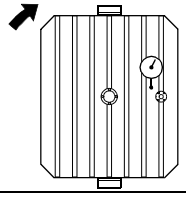
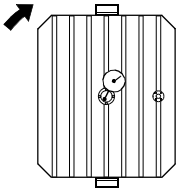
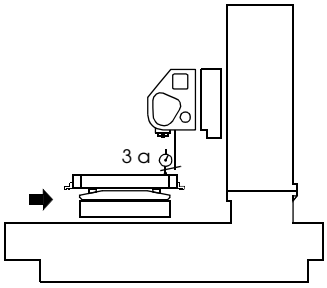
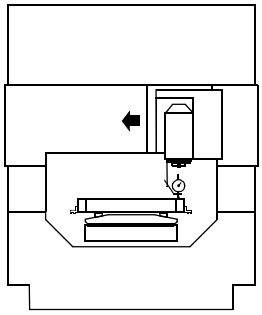
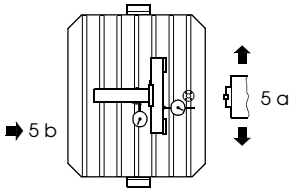
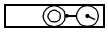
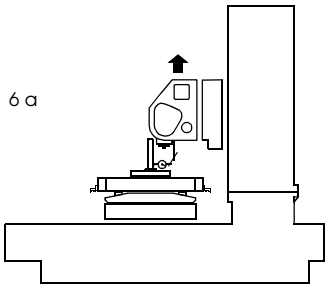
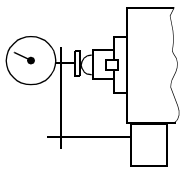
DECKEL MAHO

Pfronten GmbH

ACCURACY TEST CHART

Geometrical Measurements for Universal- boring- and milling machine with NC- rotary table, pallets and NC-millinghead. Measuring 3 b can be left out when pallets have no T-slots.			PP. Nr. P0000240
Type	Machine. No.	Project No.	
Customer		Quality inspector/date	Page 1 of 3

No.	Object of measurement	Picture	Measuring instruments	Measuring instructions	Deviation permissible	Deviation measured
1	Camming of the clamping surface 		Dial gauge	Place dial gauge against clamping surface of first pallet. Rotate pallet 360 degree. Repeat measurement on second pallet.	0,012mm up to Ø 500mm 0,025mm up to Ø 1000mm	1/Pallet 1 1/Pallet 2
2	Run out of the Center bush 		Dial gauge	Place dial gauge against Center bush of first pallet. Rotate pallet 360 degree. Repeat measurement on second pallet.	0,02mm	2/Pallet 1 2/Pallet 2
3	3 a Parallelism of clamping surface in relation to transversal movement 		Dial gauge	Place dial gauge against clamping surface of first pallet. Move slide rest transversal for lenght of measurement.	0,02mm up to measuring lgt. 500mm 0,03mm up to measuring lgt. 1000mm	3 a
	3 b Parallelism of reference T-slot to transversal movement 		Dial gauge	Place dial gauge against Reference T- slot. Move slide rest transversal for lenght of measurement.		3 b/Pallet 1 3 b/Pallet 2
4	Parallelism of clamping surface in relation to longitudinal movement		Dial gauge	Place dial gauge against clamping surface of first pallet. Move slide rest longitudinal for lenght of measurement.	0,02 mm up to measuring 500 mm 0,03mm up to measuring lgt. 1000mm	4
5	Rectangularity of longitudinal movement to transversal movement		Dial gauge, Angle	5 a Align bottom surface of the angle parallel to longitudinal movement. 5 b Place dial gauge against cylindrical part of the angle. Pass over slide rest transversal for lenght of measurement.	5 b 0,02 mm up to measuring 500 mm	5 b
6	Rectangularity of clamping surface in relation to vertical movement 6 a transversal 		Dial gauge, Angle	Place angle at center of first pallet. Move longitudinal-axis in center position. Place dial gauge against angle. Travers spindle head vertical for lenght of measurement.	0,02 mm up measuring 300 mm 0,03mm up measuring 500 mm	6 a
	6 b longitudinal 			For measurement 6 b turn angle and dial gauge 90 degree.		6 b
7	Axial rest of work spindle		Dial gauge, Testing arbor	Clamp testing arbor in work spindle. Place dial gauge at center. Rotate work spindle.	0,01 mm	7 7 attachment spindle

