



GM Europe

Aspern, Austria

GM 4463

Workpiece: **Transmission case F17**

System type: **Manufacturing system**

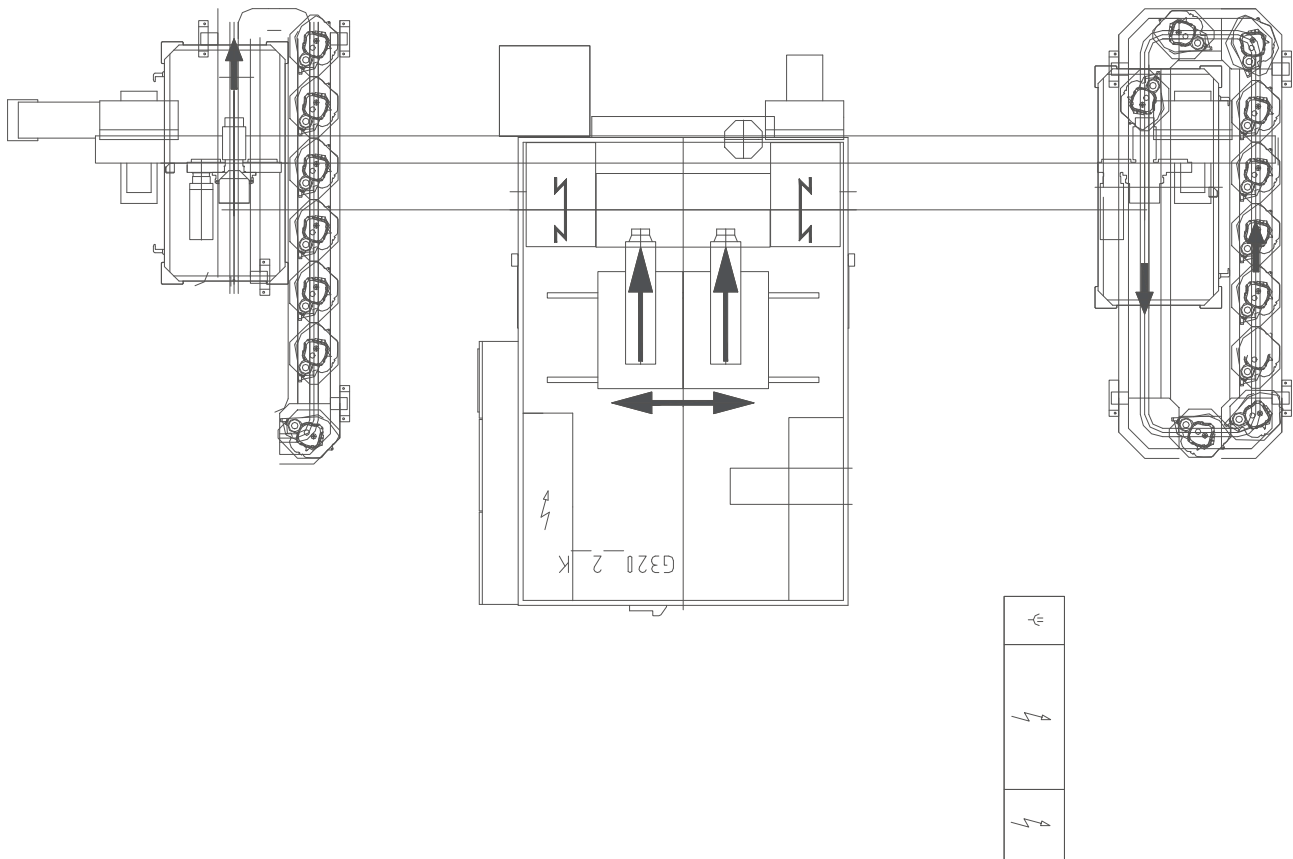
Inventory No.: **70600755**
 70600818

SAP No.: **100545632-01**
 100545632-02

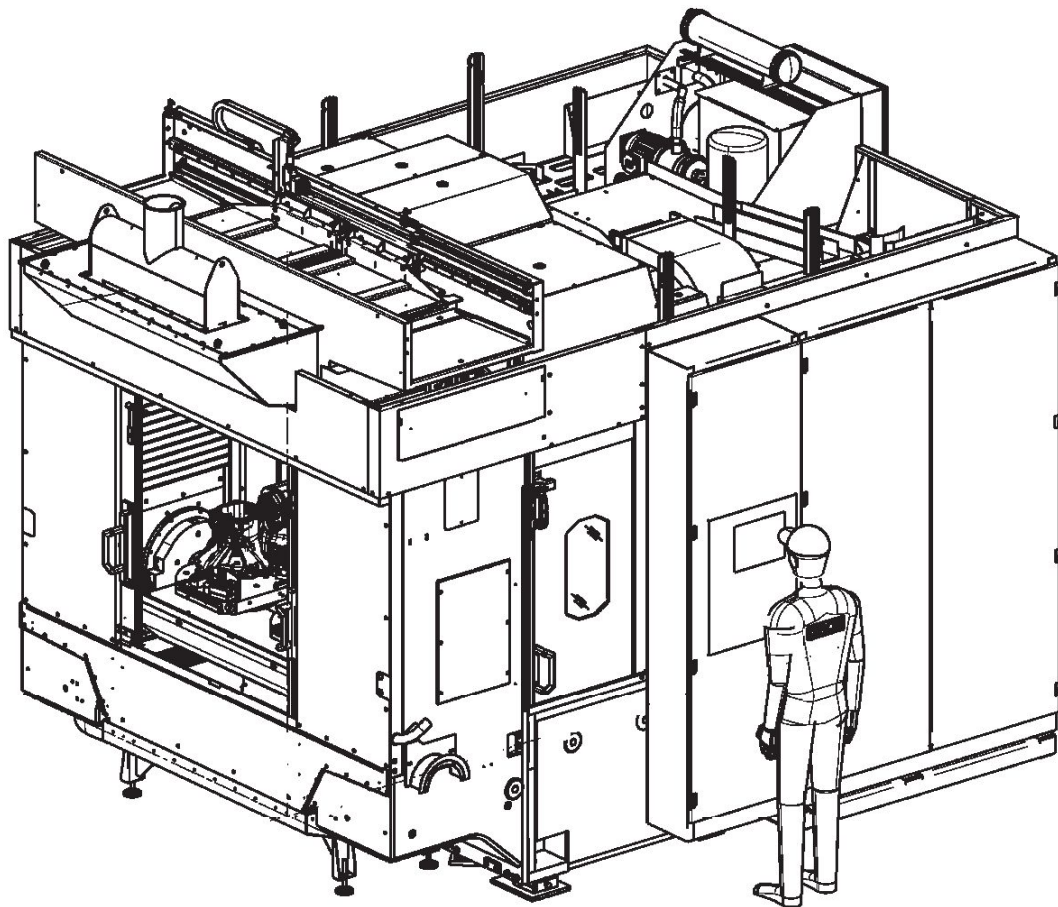
Machine No.: **GM4463/01-01**
 GM4463/01-60

