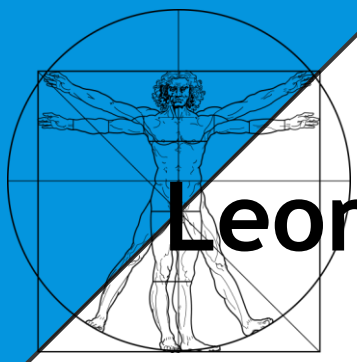
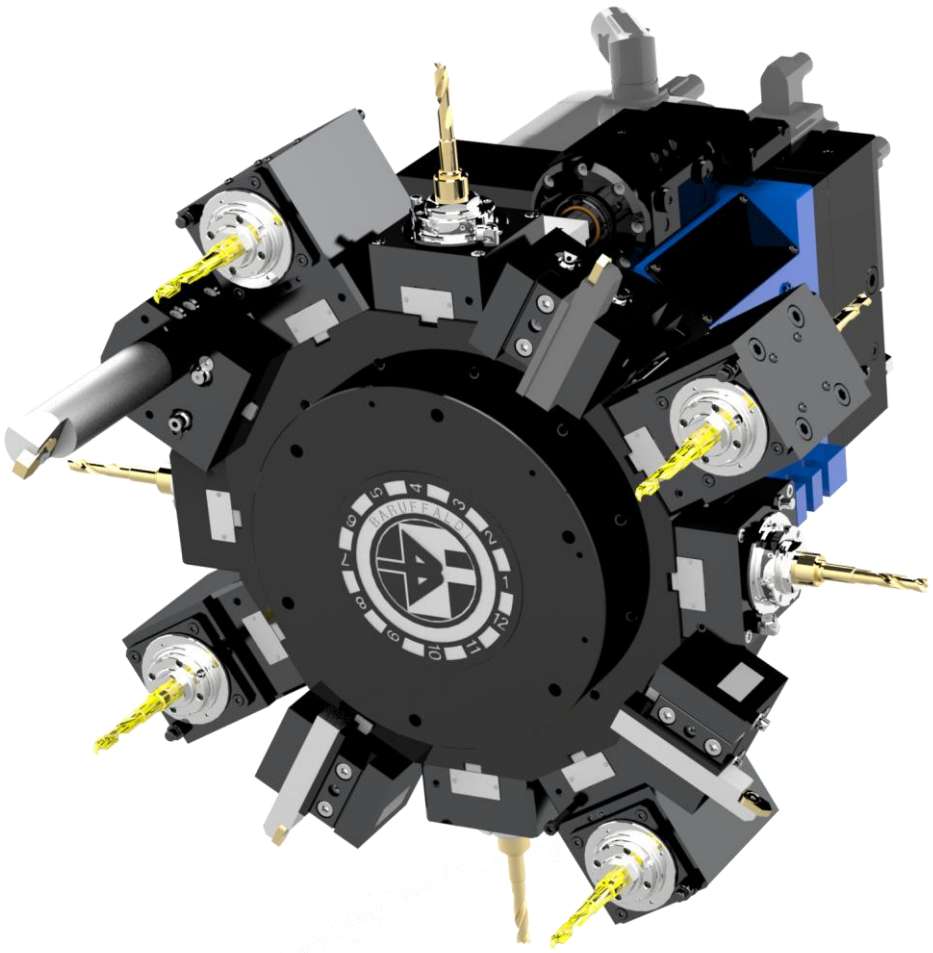
BARUFFALDI

MACHINE TOOL COMPONENTS



Leonardo-Line Turrets

Compact Servo Turrets TC
Axial Driven Tool Turrets TCMA
Radial Driven Tool Turrets TCMR
ATC Turrets with Eppinger Quicklock® TCMQ



The Partner for Machine Tool Builders

WWW.BARUFFALDI.IT

Rev.01 - 2026

BARUFFALDI - since 1927

1927
FOUNDATION

Baruffaldi was founded in Milano (Italy) by Cesare Boffelli, a qualified mechanical engineer, in 1927



1955
BRAKES AND CLUTCHES

In the '50s Baruffaldi expanded, its business area, manufacturing brakes and clutches for several industrial applications as industrial machines



