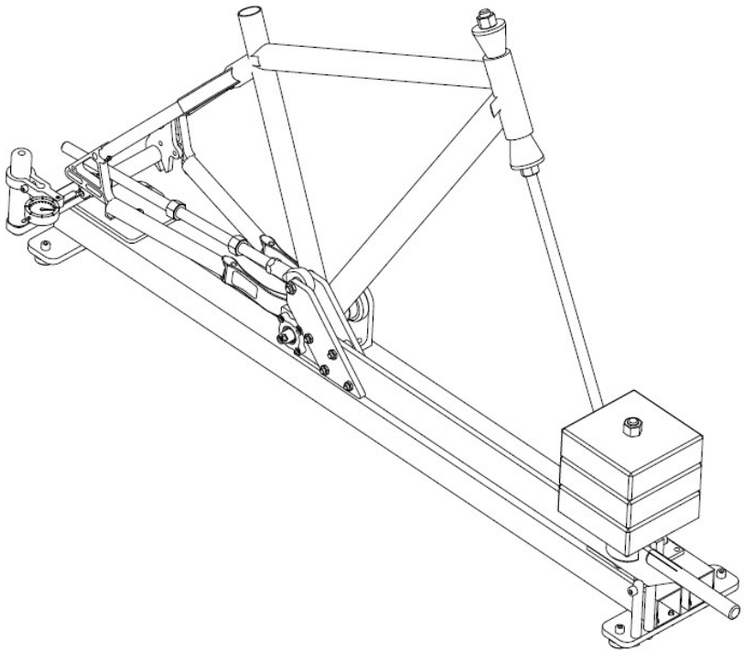
Frame Stiffness Test Fixture
Measurement Instructions

The frame stiffness test is applicable when Rohloff ® Internal Gear Hubs (IGH) are used in conjunction with Gates Carbon Drive™ systems.



This document contains information on how to measure frame stiffness with the Gates Frame Stiffness Tester after it has been assembled. This test is required before an OEM can purchase Rohloff ® IGH parts for use with the Gates Carbon Drive™ belt drive system. For information on how to assemble the tester, or mount the frame, please see our Assembly Instructions. If you have any questions, please contact one of our regional testing facilities or email inquiries to info@carbondrive.net

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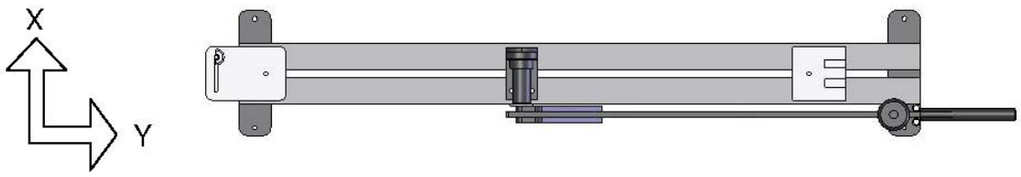
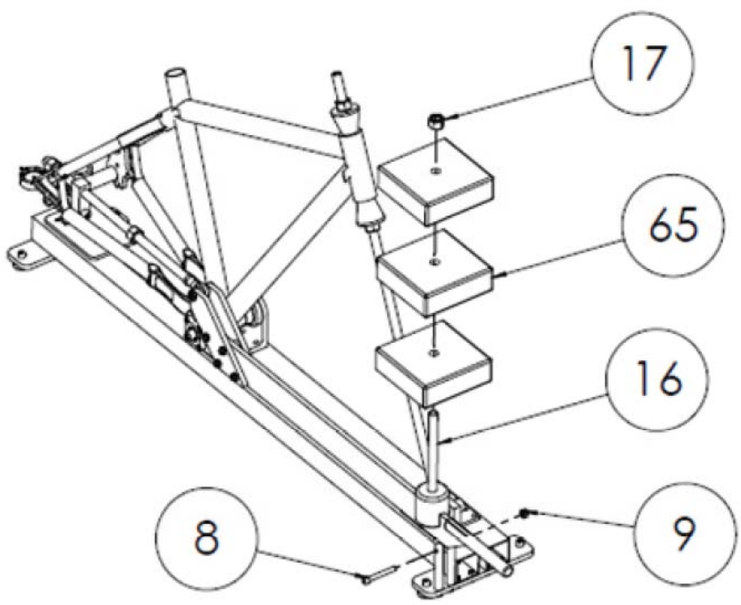
MEASUREMENT INSTRUCTIONS



For the implementation of the measurements you must use the special spreadsheet added in the annex!