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Geometrical Measurements for Universal- boring- and milling machine with NC- rotary table, pallets and NC-millinghead. Measuring 3 b can be left out when pallets have no T-slots.			PP. Nr. P0000240
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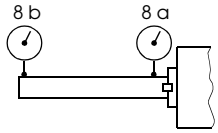
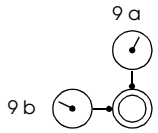
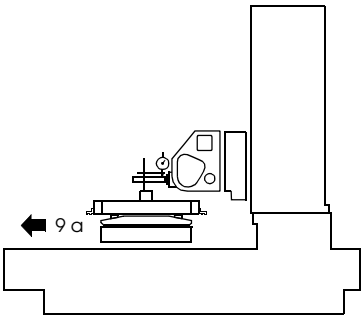
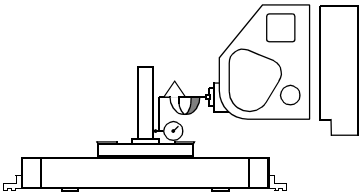
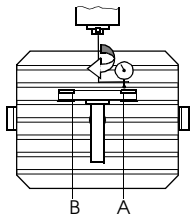
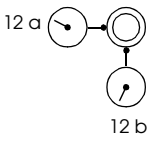
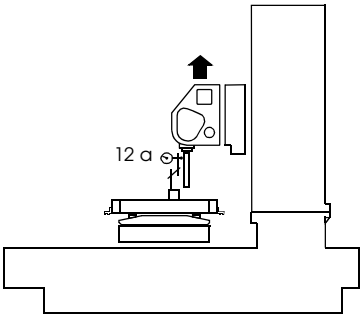
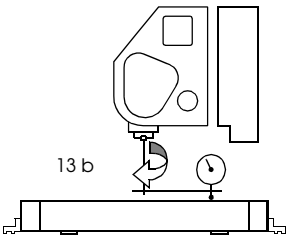
No.	Object of measurement	Picture	Measuring instruments	Measuring instructions	Deviation permissible	Deviation measured
8	Run out of inside taper of work spindle 8 a close to spindle-nose		Dial gauge Testing arbor-300mm	Clamp testing arbor in work spindle. Place dial gauge as shown in 8 a, 8 b. Rotate work spindle.	8 a: 0,01mm	8 a 8 a attachment spindle
	8 b at a distance of 300 mm to spindlenose with attachment spindle: at a distance of 150 mm.				8 b: 0,02 mm attachment spindle: 0,015 mm, at a distance of 150 mm	8 b 8 a attachment spindle
9	Parallelism of work spindle in relation to transversal movement 		Dial gauge, Testing arbor	Clamp testing arbor in work spindle. Turn work spindle into position that shows the half concentricity error. Place dial gauge as shown in 9 a, 9 b. Pass over transversal for lenght of measurement. attachment spindle: Clamp testing arbor in work spindle. Turn work spindle into position that shows the half concentricity error. Place dial gauge as shown in 9 a , 9 b. Pass over transversal for lenght of measurement. Check difference to standard spindle.	0,02 mm, measuring 300 mm attachment spindle: difference to standard spindle 0,007 mm, measuring lgt. 150 mm	9 a 9 a attachment spindle 9 b 9 b attachment spindle
10	Measurement with swing motion of work spindle, vertical		Dial gauge, Cranked arm-150 mm, Angle	Fix angle at center of first pallet. Clamp cranked arm with dial gauge in work spindle. Place dial gauge against angle and set to zero. Turn work spindle 180 degree.	0,02 mm, ∅ 300 mm	10
11	Measurement with swing motion of work spindle, horizontal		Dial gauge, Cranked arm-150 mm Angle	11 a Fix angle at center of first pallet. Align bottom surface of the angle parallel to longitudinal movement. 11 b Clamp cranked arm with dial gauge in work spindle. Set dial gauge to zero in position A. Turn cranked arm 180 degree into position B.	11 b 0,02 mm, ∅ 300 mm	11 b
12	Parallelism of work spindle in relation to vertical movement 		Dial gauge, Testing arbor	Clamp testing arbor in work spindle. Turn work spindle into position that shows the half concentricity error. Place dial gauge as shown in 12 a, 12 b. Pass over vertical for lenght of measurement. attachment spindle: Clamp testing arbor in work spindle. Turn work spindle into position that shows the half concentricity error. Place dial gauge as shown in 12 a , 12 b. Pass over transversal for lenght of measurement. Check difference to standard spindle.	0,02 mm, measuring 300 mm attachment spindle: difference to standard spindle 0,007 mm, measuring lgt. 150 mm	12 a 12 a attachment spindle 12 b 12 b attachment spindle
13	Measurement with swing motion of work spindle: 13 a longitudinal		Dial gauge, Cranked arm-150 mm	Place millinghead in center position to first pallet. Clamp cranked arm with dial gauge in work spindle. Set dial gauge to zero on clamping surface. Turn cranked arm 180 degree. Check longitudinal (13 a) and transversal (13 b).	0,02 mm, ∅ 300 mm	13 a
	13 b transversal					13 b