1975
2nd GENERATION

Piercarlo Boffelli, already in the company since end of the end of '70s, become the CEO of Baruffaldi



1984
AGRICULTURAL & TEXTILE

Baruffaldi entered the agricultural and textile machines industries with the production of several brakes/clutches units



2010
NEW LOCATION & PRODUCTION UNITS

Baruffaldi reorganized the company into new production units located in Tribiano, Milan area. The total covered area is 25.000sqm



2018
3rd GENERATION

Dr. Barbara Boffelli, 3rd generation of the Boffelli family, takes over the company becoming Managing Director of the company



2022
NEW AUTOMATION PRODUCTION LINES

With a huge investment The Company renew the production lines with fully automation systems



1932
MOTORCYCLE

The Company started the production of brakes systems for motorcycles in the '30s



1972
INDUSTRIAL VEHICLES

With high technology knowledge in brake and clutches The Company became a partner of truck manufacturers



1978
TURRETS for MACHINE TOOLS

In the '70s it began the production of components for Machine Tool industry as automatic tool turrets



1990
GEARBOXES for MACHINE TOOLS

To strategically increase its presence in the machine tool industry, Baruffaldi presents a new line of 2 Speed Gearboxes for milling and turning machines



2013
PLANETARY REDUCERS

Baruffaldi designed a new line of 2 and 3 stage reducers for various applications as decanter centrifuge for food machinery



2020
INVESTMENT IN SUSTAINABLE

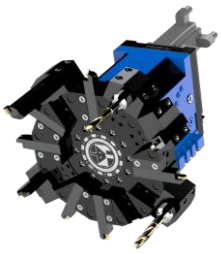
Baruffaldi invests in environmental sustainability with a photovoltaic system, of 1500kW, reducing emissions and costs



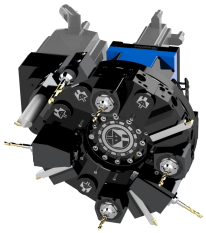
2024
HYBRID TECHNOLOGY FOR VEICHLES

Baruffaldi starts the production of dual drive hybrid systems for smart and efficient controlling the engine cooling systems

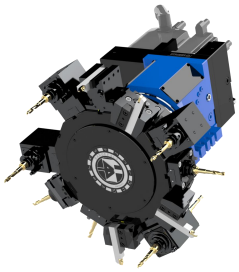




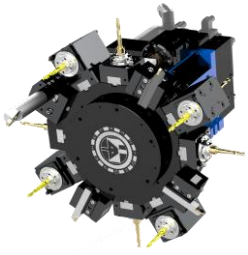
TC
COMPACT SERVO MOTOR TURRETS



TCMA
AXIAL LIVE TOOL VDI TURRETS



TCMR
RADIAL LIVE TOOL BMT/VDI TURRETS



TCMQ
FOR MACHINES WITH ATC with Eppinger Quicklock®

LINEA LEONARDO - PERFORMANCES

10.000*rpm **Live Tools** High Speed (S1)