To start the measurements, all the previous steps must be completed and the safety screw (Pos.8) has to be removed (see fig.4 Assembly Instructions). Use one spreadsheet for every frame model and every frame size. A measurement series consists of six individual measurements (three measurements in X-deflection and three in Y-deflection). Please perform each series of measurements and note the received data three times.
A total of 18 datasets are listed on the form at the end of the procedure.

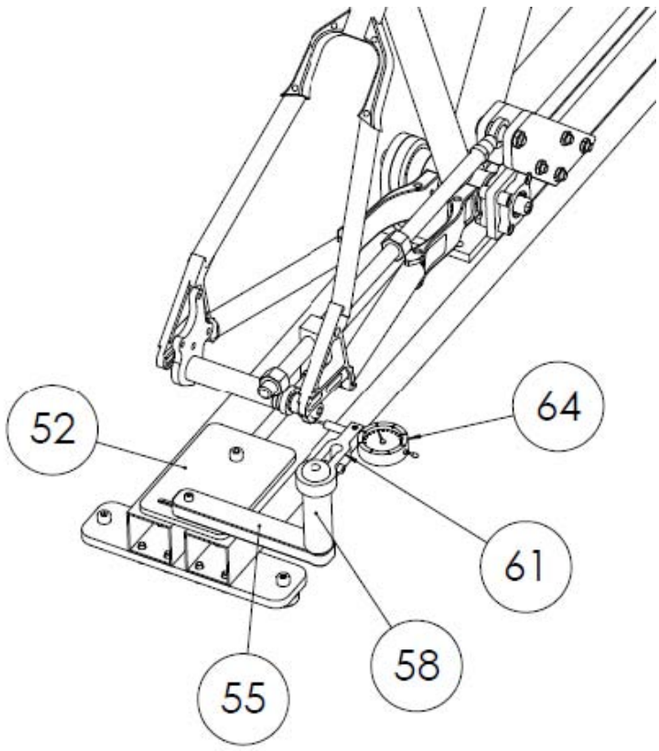


(fig. 8) test stand with 3 weights applied

The measurement device simulates a pedaling torque of 60 Nm (1st weight), 120 Nm (1st + 2nd weight) and a maximum torque of 180 Nm (1st + 2nd + 3rd weight).

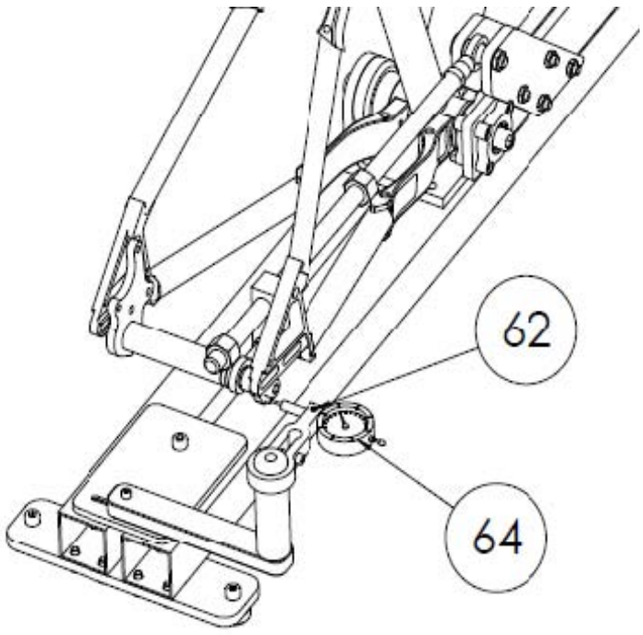
Measure the X-deflection

To measure the X-deflection, choose the right or the left dropout of the frame as a measuring point. To position the indicating caliper correctly you have to start with the settings of the indicating caliper slide (Pos.52) and the turning lever (Pos.55). After that, please change the elevation adjustment (Pos.58) and the carrier (Pos.61) to set the adjustment for the indicating caliper (Pos.64). The tip of the indicating caliper has to point perpendicular on the surface to measure the exact deflection.