Machine documentation

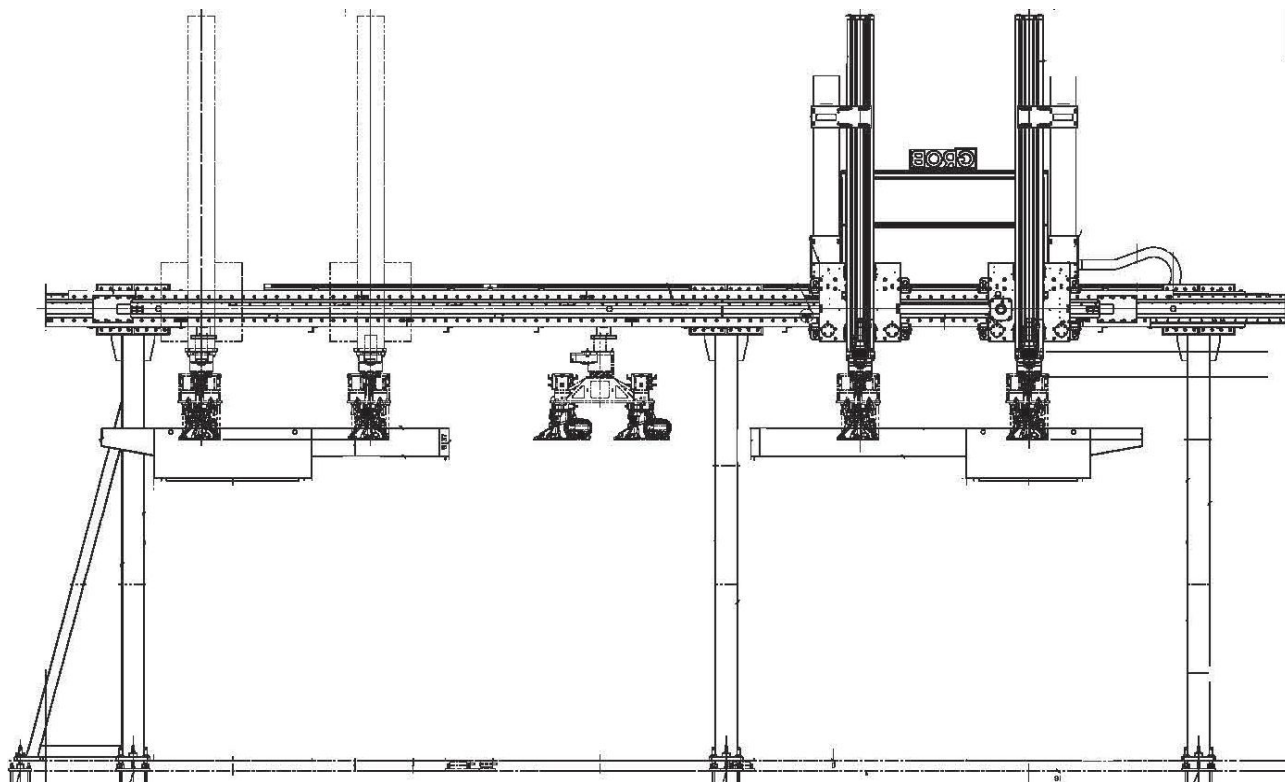
3 Layout manufacturing system GM4463/01



3.1 Layout machining center G325AB2



3.2 Layout transfer system GM4463/01-60



1 Machine data
1.1 Machine data: G325AB2 (OP10) machining center

Dimensions and weights		
Space requirements		
Length G325	5 300	[mm]
Width G325	3 300	[mm]
Machine height G325	3 400	[mm]
Machine weight G325	17 000	[kg]
Filling capacities		
Hydraulic power unit on machining center	40	[l]
centralized lubrication	6	[l]
Lubrication points	Refer to lubrication diagram	
Electrical installed loads		
Line voltage	500	[V AC]
Installed power machining center G325	95	[KVA]
Frequency	50	[Hz]
Media		
Type of lubricant	Emulsion	
Cooling lubricant with 3 bar	-	[l/min]
Cooling lubricant with 10 - 80 bar	-	[l/min]
Required system pressure	5	[bar]
Important note: The length, size and liter specifications are approximate values		

1.2 Machine data: GM4463/01-60 (OP10) transfer system

Dimensions and weights			
Space requirements			
Length		11 200	[mm]
Width		2 500	[mm]
Machine height (linear gantry)		6 800	[mm]
Filling capacities			
centralized lubrication		6	[l]
Lubrication points		Refer to lubrication diagram	
Electrical installed loads			
Line voltage		500	[VAC]
Installed power		15	[kW]
Frequency		50	[Hz]
Media			
Type of lubricant		Emulsion	
Required system pressure		5	[bar]
Important note: The length, size and liter specifications are approximate values			

2 Operating conditions

Media Supply		
Electrical connection	- Voltage:	3P/PEN-500 V +/- 10 %
	- Frequency:	50 Hz +/- 1 %
		TN-C-system
	- Total power:	110 KW
High pressure cooling lubricant	- Pressure: p = 3 bar in supply line of central supply	
	- Grade of filtration: 30 µm nominal	
	- spec. contamination: max. 30 mg/l	
	(measured with 5 µm cellulose nitrate membrane, flushed with a solvent)	
Low pressure cooling lubricant	- Pressure: p = 3 bar in supply line of central supply	
	- Grade of filtration: 100 µm nominal	
	- Spec. contamination: max. 100 mg/l	
	(measured with 5 µm cellulose nitrate membrane, flushed with a solvent)	
Cooling water	< 16°C	
Compressed air	- Operating pressure: p = 5 bar (max. pressure: 10	
	- Solids content: class 4 (according to ISO 8573-1)	
	Particle size max. 15 µm	
	Particle density max. 8 mg/m ³	
	- Water content: class 4 (according to ISO 8573-1)	
	Pressure dew point at operating pressure: + 3°C	
	- Oil content: class 4 (according to ISO 8573-1)	
	Max. 5 mg/m ³	
Ambient conditions for basic machine operation without exceptional accuracy requirements:		
Ambient temperature	+ 10°C to + 35°C	
Humidity	Relative humidity: 10 % to 70 %	
	Absolute humidity: max. 22 g/m ³	
Atmosphere	normal industrial environment	
Geographic location	Up to 1.000 m above sea level NN	



Noise measurement report
(Measuring points layout and noise emission card)

Date / Time	08.05.2013
Name:	Waldir Simões
Department:	Assembly

Sound pressure level

integrated measuring

Integrat.-time. $t(i) = 145,5$ s

Frequency weighting "A"

Time assessment "F"