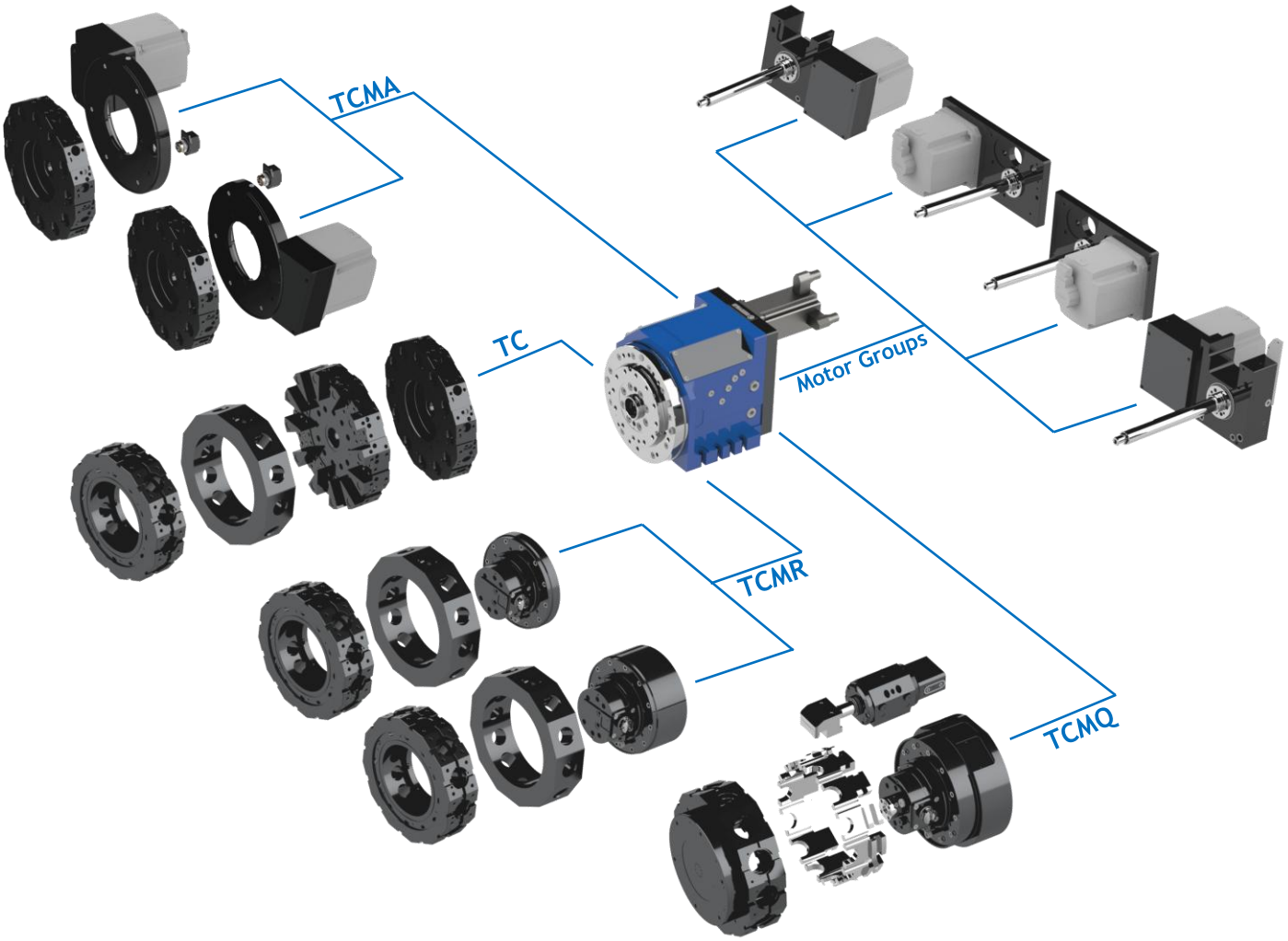
75Nm **High Torque** for Milling, Drilling and Tapping

100% **Milling and Drilling** mode with Live Tools (100%)

120bar **High Coolant** Pressure for hard materials

24 Positions for **Static and Driven Tools**

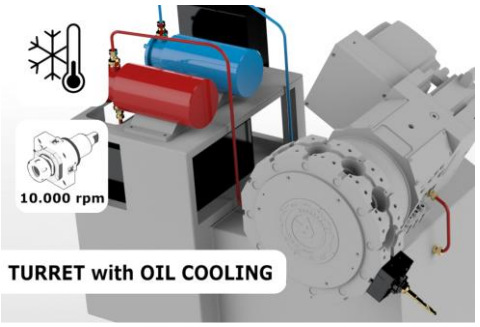
New Servodrive Power supply **400/230V**



The Leonardo Line is based on a **standard turret** that offers **several combinations** of parts in order to reach the final requested design. This concept helps having standard parts that are common for all configurations, ensuring the machine builders benefits in terms of**: delivery, price and quality.**

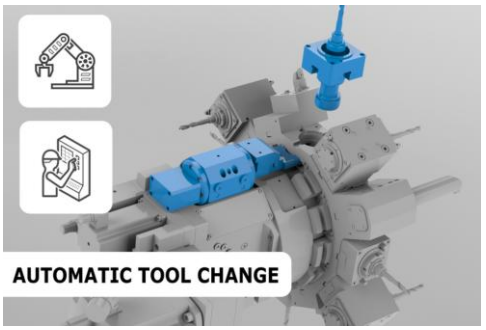
OIL COOLED Live Tool Turret

The Leonardo Line is equipped with an internal oil cooling circuit as standard. An oil recirculation system, applied to the turret, allows live tools at high speed (up to **10.000 rpm*)** in continuous mode (**S1-100%).**
The turret can be considered as a milling unit.