(Fig.9) position for the X-deflection

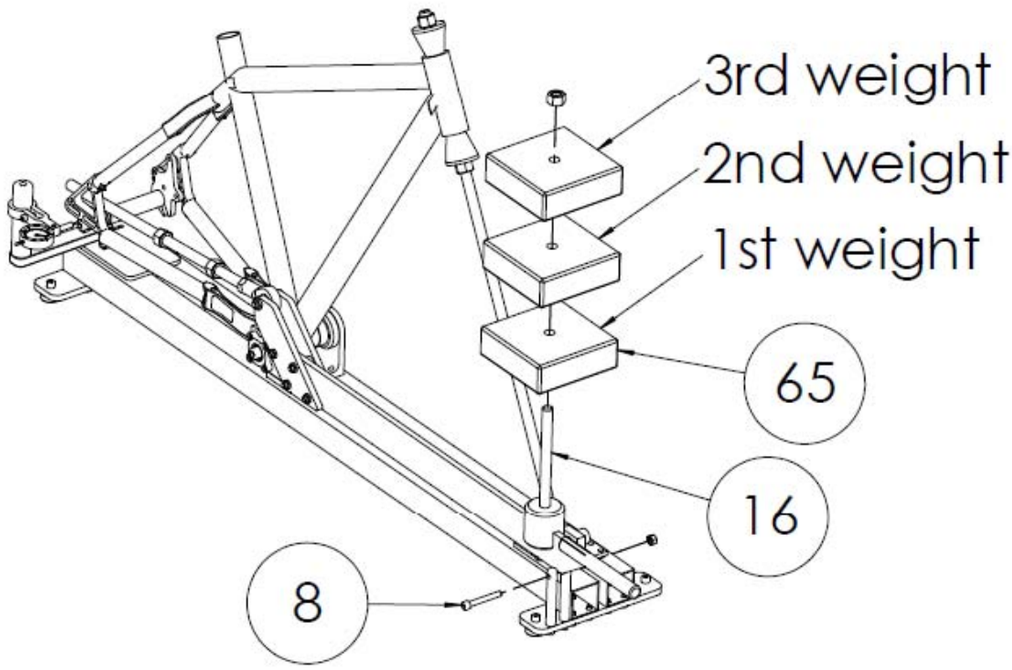
The safety bolt needs to be replaced before the dial gauge can be fine adjusted. The fine adjustment will be accomplished via the setscrew (Pos.62). The self-weight of the Lever is pre-tensioning the system (see fig.4)! The last step is to turn the outer ring of the dial gauge to zero the indicating caliper.



(Fig.10) vernier adjusting the indicating caliper

At this point you installed the measurement device correctly. Please continue with the series of measurement.

For the first measurement of X-deflection apply the first weight (Pos.65) onto the thread rod (Pos.16). The values of the weight [g] and the deflection [mm] have to be noted on the spreadsheet. Please follow this measuring procedure to receive the data for the 2nd pedaling torque from about 120 mm (weight 1 and 2 applied) and maximum pedaling torque from about 180 Nm (all three weights applied) as well.