Measuring distance

$d = 1$ m

Measuring height

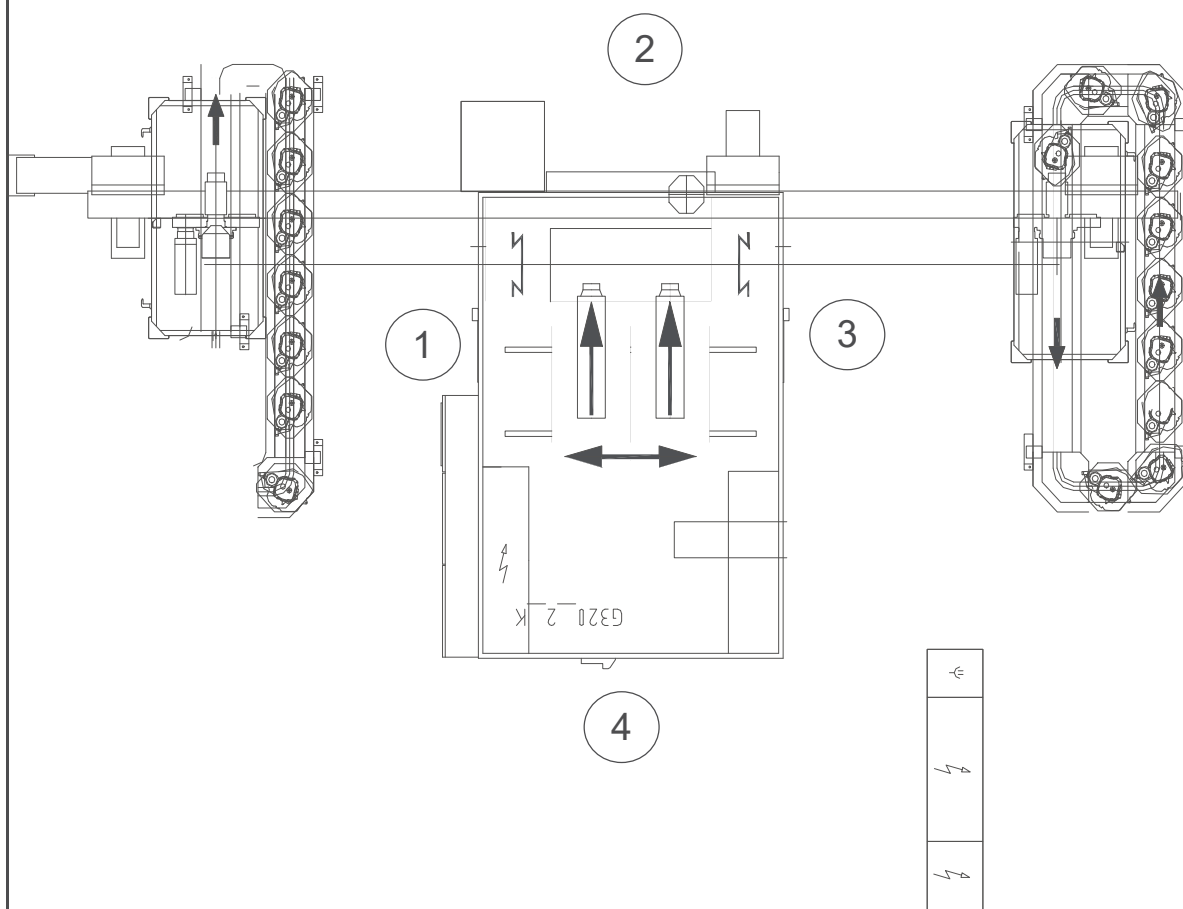
$h = 1,4$ m

Measuring instrument

Customer workpiece

B&K 2260

Accuracy class 1



Values: see sheet 1

Machine No.	Customer	Sheet 2 of 2
GM4463-01 G325	GM Opel Aspern	Signature:

1 Part specification**1.1 Workpiece specification - Intended use of the machine**

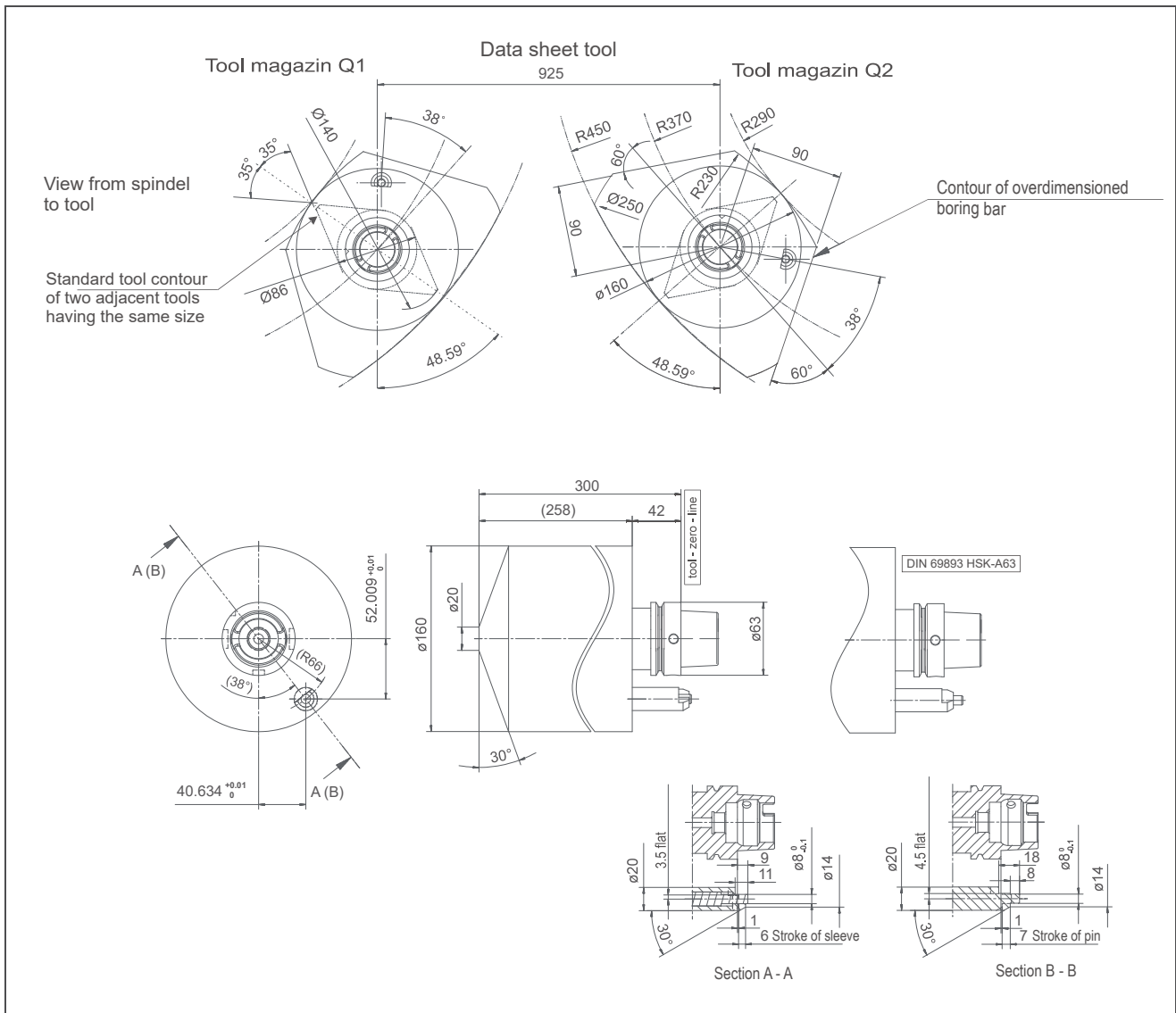
The described scope of machinery is exclusively designed for machining the following listed workpieces:

Workpiece designation:	Workpiece type:	Material:
Transmission case F17	F17 (24580888)	GD-AISI9Cu3
		

Any unintended use of the described machines may lead to the exclusion of any liability and/or guarantee by the manufacturer! (see also [Chapter 2](#))

Please note any applicable specifications (e.g. machine documentation, electrical-, fluids-, tool-, engineering- as well as operating-, maintenance- and inspection documentations, ...)

2 Tool data: G325AB2 - 1088



Note:

Tools with torque plate (with and without support) as well as oversize tools may only be placed into magazine disk 1/1, 2/1 (front) (during automatic tool change or loading via tool lifter).

In magazine disks 1/1, 2/1 (front) as well as in magazine disks 1/2, 2/2 (rear) tools with maximum diameter (250 mm) can be placed.

During an automatic tool change with oversize tool being "UNLOADED tool" the LOADING gripper of the tool changer arm must be kept free.

G325AB2

Maximum tool weight	:	8	kg
Maximum total tool weight	:	156	kg
Average tool weight for 2x 26 tools	:	3	kg
Max. torque around aut. tool change groove	:	12	Nm
Maximum tool diameter	:	160	mm
Authorized adjacent tool diameter relating to max. tool	:	0	mm
Standard tool diameter (authorized diameter of two adjacent tools having the same size)	:	86	mm

3 Safety- protective covering:G325AB2


Disruptive strength of the enclosure according to prEN 12417	: v _{max}	=	200	m/s
maximum spindle speed	: n _{Sp}	=	12 000	1/min
biggest rotating diameter	: D _{max}	=	250	mm
Max. speed for tools ≤ half tool pockets (≤ ø225 mm)	: n	=	18 000	1/min
Max. speed for tools > 4 half tool pockets (> ø225 mm) und ≤ D _{max}	: n	=	8 000	1/min

Only tools equipped with authorized HSK-movable coolant pipe for internal coolant supply are to be used.

