High precision mechanical industries development

# TB100 and TBMA100 Servo Turrets guide





BARUFFALDI

MACHINE TOOL COMPONENTS

www.baruffaldi.it



Baruffaldi has been in the mechanical branch since 1927.

Thanks to the development of the market and to the experience gained, during the 70s Baruffaldi started the production of components for machine tools.

Following the needs and demands of new technology, Baruffaldi has been able to develop the precise and safe products requested by the machine tools market.

Today Baruffaldi is a leader in the production of turrets for CNC lathes, 2 speed gearboxes, tool holder discs, driven tools, Y axis and B axis units.









#### TB100 and TBMA100 Turrets - Introduction





**TB100 - SERVO TURRETS** 

The TB100 and TBMA100 turrets rotate thanks to a Brushless Servo Motor controlled by a new generation Servo Drive.

Discs according to ISO 10889 (ex DIN 69880) norms can be used. Compact overall dimensions of the driven tool system, very high rotating tools speed, sensor switch for the tool engagement control.

This turrets are the perfect application for small CNC turning lathe solutions.

#### **TB 100 Main Characteristics**

- Super fast indexing time
- Pneumatic locking/unlocking system
- Bi-Directional positioning
- No axial movement during the tool change
- Extreme positioning accuracy

#### **TBMA 100 Main Characteristics**

- High Speed of the driven tool system up to 6.000rpm (standard version).
- Possibility for forced lubrication in order to increase the working time (100%) and the speed (10.000rpm)
- Possibility of turret pressurizing to prevent contamination of dirt and chips into the unit.
- Proximity switch for the tool engagement control
- Many different possibilities and special applications available
- Easy maintenance

	TB 100	TBMA100		
Number of division		8-12-16	8 - 12-16	
Moment of Inertia	Kgm <sup>2</sup>	0,25	0,25	
Max tangential torque			450	450
Max Overturning torque in pressing	direction	Nm	400	400
Max Overturning torque in lifting d	irection	INITI	150	150
Max Out of balance torque		3	3	
Positioning accuracy	Deg.	±4"		
Accuracy of repeatability	Deg.	±1,6"		
Desitining time *	30°	sec	0,13	0,13
Positining time *	45°	sec	0,17	0,17
	180°	sec	0,3	0,3
Unlocking time*		sec	0,1	0.1
Locking time*		sec	01	01
Total weight of the turret		Kg	20	35
Hydraulic Locking Pressure	Bar	5	5 ±1	
Max coolant pressure (standard ver	sion)	bar	20	10

## TBMA100 Turrets - Driven tool unit technical data

		TBMA100	C
VDI size		16 - 20	
Max speed of driven tool	rpm	6000	
Max speed of driven tool (forced lubrication)	rpm	8000	
Max motor nominal torque (S1)	Nm	10	
Max nominal power	Kw	3	
Ratio: RPM motor : RPM take power		1:1	
Live Tooling System Type		Baruffalc	li

Following diagrams refer to forced applied to tool holder disc. For loading capacity of static tool holders please refer to manufacturer's data sheet.



**TANGENTIAL F - F1** 



# TB100 and TBMA100 Turrets - Loading capacity





# TO LIFT F3



A Brushless Servo Motor (M), controlled by a new generation Servo Drive, drives tool holder disc by means of proper gearing, to achieve tool change.

The activation of the pneumatic piston (P) lets the roller-carrier (F) turn, thus releasing rollers (B) from cams (C). locking ring (D) is then pushed back by spring (G), thus disengaging indexing ring (A) from fixed ring (E). Turret is now ready to turn.

Opposite stroke of pneumatic piston (P) causes the roller-carrier (F) to turn back, thus matching rollers (B) with cams (C), pushing locking ring (D) forward and engaging it with both indexing ring (A) and fixed ring (E). Turret is now in locked status, ready to work.



Motor (M) drives the tool holder (U) by means of a gearing (I) and a frontal Hirth-like coupling (H). When this coupling is axially preloaded by means of a pneumatic piston (P2), it operates with no backlash, allowing difficult milling operations.

Before disc indexing procedure the Coupling (H) disengages automatically Tool Holder (U) (shaft as per **ISO 10889** norms). During the locking sequence of the turret the Coupling (H) engages the Tool Holder (U).