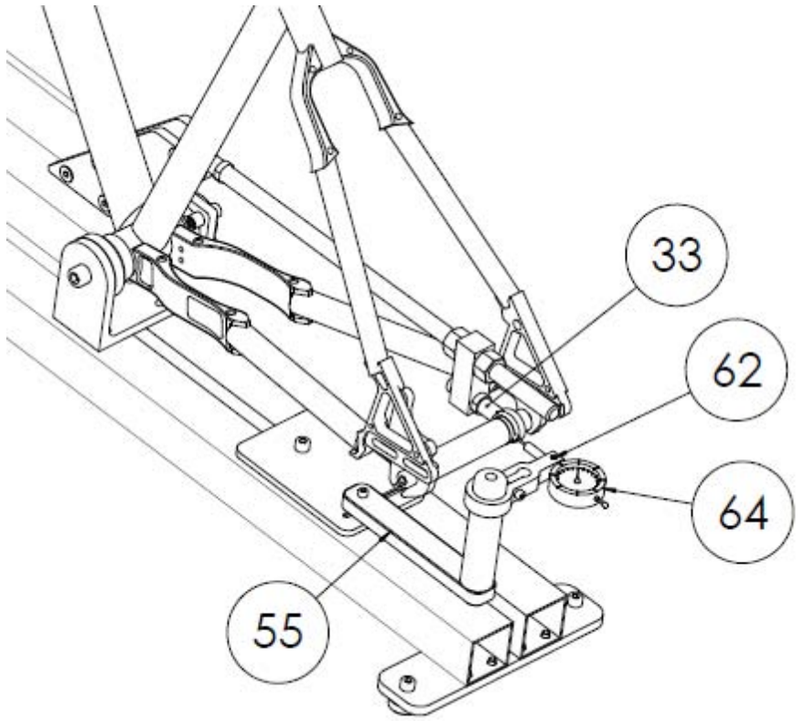


(Fig.11) three weights applied

Measure the Y-deflection

The measurement of the Y-deflection will now be measured. The procedure is nearly the same like measuring the X-deflection. The difference is the adjustment of the indicating caliper onto another measuring surface.

To measure the Y-deflection, use the pivot (Pos.36) as a measuring point. The tip of the indicating caliper (Pos.65) has to point perpendicular onto the surface. To receive reliable measurements the indicating caliper should be positioned next to the joint bearing (Pos.33). To adjust the indicating caliper, start with the setting of the Indicating caliper slide (Pos.52) and the turning lever (Pos.55). Before the fine adjustment can be done, replace the safety bolt (Pos.8) (see fig.4 Assembly Instructions)! The tip of the indicating caliper has to be tempered 2 mm for this measurement! Push the tip of the indicating caliper on the measurement point softly while the indicator is turning. The small dial of the indicating caliper should show a 2mm pretension of the dial gauge. Now fix the indicating caliper by tighten the setscrew (Pos.62) and zero the tall indication by turning the chart of the indicating caliper.



(Fig. 12) position for the Y-deflection

Annex

a) Spreadsheet

b) Example spreadsheet with sample data

Measurement Report

Gates Frame Stiffness Test

Date:	**Frame model /-size:**
Sign:	**Frame number:**

Measurement	Direction		Weight (g)	Value (mm)	Quotient (Kg/mm)
				$S_{x,y}$	$1/c_{x,y}$
1	X	m1			
2	Y				
3	X	m1+m2			
4	Y				
5	X	m1+m2+m3			
6	Y				
1	X	m1			
2	Y				
3	X	m1+m2			
4	Y				
5	X	m1+m2+m3			
6	Y				
1	X	m1			
2	Y				
3	X	m1+m2			
4	Y				
5	X	m1+m2+m3			
6	Y				

*** Use this calculation to get the quotient value:**

Quotient =(weight/value)/1000

Prescriptivelimits!

Allthreeweightsapplied!

X-direction: quotient ($1/c_x$) **> 5,3 Kg/mm** (~5mm deflection)

Y-direction: quotient ($1/c_y$) **> 26,5 Kg/mm** (~1mm deflection)

Measurement report

Gates Frame Stiffness Test

Date: XXXXXX	**Frame Model /-size: XXXXXX**
Sign: XXXXXX	**Frame Number: XXXXXXX**

Measurement	Direction		Weight (g)	Value (mm)	Quotient* (Kg/mm)
				$S_{x,y}$	$1/c_{x,y}$
1	**X**	**m1**	8760	1,08	8,1
2	**Y**			0,12	73,0
3	**X**	**m1+m2**	17480	2,27	7,7
4	**Y**			0,28	62,4
5	**X**	**m1+m2+m3**	26220	3,45	7,6
6	**Y**			0,44	59,6
1	**X**	**m1**	8760	1,01	8,7
2	**Y**			0,12	73,0
3	**X**	**m1+m2**	17480	2,1	8,3
4	**Y**			0,25	69,9
5	**X**	**m1+m2+m3**	26220	3,22	8,1
6	**Y**			0,4	65,6
1	**X**	**m1**	8760	1,06	8,3
2	**Y**			0,12	73,0
3	**X**	**m1+m2**	17480	2,07	8,4
4	**Y**			0,27	64,7
5	**X**	**m1+m2+m3**	26220	3,27	8,0
6	**Y**			0,42	62,4

*** Use this calculation to get the quotient value:**

Quotient =(weight/value)/1000

Prescriptivelimits!

All theweightsapplied!

X-direction: quotient ($1/c_x$) **> 5,3 Kg/mm** (~5mm deflection)

Y-direction: quotient ($1/c_y$) **> 26,5 Kg/mm** (~1mm deflection)