Required balancing quality grade for maximum spindle speed:

G 2.5 according to ISO 1940 norm

Q 2.5 according to VDI 2060 norm

designation of the axis: X

720 nominal measure length position encoder

640 MB - MB

600 NOMINAL STROKE

700

350

300

300

18 STROKE of spring

1

20 OVERTRAVEL

40

MB position encoder

MB = mechanical stop

SE = software limit

X + FINAL POSITION
tool loaded manually into spindle 2

center of B2' - rotary table

spindle 2 (Z2)

center of machine

spindle 1 (Z1)

machine-zero point
tool change point (for Z1)
tool loading for Q1 or Q2
Home position

X-FINAL POSITION
tool loaded manually into spindle 1

SE = software limit

MB = mechanical stop

MB position encoder

direction of axis
DIRECTION of MOTION
LEFT + RIGHT

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	STY/A10 Ms ; STY/A20 Ms				
2	M manufacture	Siemens				
3	M Type	(2x) 1FT7105-5WF71-4-G1				
4	M Rated speed	3000 rpm				
5	M standstill torque ($M_{0.95}$)	72 Nm				
6	M torque constant	1.69 Nm/A				
7	M brake	STY/A10 Br ; STY/A20 Br				
8	M manufacture	Mayr				
9	M item number	(2x) 8 199 286				
10	M holding torque	108 Nm (135 Nm -20% +40%)				
11	M coil voltage	225 VDC				
12	M input voltage rectifier	400 VAC to 500 VAC				
13	M output voltage rectifier	360 / 180 VDC to 450 / 225 VDC				
14						
15	type of drive					
16	M Motor - ball screw	(2x)				
17	M nominal diameter x pitch	ø 50 x 25				
18						
19	Frequency inverter					
20	E manufacture	Siemens				
21	E Type	(2x) 45 / 85 A				
22	E number of axes					
23	E designation of axis					
24						
25	ABSOLUTE ENCODER					
26	M pos. detection	direct				
27		STY/A10 Cod ; STY/A20 Cod				
28	M manufacture	Heidenhain				
29	M Type	(2x) LC 483 ; ML = 720				
30	M grating period	0,020 mm				
31	M encoder mount	slide				
32						
33	E multiple evaluation CNC					
34	E total resolution					
35						
36						
37						
38						
39	MOMENTS OF INERTIA					
40	M moments of inertia (J_{mx})					
41	M Own moment of inertia (J_p)					
42	M Reduced external moment of inertia (J_R)					
43	M Mass moment of inertia J_F / J_E					
44						
45						
46						
47						
48						
49						
50						
changes		Date 16.10.2012		Customer GM EUROPE Aspern		
Date		made by Schildknecht		drawing no. sheet 2		
Name		Checked Schildknecht		Inventory No. G325AB2-1088 -206-BZ-NC-SI Sheets 15		
				refer to diagram No. replacement for: replaced by		

designation of the axis: Y'

The diagram illustrates the Y' axis configuration. Key features include:

- Stroke Limits:** NOMINAL STROKE of 655 mm (MB - MB), with OVERTRAIL of 20 mm and a range of 17 mm.
- Positioning:** Y' - FINAL POSITION, SE = software limit, and machine-zero point (center of A-axis, center of spindle, tool change point, home position).
- Motion Directions:** TOP (+) and BOTTOM (-) directions, with arrows indicating motion up and down.
- Encoder:** MB position encoder and bottom edge of machine.
- Dimensions:** 12,5 mm, 695 MB - MB, 340 mm (direction of motion downwards), 30 mm, 315 mm (direction of motion upwards), 1400 mm.

the following will be filled-in and dimensioned according to application of data sheet:

machine-zero point	tool change point
Datum point: refer to respective fixture and drawings	

date of issue: 0 16.10.2012

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	KSZ/A10 Ms ; KSZ/A20 Ms				
2	M manufacture	Siemens				
3	M Type	(2x) 1FK7101-1AF71-1GG1				
4	M Rated speed	3000 rpm				
5	M standstill torque ($M_{0.95}$)	22.5 Nm				
6	M torque constant	1.44 Nm/A				
7						
8	type of drive					
9	M Motor - ball screw	(2x)				
10	M nominal diameter x pitch	ø 40 x 25				
11						
12						
13						
14						
15						
16						
17	Frequency inverter					
18	E manufacture	Siemens				
19	E Type	18 / 36 A				
20						
21		2-axis converter for Z1 and Z2				
22	E number of axes					
23	E designation of axis					
24						
25	ABSOLUTE ENCODER					
26	M pos. detection	direct				
27		KSZ/A10 Cod ; KSZ/A20 Cod				
28	M manufacture	Heidenhain				
29	M Type	(2x) LC 483 ; ML = 720				
30	M grating period	0,020 mm				
31	M encoder mount	Cross-slide				
32						
33	E multiple evaluation CNC					
34	E total resolution					
35						
36						
37						
38						
39	MOMENTS OF INERTIA					
40	M moments of inertia (J_{rot})					
41	M Own moment of inertia (J_p)					
42	M Reduced external moment of inertia (J_F)					
43	M Mass moment of inertia J_F / J_E					
44						
45						
46						
47						
48						
49						
50						

DRIVE DATA		POSITION ENCODER		MOVED MASS	
M	Fast traverse V_E	90 m/min			
M	n motor for V_E	3600 rpm			
M	Feed thrust F_V	6 kN			
M	Acceleration	8,0 m/s ²			
I	KV-factor	10 ¹ /min			
I	Jerk	300 m/s ³			
E	control system (manufacture)	Siemens			
E	Type	840D sl			
M	travel / motor revolution	25 mm			
M	travel / encoder increment	0,02 mm			
M	encoder increments / mm	50			

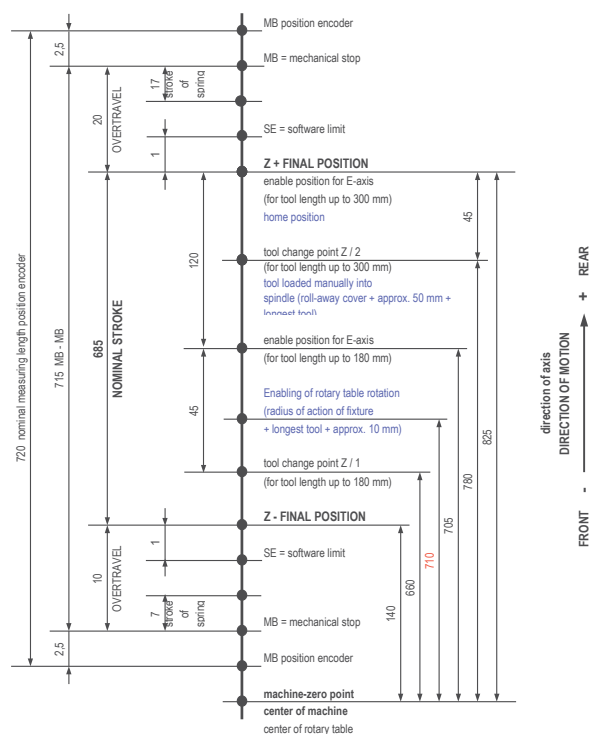
AXIS DATA	
E	control system (manufacture)
E	Type
M	travel / motor revolution
M	travel / encoder increment
M	encoder increments / mm