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All TB100 and TBMA100 turrets can be supplied with a new generation Drive (type DMS08) that operates the turret by connecting it to the plc and allows its remote control. A digital display shows constantly:

- The Drive Supply (24V)
- Current position of the turret
- The activation of 26 alarms in case of trouble: this allows to easily find problems that occur during the turret operation
- Position feedback



MAIN SHOWN ALARMS	
Input Power Supply Error	Zero search error
Position error	Rotation time out (30")
No signal from unlock proximity switch	Resolver failure
No signal from lock proximity switch	Motor PTC
No signal from Zero proximity switch	Wrong parity bit setting
During locking sequence the turret remains opened	A non-existing position has been called

### TB100 and TBMA100 Turrets - Electrical connections



## TB100 and TBMA100 Turrets - Supplied without Baruffaldi

The turrets TB100 and TBMA100 are also available without Baruffaldi motor.

On request Baruffaldi supply a special motor interface kit in order to fit customer's motor. Shown below an indicative solution, each motor needs its own interface.



When operating live tools, please consider *tool "torque/speed" diagram* and "working time" reference diagram (10 min.) shown below to adjust working parameters (except for the forced lubrication application).

Below rated speed  $n_0$ , tool torque can reach maximum torque  $C_{max}$  (according to turret size), while over  $n_0$  tool torque shouldn't exceed value C corresponding to tool speed n on max. power P curve. Turret information on mechanical capabilities are indicated above.

Concerning speed, the greater it is, the lower the allowed working time. Once evaluated parameter k as ratio between actual speed and maximum speed, working time can be obtained from the chart on the right, as shown below. Left curve corresponds to lower mechanical stress while right curve corresponds to higher mechanical stress: an average value is recommended.

TOOL TORQUE/SPEED DIAGRAM

#### WORKING TIME REFERENCE DIAGRAM





The TBHMA turrets can now be equipped with **Forced Lubrication** that allows Tool Driving at High Speed (up to **10000 rpm**) in continuous mode (up to **100%**). The turret is thus upgraded to a Milling Unit.



		TBMA100
Flow Oil Rate ( <u>minimum</u> ) Flusso Olio ( <u>minimo</u> )	l/min	1
<b>Oil viscosity</b> Viscosità Olio		ISO VG32
<b>Filtering</b> Filtraggio	μm	20
Input connection Connessione entrata		1/8'' GAS
Outlput connection Connessione uscita		1/8'' GAS

Every TBHMA turrets is equipped with a "pressurizing function", that might be used in order to prevent external agent contamination into the sealed area of the power unit and, consequently, avoid infiltration of coolant and/or other pollutants into the Driven Tool Unit.

This function is recommended in case of machining of materials that create dust or high corrosion (bronze, aluminium, graphite, etc..)



		TBMA 100
Pressure of Air inlet	bar	0,5
Filtering	μm	20
Connection		1/8'' GAS

Air used for turret pressurizing must be carefully dried in order to avoid condensation inside the turret, that may cause corrosion and electrical failures.

BARUFFALDI Coupling												
VDI	А	В	D	Z								
16	32	48	14.5	4								
20	35	44	19	6								



# TBMA100 Turrets - Cutting Capacity

	TWIST DRILLING	TAPPING	SLOT MILLING
	FORATURA	MASCHIATURA	FRESATURA
	d a	d p	
	d x a	d x p	d x p x a
	(mm)x(mm)	(mm)x(mm)	(mm)x(mm) x (mm/min)
TBMA 100	10 x 0.18	M10 x 1. 5	10 x 6 x 45

Cutting capacity with 600N/mm2 steel, HSS tools

The above data sheet is indicative and only for general reference



## Axial rotary tool holder - external coolant supply



Code	d1	ER	1	12	13	4	b1	b2	h1	M₂ Nm	n₂ min-1	p kw	
RAPPS 20 121UB	20	20	35	90	49	61	50	25	56	13	6000	5	
RAPPS 20 221UB	20	20	35	65	25	37	50	25	56	13	6000	5	

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i= n1:n2 = 1:4





Code	d1	ER	11	12	13	14	b1	b2	h1	M₂ Nm	n₂ min-1	p kw	
RAPPS 20 122UB	20	16	35	100	68	85	50	25	56	3	24000	3	

# Radial rotary tool holder - external coolant supply

i= n1:n2 = 1:1







Code	Working Side	d1	ER	11	12	13	b1	h1	h2	h3	h4	M <sub>2</sub> Nm	n₂ min-1	p kw
RRPPS 20 121DB	Right	20	20	35	60	25	50	60	38	19	57	13	6000	5
RRPPS 20 121SB	Left	20	20	35	60	25	50	60	38	19	57	13	6000	5





#### TBMA 100 Turrets - with Tool Disc 8 position VDI20 - Right - Baruffaldi motor







Baruffaldi has developed a sales and service organization all over the world. Furthermore, thanks to a network of agents and distributors, it is ensured a direct contact in many countries.

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The tecnical data, dimensions and weight are subject to change without notice. The illustrations are for reference only.