19**  Diagram 6

(6) If necessary, gradually increase the belt tension by first loosening the grub screw [D] (see Figure 17, page 17) (used for locking/fixing) and then adjusting the belt tension using the two tension screws [C] (see Figure 17, page 17) until the diagram value is approximately reached (see diagram 6 in Figure 19 above). Then counter the pressure piece again with the help of the grub screw and secure with Loctite.

**NOTE** Ensure that the pressure piece is parallel to the end face of the carriage plate (see Figure 17, page 17).
10 Appendix

10.1 Drawing measuring bracket (for module 105)

Figure 20  Measuring bracket, IEF-Werner Part no.: 1054168
10.2 Drawing measuring bracket (for module easyLINE)

Figure 21  Measuring bracket, IEF-Werner Part no.: 1430643