CHANGES		DATE		CUSTOMER		DRAWING NO.		SHEET	
changes		16.10.2012		GM EUROPE Aspern				3	
Date		Schildknecht				G325AB2-1088 -206-BZ-NC-SI		15	
Name		Schildknecht				replaced by:			

the following will be filled-in and dimensioned according to application of data sheet:	
machine-zero point	tool change point
Datum point: refer to respective fixture and drawings	

date of issue:	
0	16.10.2012

designation of the axis: Z1 / Z2



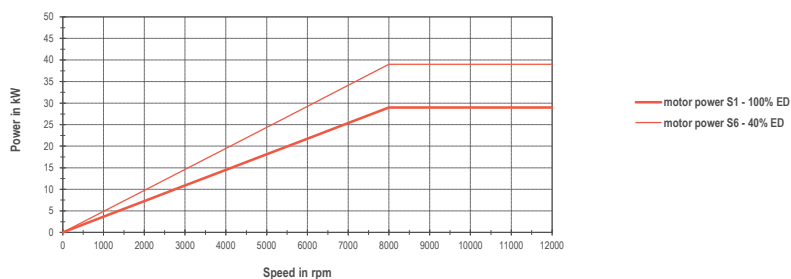
GROB		NC AXIS DATA SHEET		Machine	
				G325AB2-1088	G325AB24K
		Unit		Machining center	
1	Drive	MSP/A10 Ms ; MSP/A20 Ms			
2	M manufacture	Grob			
3	M Type	(2x) MSP63150-042-01-01			
4	M Rated speed	8000 rpm			
5	M Max. speed	12000 r.p.m.			
6	M min. speed				
7	M rated-load torque	34,6 Nm for 100%ED, 46 Nm for 40%ED			
8	M Rated power	29 kW for 100 % ED, 39 kW for 40%ED			
9	M data sheet number	050607			
10					
11	type of drive				
12	M Motorized spindle	(2x)			
13					
14					
15					
16					
17					
18					
19	Frequency inverter				
20	E manufacture	Siemens			
21	E Type	(2x) 60 / 80 / 113 A			
22	E number of axes				
23	E designation of axis				
24					
25	INCREMENTAL ENCODERS				
26	M pos. detection	direct			
27		MSP/A10 Cod ; MSP/A20 Cod			
28	M manufacture	Lenord+Bauer			
29	M Type	(2x) gear wheel encoder GEL244			
30	M grating period	1,40625"			
31	M increments / revolution	256			
32	M encoder mount	spindle & motor			
33					
34	E multiple evaluation CNC				
35	E total resolution				
36					
37					
38					
39	MOMENTS OF INERTIA				
40	M moments of inertia (J_{tool})				
41	M total moment of inertia				
42	M (without tool) (J_0)				
43					
44					
45					
46					
47					
48					
49					
50					
		data sheet filled in by department as indicated by capital letter: (M) mechanical; (E) electrical; (I) initial commissioning		date of issue: 0 16.10.2012	
		the following will be filled-in and dimensioned according to application of data sheet: for machine datum see NC-data sheets for X-, Y-, Z-axis for setting datum point see NC-data sheets for X-, Y-, Z-axis		for tool change point see NC-data sheets X-, Y-, Z-axis	
changes Date Name		Date made by Checked		Customer Inventory No. refer to diagram No.	
		16.10.2012 Schildknecht Schildknecht		GM EUROPE Aspern G325AB2-1088 -206-BZ-NC-SI replaced by	
				drawing no. Sheets 4	



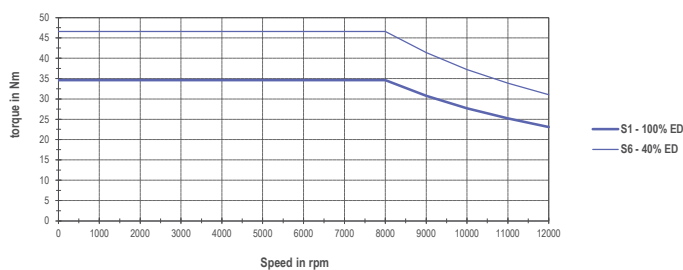
NC AXIS DATA SHEET

Machine	G325AB2-1088	G325AB24K
Unit	Machining center	

SPINDLE POWER



SPINDLE TORQUE



date of issue: 0 16.10.2012

data sheet filled in by department as indicated by capital letter: (M) mechanical; (E) electrical;
(I) initial commissioning

the following will be filled-in and dimensioned according to application of data sheet:

for machine datum see NC-data sheets for X-, Y-, Z-axis

for setting datum point see NC-data sheets for X-, Y-, Z-axis

for tool change point see NC-data sheets X-, Y-, Z-axis

changes					Date	16.10.2012		Customer	GM EUROPE Aspern	drawing no.		sheet	5
Date					made by	Schildknecht		Inventory No.		G325AB2-1088 -206-BZ-NC-SI		Sheets	15
Name					Checked	Schildknecht		refer to diagram No.		replacement for:		replaced by	

Customer	GM EUROPE Aspern	drawing no.	sheet	6
Inventory No.		G325AB2-1088 -206-BZ-NC-SI	Sheets	15
refer to diagram No.		replacement for:	replaced by	

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	RTB/A10 Ms ; RTB/A20 Ms				
2	M manufacture	Bosch Rexroth				
3	M Type	(2x) MST290D-0004-FS-N0CN-SG01 (Stator)				
4		(2x) MRT290D-3N-0200-NNNN (rotor)				
5	M Max. speed	50 rpm				
6	M rated-load torque resp.					
7	M standstill torque	350 Nm (water-cooled)				
8	type of drive					
9	M direct drive	(2x)				
10						
11						
12						
13						
14						
15						
16						
17						
18	Frequency inverter					
19	E manufacture	Siemens				
20	E Type	9 / 18 A				
21		2-axis converter for B1' and B2'				
22	E number of axes					
23	E designation of axis					
24						
25	INCREMENTAL ENCODERS					
26	M pos. detection	direct				
27		RTB/A10 Cod ; RTB/A20 Cod				
28	M manufacture	Heidenhain				
29	M Type	(2x) RON 287 C +/- 2.5"				
30	M grating period	0,02000"				
31	M increments / revolution	18000				
32	M encoder mount	Rotary table				
33						
34	E multiple evaluation CNC					
35	E total resolution					
36						
37						
38						
39	MOMENTS OF INERTIA					
40	M moments of inertia (J_{mx})					
41	M Own moment of inertia (J_p)					
42	M Reduced external moment of inertia (J_F)					
43	M Mass moment of inertia J_F / J_E					
44						
45						
46						
47						
48						
49						
50						
changes		Date		Customer		drawing no.
Date		made by		Inventory No.		G325AB2-1088 -206-BZ-NC-SI
Name		Checked		refer to diagram No.		replacement for: replaced by
		Date 16.10.2012		Customer GM EUROPE Aspern		sheet 7
		made by Schildknecht		Inventory No.		Sheets 15
		Checked Schildknecht				

designation of the axis: B1' / B2' (rotary table)

rotary table shown in 0° position (home positions)
range for home position + 359,9° to + 0,1°

AXIS DIRECTION Z
MOVING DIRECTION Z

date of issue: 0 16.10.2012

the following will be filled-in and dimensioned according to application of data sheet:

for machine datum see NC-data sheets for X-, Y-, Z-axis
for tool change point see NC-data sheets X-, Y-, Z-axis

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	WZS/A10 Ms	positions of tool magazine			
2	M manufacture	Siemens	M 0°	tool transfer position of tool changer arm		
3	M Type	1FK7060-1AF71-1-H1	M 0°	positioning point Q1-axis		
4	M Rated speed	3000 rpm	M 289.91°	magazine loading via tool lifter (magazine disk)		
5	M standsstill torque ($M_{0.05}$)	5 Nm				
6	M torque constant	1.33 Nm/A				
7	M brake	WZS/A14 Br				
8	M manufacture	Siemens				
9	M Type					
10	M holding torque	13 Nm				
11	M connecting voltage	24 VDC				
12	M rated current	0.8A				
13						
14	type of drive					
15	M motor - Cyclo gearbox					
16	M Cyclo gearbox	i = 120				
17	M number of tool pockets per disk	26				
18	M total transmission	i = 120				
19	M tooth pitch of tool magazine	360° / 26 13.84615°				
20						
21	Frequency inverter					
22	E manufacture	Siemens				
23	E Type	5 / 10 A				
24		2-axis converter for Q1 and Q2				
25	E number of axes					
26	E designation of axis					
27						
28	ABSOLUTE ENCODER					
29	M pos. detection	indirect, absolute				
30		WZS/A10 Cod				
31	M manufacture	Siemens				
32	M Type	AM240Q1				
33	M grating period	0.17578"				
34	M increments / revolution	2048				
35	M absolute resolution	4096 rotations				
36	M encoder mount	Three-phase servomotor				
37						
38	E multiple evaluation CNC					
39	E total resolution					
40						
41						
42	MOMENTS OF INERTIA					
43	M moments of inertia (J_{xx})					
44	M Own moment of inertia (J_y)					
45	M Reduced external moment of inertia (J_z)					
46	M Mass moment of inertia J_F / J_E					
47						
48						
49						
50						