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Measurements / Help to program for machine with NC- rotary table, pallets and NC-millinghead. Measuring 3 b can be left out when pallets have no T-slots.			PP. Nr. P0000240
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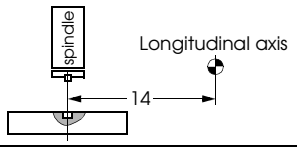
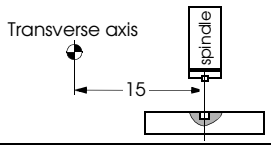
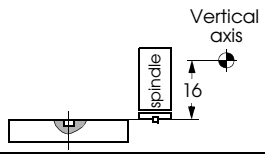
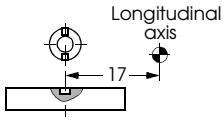
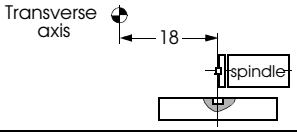
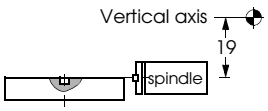
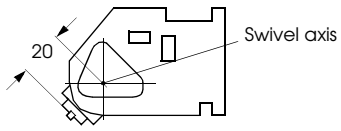
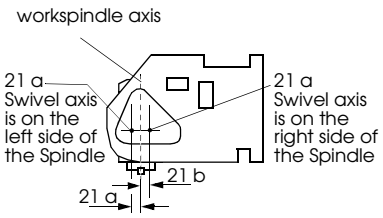
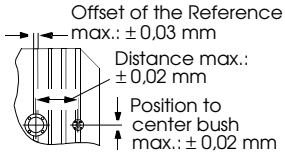
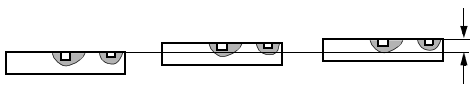
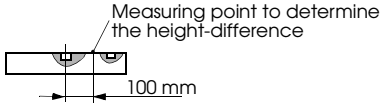
No.	Objekt of measurement	Picture	Preconditions	measured
14	Distance from work spindle to reference point of longitudinal axis. Reference: Center bush in clamping surface.		Reference point offset and millinghead compensation out of work.	14 14 with attachment spindle
15	Distance from work spindle to refe-rence point of transverse axis. Reference: Center bush in clamping surface.		Reference point offset and millinghead compensation out of work.	15 15 with attachment spindle
16	Distance from inside taper of work spindle to reference point of vertical axis. Reference: Clamping surface close to Center bush.		Reference point offset and millinghead compensation out of work.	16 16 with attachment spindle
17	Distance from work spindle to reference point of longitudinal axis. Reference: Center bush in clamping surface.		Reference point offset and millinghead compensation out of work.	17 17 with attachment spindle
18	Distance from inside taper of work spindle to reference point of transverse axis. Reference: Center bush in clamping surface.		Reference point offset and millinghead compensation out of work.	18 18 with attachment spindle
19	Distance from work spindle to reference point of longitudinal axis. Reference: Clamping surface close to Center bush.		Reference point offset and millinghead compensation out of work.	19 19 with attachment spindle
20	Distance from inside taper of work-spindle to Swivel axis (swivelradius)		Reference point offset and millinghead compensation out of work.	20
21	Offset between Swivel axis and work-spindle axis Reference: workspindle axis		Reference point offset and millinghead compensation out of work. Workspindle is aligned.	21 a 21 a with attachment spindle 21 b 21 b with attachment spindle

Comment: Above mentioned measures refer to the first pallet. The maximum difference of height between both or more pallets is 0,02 mm, the offset of the Reference T-slot ± 0,03 mm. The maximum positional deviation of the bush is ± 0,02 mm.







Comment: The machine will return to the equal actual position after changing the working plane. (G17 = work spindle vertical, G18 = work spindle horizontal). This is guaranteed through the application of offset values in suitable machine constants, by the company.The compensation works automatically by swivelling the millinghead.

Attention: Please pay attention to the positions of the working plane G17 and G18, the reference points, and the machine zero points of your machine. They can deviate from the symbolic description (For example, after a change of the working planes).

Bild