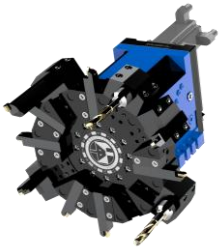


TURRET for ATC- Automatic Tool Turret

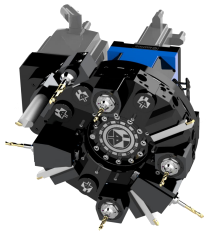
The standard TCMR of Leonardo Line Turrets can be equipped and upgraded with **EPPINGER QUICKLOCK®** system
A special hydraulic actuator with an integrated drawbar, mounted on the top of the turret, automatically engages and disengages the toolholder locking mechanism.
Thus, the turret can be integrated in machines with ATC System (Automatic Tool Change) where the tool holders are automatically changed by a robot or with direct control of the operator.



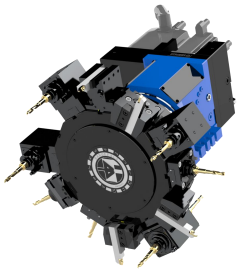
LINEA LEONARDO SUMMARY



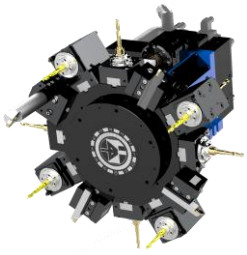
TC - PG: 7-16
Compact Servo Motor Turrets



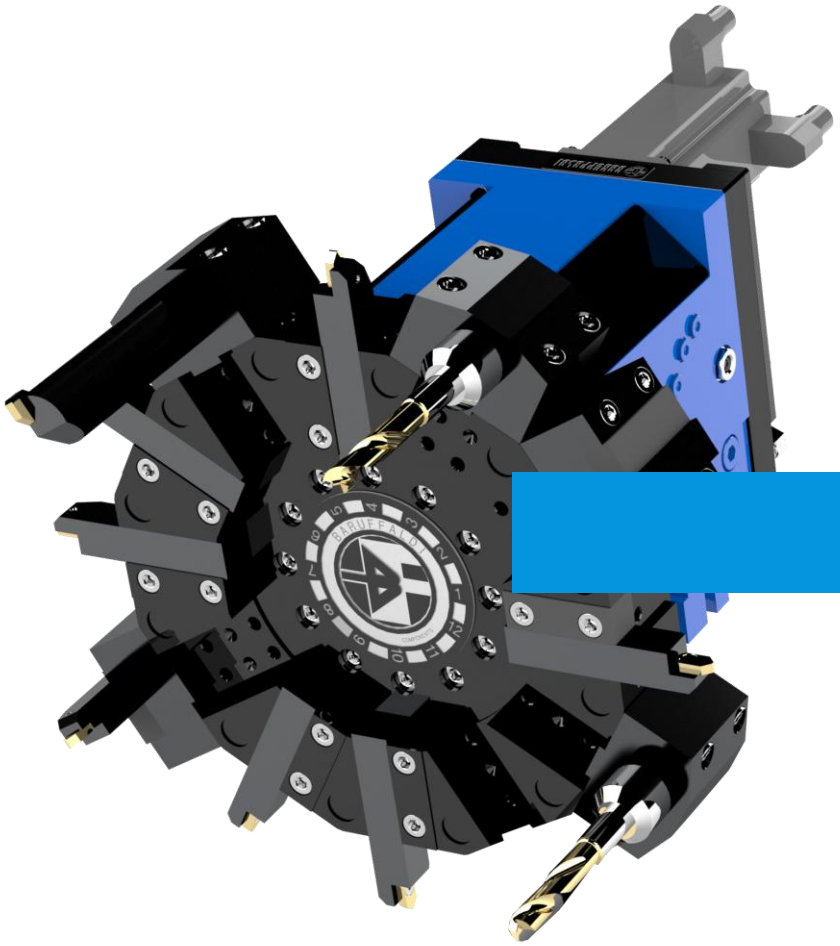
TCMA - PG: 17-32
Axial Live Tool VDI Turrets