BRAKE TEST (complies with EN954-1, category 2)	
M motor brake load torque in case of unilateral load	1.5 Nm
(average tool weight 3 kg)	
M holding torque safety brake / load torque	8.6
carry out electric brake test	

CIRCUIT AXIS	
M Fast traverse n_E	546 Tool pockets/min
M n motor for n_E	2520 rpm
M tool magazine n for n_E	21 rpm
M tool magazine	26 tool pockets
M Acceleration	12.57 rad/s²
I KV-factor	10%/min
I Jerk	40 m/s³

ABSOLUTE ENCODER	
M pos. detection	indirect, absolute
M manufacture	Siemens
M Type	AM240Q1
M grating period	0.17578"
M increments / revolution	2048
M absolute resolution	4096 rotations
M encoder mount	Three-phase servomotor

MOMENTS OF INERTIA	
M moments of inertia (J_{xx})	
M Own moment of inertia (J_y)	
M Reduced external moment of inertia (J_z)	
M Mass moment of inertia J_F / J_E	

POSITION ENCODER	
M manufacture	Siemens
M Type	AM240Q1
M grating period	0.17578"
M increments / revolution	2048
M absolute resolution	4096 rotations
M encoder mount	Three-phase servomotor

MOVING MASSES	
M moments of inertia (J_{xx})	
M Own moment of inertia (J_y)	
M Reduced external moment of inertia (J_z)	
M Mass moment of inertia J_F / J_E	

CHANGES	
changes	
Date	
Name	

DATE	
Date	16.10.2012
made by	Schildknecht
Checked	Schildknecht

CUSTOMER	
Customer	GM EUROPE Aspern
Inventory No.	
refer to diagram No.	

DRAWING	
drawing no.	8
G325AB2-1088 -206-BZ-NC-SI	Sheets 15
replacement for:	replaced by

designation of the axis: Q1 (tool magazine)

For the tool transfer between magazine disk 1/1 (front) and magazine disk 1/2 (rear) the tool pockets 24 to 26 of magazine disk 1/1 (front) must be kept free (f. tools > 2 half tool pockets). Tool exchange point is tool pocket 25.

Caution
view from spindle towards part

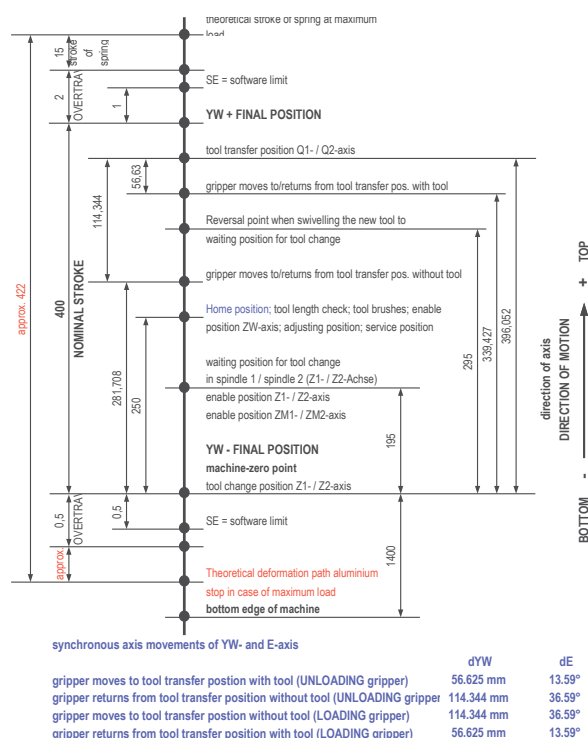
the following will be filled-in and dimensioned according to application of data sheet:

for machine datum see NC-data sheets for X-, Y-, Z-axis
for setting datum point see NC-data sheets for X-, Y-, Z-axis
for tool change point see NC-data sheets X-, Y-, Z-axis

Caution view from spindle towards part		date of issue:		0	16.10.2017
the following will be filled-in and dimensioned according to application of data sheet:					
for machine datum see NC-data sheets for X-, Y-, Z-axis		for tool change point see NC-data sheets X-, Y-, Z-axis			
for setting datum point see NC-data sheets for X-, Y-, Z-axis					
Customer	GM EUROPE Aspern		drawing no.		sheet
Inventory No.			G325AB2-1088 -206-BZ-NC-SI		Sheets
refer to diagram No.			replacement for:		replaced by:

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	WZWA/A10 Ms				
2	M manufacture	Siemens				
3	M Type	1FK7064-1CGF71-1CH1				
4	M Rated speed	3000 rpm				
5	M standstill torque ($M_{0.2}$)	10 Nm				
6	M torque constant	1.11 Nm/A				
7	M brake	WZWA/A14 Br				
8	M manufacture	Siemens				
9	M Type					
10	M holding torque	13 Nm				
11	M connecting voltage	24 VDC				
12	M rated current	0.8A				
13						
14	type of drive					
15	M motor - angular gear - pinion - gear rack					
16	M angular gear	i = 5				
17	M number of teeth of pinion	z = 23				
18	M effective diameter of pinion	48.807				
19	M effective circumference of pinion	153.332				
20						
21	Frequency inverter					
22	E manufacture	Siemens				
23	E Type	9 / 18 A				
24		2-axis converter for YW and ZW				
25	E number of axes					
26	E designation of axis					
27						
28	ABSOLUTE ENCODER					
29	M pos. detection	indirect, absolute				
30		WZWA/A10 Cod				
31	M manufacture	Siemens				
32	M Type	AM240Q1				
33	M grating period	0.17578"				
34	M increments / revolution	2048				
35	M absolute resolution	4096 rotations				
36	M encoder mount	Three-phase servomotor				
37						
38	E multiple evaluation CNC					
39	E total resolution					
40						
41						
42	MOMENTS OF INERTIA					
43	M moments of inertia (J_{rot})					
44	M Own moment of inertia (J_G)					
45	M Reduced external moment of inertia (J_E)					
46	M Mass moment of inertia J_F / J_E					
47						
48						
49						
50						
data sheet filled in by department as indicated by capital letter: (M) mechanical; (E) electrical; (I) initial commissioning				the following will be filled-in and dimensioned according to application of data sheet:		
Date 16.10.2012				Customer GM EUROPE Aspern		
made by Schildknecht				drawing no. G325AB2-1088 -206-BZ-NC-SI		
Checked Schildknecht				Inventory No. refer to diagram No.		
				sheet 10		
				Sheets 15		
				replacement for: replaced by		

designation of the axis: YW (tool changer arm)



date of issue: 0 16.10.2012

GROB		NC AXIS DATA SHEET		Machine G325AB2-1088 G325AB24K	
				Unit Machining center	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	DRIVE DATA	Drive WZWA/A60 Ms			
		M manufacture :	Siemens		
		M Type :	1FK7042-1AK71-1G1		
		M Rated speed :	6000 rpm		
		M standstill torque ($M_{0.95}$) :	2.5 Nm		
		M torque constant :	0.68 Nm/A		
		type of drive			
		M Motor - Planetary gear drive - pinion - gear rack			
		M Planetary gear drive :	i = 7		
		M number of teeth of pinion :	z = 22		
M effective diameter of pinion :	46,685				
M effective circumference of pinion :	146,665				
28 29 30 31 32 33 34 35 36 37 38 39 40 41	POSITION ENCODER	Linear axis			
		M Fast traverse V_E :	125 m/min		
		M n motor for V_E :	5966 rpm		
		M Acceleration :	11 m/s ²		
		I KV-factor :	10°/min		
		I Jerk :	220 m/s ³		
		max. motor torque limited to 11 Nm in all operating modes			
		E control system (manufacture) :	Siemens		
		E Type :	840D		
		Frequency inverter			
E manufacture :	Siemens				
E Type :	9 / 18 A				
2-axis converter for YW and ZW					
E number of axes :					
E designation of axis :					
42 43 44 45 46 47 48 49 50	MOVED MASSES	ABSOLUTE ENCODER			
		M pos. detection :	indirect, absolute		
		M pos. detection :	WZWA/A60 Cod		
		M manufacture :	Siemens		
		M Type :	AM240G1		
		M grating period :	0,17578"		
		M increments / revolution :	2048		
		M absolute resolution :	4096 rotations		
		M encoder mount :	Three-phase servomotor		
		MOMENTS OF INERTIA			
M moments of inertia (J_{rot}) :					
M Own moment of inertia (J_G) :					
M Reduced external moment of inertia (J_E) :					
M Mass moment of inertia J_F / J_E :					
data sheet filled in by department as indicated by capital letter: (M) mechanical; (E) electrical; (I) initial commissioning		the following will be filled-in and dimensioned according to application of data sheet:			
for machine datum see NC-data sheets for X-, Y-, Z-axis		for tool change point see NC-data sheets X-, Y-, Z-axis			
for setting datum point see NC-data sheets for X-, Y-, Z-axis					
changes		Date 16.10.2012		Customer GM EUROPE Aspern	
Date		made by Schildknecht		Inventory No.	
Name		Checked Schildknecht		drawing no. G325AB2-1088 -206-BZ-NC-SI	
				replacement for: replaced by	

designation of the axis: ZW (tool changer arm)

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K	
				Unit	Machining center		
1	Drive	WZWA/A30 Ms	SIGNAL TRANSMITTER	M switch	WZWA/A44 E S1		
2	M manufacture	Siemens	M Type	tool present in UNLOADING gripper 1	ES142		
3	M Type	1FT7034-1AK71-1CH1	M runs along with	cam			
4	M Rated speed	6000 rpm	M Type	tool present in LOADING gripper 1	ES142		
5	M standstill torque ($M_{0.95}$)	1.6 Nm	M switch	WZWA/A46 E S1			
6	M torque constant	0.74 Nm/A	M runs along with	cam			
7	M brake	WZWA/A34 Br	M Type				
8	M manufacture	Siemens	M runs along with				
9	M Type						
10	M holding torque	3 Nm					
11	M connecting voltage	24 VDC					
12	M rated current	0.3 A					
13							
14	type of drive						
15	M motor - gear unit- belt drive						
16	M Gearbox	i = 50					
17	M Belt gear	z = 22 / 22					
18							
19	Frequency inverter						
20	E manufacture	Siemens					
21	E Type	5 / 10 A					
22		2-axis converter for E1 and E2					
23	E number of axes						
24	E designation of axis						
25							
26	ABSOLUTE ENCODER						
27	M pos. detection	indirect, absolute					
28	M manufacture	WZWA/A30 Cod					
29	M Type	AM2400					
30	M grating period	0,17578"					
31	M increments / revolution	2048					
32	M absolute resolution	4096 rotations					
33	M encoder mount	Three-phase servomotor					
34							
35							
36	E multiple evaluation CNC						
37	E total resolution						
38							
39							
40	MOMENTS OF INERTIA						
41	M moments of inertia (J_{xx})						
42	M Own moment of inertia (J_y)						
43	M Reduced external moment of inertia (J_z)						
44	M Mass moment of inertia $J_x / J_y / J_z$						
45							
46							
47							
48							
49							
50							
changes		Date	16.10.2012	Customer	GM EUROPE Aspern	drawing no.	sheet 12
Date		made by	Schildknecht	Inventory No.		G325AB2-1088 -206-BZ-NC-SI	Sheets 15
Name		Checked	Schildknecht	refer to diagram No.		replacement for:	replaced by

designation of the axis: E1 (tool changer arm)

direction of axis
DIRECTION OF MOTION

synchronous axis movements of YW- and E-axis

	dYW	dE
gripper moves to tool transfer position with tool (UNLOADING gripper)	56.625 mm	13.59°
gripper returns from tool transfer position without tool (UNLOADING gripper)	114.344 mm	36.59°
gripper moves to tool transfer position without tool (LOADING gripper)	114.344 mm	36.59°
gripper returns from tool transfer position with tool (LOADING gripper)	56.625 mm	13.59°

Caution
view from spindle towards part

the following will be filled-in and dimensioned according to application of data sheet:

for machine datum see NC-data sheets for X-, Y-, Z-axis
for tool change point see NC-data sheets X-, Y-, Z-axis

date of issue: 0 16.10.2012

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	WZWA/A35 Ms	SIGNAL TRANSMITTER	M switch	WZWA/A47 E S1	
2	M manufacture	Siemens		M Type	tool present in UNLOADING gripper 2	
3	M Type	1FT7034-1AK71-1CH1		M Type	ES142	
4	M Rated speed	6000 rpm		M runs along with	cam	
5	M stands still torque ($M_{0.95}$)	1.6 Nm		M switch	WZWA/A49 E S1	
6	M torque constant	0.74 Nm/A		M Type	tool present in LOADING gripper 2	
7	M brake	WZWA/A39 Br		M Type	ES142	
8	M manufacture	Siemens		M runs along with	cam	
9	M Type					
10	M holding torque	3 Nm				
11	M connecting voltage	24 VDC				
12	M rated current	0.3 A				
13						
14	type of drive					
15	M motor - gear unit- belt drive					
16	M Gearbox	i = 50				
17	M Belt gear	z = 22 / 22				
18						
19	Frequency inverter					
20	E manufacture	Siemens				
21	E Type	5 / 10 A				
22		2-axis converter for E1 and E2				
23	E number of axes					
24	E designation of axis					
25						
26	ABSOLUTE ENCODER					
27	M pos. detection	indirect, absolute				
28	M manufacture	WZWA/A35 S				
29	M Type	AM2400				
30	M grating period	0,17578"				
31	M increments / revolution	2048				
32	M absolute resolution	4096 rotations				
33	M encoder mount	Three-phase servomotor				
34						
35						
36	E multiple evaluation CNC					
37	E total resolution					
38						
39						
40	MOMENTS OF INERTIA					
41	M moments of inertia (J_{xx})					
42	M Own moment of inertia (J_y)					
43	M Reduced external moment of inertia (J_z)					
44	M Mass moment of inertia J_x / J_y					
45						
46						
47						
48						
49						
50						
changes						
Date						
Name						
Date		16.10.2012				
made by		Schildknecht				
Checked		Schildknecht				
Customer		GM EUROPE Aspern				
Inventory No.						
refer to diagram No.						
drawing no.		G325AB2-1088 -206-BZ-NC-SI				13
replacement for:						15
replaced by						

designation of the axis: E2 (tool changer arm)

position where Q2-axis with LOADING gripper 2 moves to tool transfer

position where Q2-axis with UNLOADING gripper 2 returns from

tool transfer position Q2-axis with LOADING gripper 2

tool brushing tool breakage detection enable position for ZW-axis if tool in LOADING gripper 2

position where Q2-axis with UNLOADING gripper 2 moves to

145° (WZWA/A47 E S1)

131.410° tool transfer position Q2-axis with UNLOADING gripper 2

90° tool breakage detection enable position for ZW-axis if tool in UNLOADING gripper 2

70° tool change position for tool loaded in spindle with LOADING gripper 2

0° Home position

tool change position for tool unloaded from spindle with UNLOADING gripper 2 (WZWA/A49 E S1) service position

UNLOADING gripper 2

LOADING gripper 2

center of E2-axis

direction of axis

DIRECTION OF MOTION

+

-

synchronous axis movements of YW- and E-axis

	dYW	dE
gripper moves to tool transfer position with tool (UNLOADING gripper)	56.625 mm	13.59°
gripper returns from tool transfer position without tool (UNLOADING gripper)	114.344 mm	36.59°
gripper moves to tool transfer position without tool (LOADING gripper)	114.344 mm	36.59°
gripper returns from tool transfer position with tool (LOADING gripper)	56.625 mm	13.59°