TCMR - PG: 33-48
Radial Live Tool BMT/VDI Turrets



TCMQ - PG: 49-54
ATC Tool Turrets with Eppinger Quicklock®



TC TURRETS

TC Turrets - Turret description

Funktionsbeschreibung - Descrizione funzionalità

The **Tool Disc** rotates and positions thanks to a **Servo Motor** controlled by the new generation **Servo Drive type DB21**.

The **Locking Coupling** moves backwards, when hydraulic oil pressure acts on its front side, disengaging **Hirth Coupling Set**. The turret is thus ready to index.

Motor drives the **Tool Disc** by means of a **Gear Transmission**, to achieve tool change.

During turret locking sequence, oil pressure acts on the rear side of the **Locking Coupling,** pushing it forward and making Hirth Coupling Set engage. The turret is now ready for machining.

The locking and unlocking status is constantly monitored by 2 **Inductive Sensors.**

The turret is also equipped with **Safety Springs** that move Locking Coupling forward when oil pressure is close to zero.

Die Scheibenrotation erfolgt über einen **Servomotor** und eine **eigene Steuerungseinheit** der neuesten Generation vom **Typ DB21**.

Die Verriegelungs-Kupplung wird **vorderseitig hydraulisch beaufschlagt** und öffnet dabei die **Hirth-Verzahnungen**. Der Revolver ist nun **schwenkbereit**.

Der **Servo-Motor** schwenkt anschließend die **Scheibe** mittels einer **Untersetzung** auf die Wunschposition.

Zur Verriegelung des Revolvers wird die **Kupplung rückseitig hydraulisch beaufschlagt** und lässt dabei die Hirth-Verzahnungen ineinandergreifen. Der Revolver ist nun **bereit für den Einsatz**.

Der Verriegelungszustand **permanent mittels zweier Sensoren** überwacht**.**

Der Revolver ist zudem mit einer **Sicherheits-Feder** ausgerüstet, welche die Verzahnungen geschlossen hält - auch wenn kein hydraulischer Druck anliegen sollte.

Il disco utensile ruota e si posiziona grazie a un **Servomotore** controllato da un **Servo Drive** di nuova generazione tipo DB21.