Caution

view from spindle towards part

the following will be filled-in and dimensioned according to application of data sheet:

for machine datum see NC-data sheets for X-, Y-, Z-axis

for tool change point see NC-data sheets X-, Y-, Z-axis

date of issue: 0 16.10.2012

GROB		NC AXIS DATA SHEET		Machine	G325AB2-1088	G325AB24K
				Unit	Machining center	
1	Drive	KSZ/A50 Ms ; KSZ/A60 Ms		designation of the axis: ZM1 / ZM2 (cover) MB = mechanical stop SE = software limit ZM + FINAL POSITION tool change position Z / 2 (for a tool length up to 300 mm) (KSZ/A50 E S1) (KSZ/A60 E S1) tool loaded manually into spindle tool change position Z / 1 (for a tool length up to 180 mm) (KSZ/A50 E S1) (KSZ/A60 E S1) ZM - FINAL POSITION front edge of cover in home position SE = software limit Fixed guard MB = mechanical stop center of machine center of rotary table		
2	M manufacture	Siemens				
3	M Type	(2x) 1FK7042-1AK71-1G				
4	M Rated speed	6000 rpm				
5	M standstill torque ($M_{0.05}$)	2.5 Nm				
6	M torque constant	0.68 Nm/A				
7						
8	type of drive					
9	M Motor - Planetary gear drive - pinion - timing belt (2x)					
10	M Planetary gear drive	i = 10				
11	M effective diameter of pinion	66.845				
12	M effective circumference of pinion	210				
13						
14						
15						
16						
17						
18	Frequency inverter					
19	E manufacture	Siemens				
20	E Type	5 / 10 A				
21		(2-axis converter for ZM1 and ZM2)				
22	E number of axes					
23	E designation of axis					
24						
25	ABSOLUTE ENCODER					
26	M pos. detection	indirect, absolute				
27		KSZ/A50 Cod ; KSZ/A60 Cod				
28	M manufacture	Siemens				
29	M Type	(2x) AM24DQI				
30	M grating period	0.17578*				
31	M increments / revolution	2048				
32	M absolute resolution	4096 rotations				
33	M encoder mount	Three-phase servomotor				
34						
35	E multiple evaluation CNC					
36	E total resolution					
37						
38						
39	MOMENTS OF INERTIA					
40	M moments of inertia (J_{rot})					
41	M Own moment of inertia (J_p)					
42	M Reduced external moment of inertia (J_F)					
43	M Mass moment of inertia J_F / J_E					
44						
45						
46						
47						
48						
49						
50						
data sheet filled in by department as indicated by capital letter: (M) mechanical; (E) electrical; (I) initial commissioning				the following will be filled-in and dimensioned according to application of data sheet:		
changes				Customer		
Date				Inventory No.		
Name				refer to diagram No.		
Date				drawing no.		
made by				G325AB2-1088 -206-BZ-NC-SI		
Checked				replacement for:		
				replaced by		
				sheet 14		
				Sheets 15		

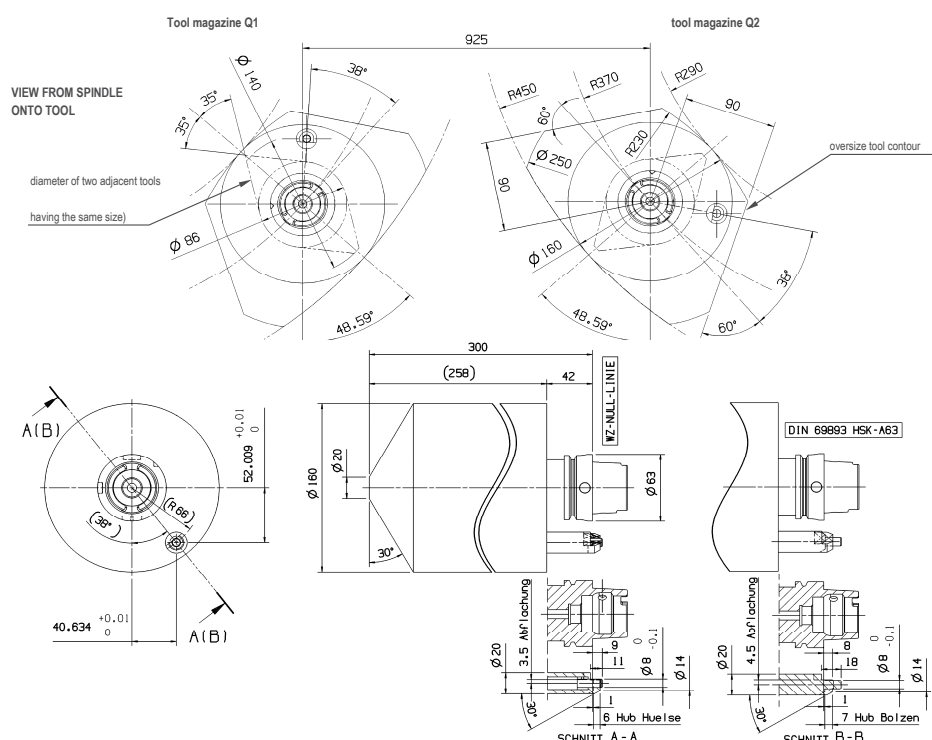
GROB**NC AXIS DATA SHEET**Machine **G325AB2-1088** G325AB24K
Unit **Machining center**

M	Disruptive strength of the enclosure according to prEN	: $v_{max} = 200 \text{ m/s}$
M	maximum spindle speed	: $n_{sp} = 12,000 \text{ rpm}$
M	biggest rotating diameter	: $D_{max} = 250 \text{ mm}$
M	Max. speed for tools ≤ 4 half tool pockets ($\leq \phi 160 \text{ mm}$)	: $n = 18,000 \text{ rpm}$
M	Max. speed for tools > 4 half tool pockets ($> \phi 160 \text{ mm}$) and $\leq D_{max}$	: $n = 8,000 \text{ rpm}$
M	Only tools equipped with authorized HSK-movable coolant pipe for internal coolant supply must be used. Required balance quality for max. spindle speed:	
M	G 2.5 according to ISO 1940	
M	Q 2.5 according to VDI 2060	

M	Maximum tool weight	: 8 kg
M	Max. torque around aut. tool change groove	: 12 Nm
M	Maximum total tool weight	: 156 kg
M	Average tool weight for 2x 26 tools	: 3 kg

M	Maximum tool diameter	: 160 mm
M	Authorized adjacent tool diameter relating to max. tool	: 0 mm
M	Standard tool diameter (authorised diameter of two adjacent tools having the same size)	: 86 mm

Note:
Tools with torque plate as well as oversize tools may only be placed into magazine disk 1/1, 2/1 (front) (during automatic tool change or loading via tool lifter).
For tools with torque plate the corresponding adjacent tool gripper in the magazine disk must be removed.
In magazine disks 1/1, 2/1 (front) as well as in magazine disks 1/2, 2/2 (rear) tools with maximum diameter (160 mm) can be placed.
During an automatic tool change with oversize tool being "UNLOADED tool" the LOADING gripper of the tool changer arm must be kept free.

Tool data sheetdate of issue: **0** **16.10.2012**

data sheet filled in by department as indicated by capital letter: (M) mechanical; (E) electrical; (I) initial commissioning

the following will be filled-in and dimensioned according to application of data sheet:

for machine datum see NC-data sheets for X-, Y-, Z-axis

for tool change point see NC-data sheets X-, Y-, Z-axis

for tool change point see NC-data sheets X-, Y-, Z-axis

changes				
Date				
Name				

Date	16.10.2012
made by	Schildknecht
Checked	Schildknecht

Customer	GM EUROPE Aspern
Inventory No.	
refer to diagram No.	

drawing no.		sheet	15
G325AB2-1088 -206-BZ-NC-SI		Sheets	15
replacement for:		replaced by	