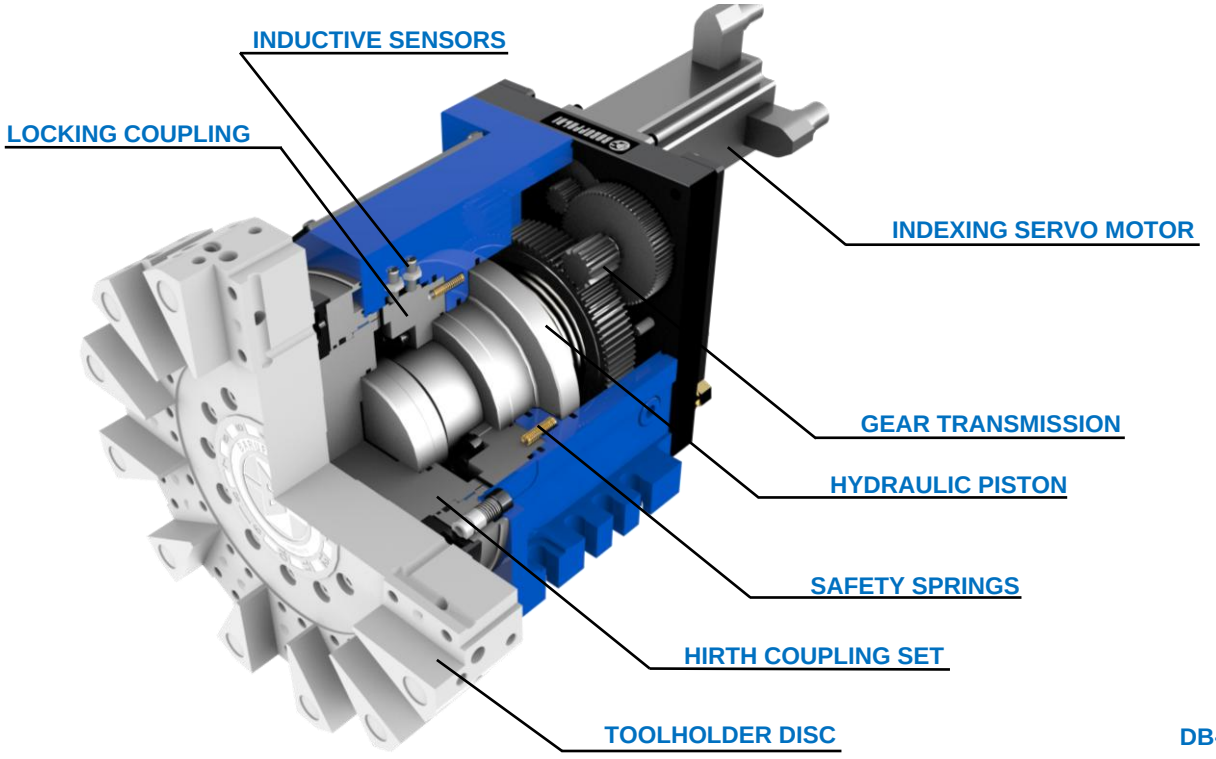
La **Corona di bloccaggio** si muove all'indietro, quando la pressione dell'olio idraulico agisce sul suo lato anteriore, disinnestando il **set di corone Hirth**. La torretta è quindi pronta per l'indicizzazione.

Il **Motore** aziona il **Disco Portautensile** tramite una **trasmissione ad ingranaggi**, per ottenere il cambio utensile.

Durante la sequenza di bloccaggio della torretta, la pressione dell'olio agisce sul lato posteriore del **Corona di bloccaggio,** spingendola in avanti e facendo innestare il set di corone Hirth. La torretta è ora pronta per la lavorazione.

Lo stato di bloccaggio e sbloccaggio è costantemente monitorato da **2 sensori induttivi.**

La torretta è inoltre dotata di **molle di sicurezza** che mantengono l'unità bloccata quando la pressione dell'olio è prossima allo zero.





DB-21 SERVO DRIVE

The Leonardo Line turrets are supplied with new generation Drive, named DB-21 that allows the turret remote control and through a digital display that shown constantly the turret status.

- Double Power Supply 230V/400V
- Power supply frequency 50/60Hz
- Activation of 30 alarms
- Working condition: -10°C ÷ 45°C
- Digital Display
- Position Feedback

Die **Leonardo Line**-Türme sind mit einem **Antrieb der neuen Generation**, dem **DB-21**, ausgestattet. Dieser ermöglicht die **Fernsteuerung** des Turms und verfügt über ein **digitales Display**, das ständig den **Status des Turms** anzeigt.

- Doppelte Stromversorgung 230V/400V
- Netzfrequenz 50/60Hz
- Aktivierung von 30 Alarmen
- Betriebstemperatur: -10°C ÷ 45°C
- Digitales Display
- Positionsrückmeldung

Le torrette della linea Leonardo sono fornite con un sistema di azionamento di nuova generazione, denominato **DB-21**, che consente il controllo remoto della torretta e dispone di un **display digitale** che mostra costantemente lo stato della torretta.

- Doppia alimentazione 230V/400V
- Frequenza di alimentazione 50/60Hz
- Attivazione di 30 allarmi
- Condizioni di lavoro: -10°C ÷ 45°C
- Display digitale
- Feedback di posizione

Size Baugröße / Taglia			**TC 160**	**TC 200**	**TC 250**
Number of division Anzahl werkzeugpositionen / Numero di posizioni			8 - 12 -16 - 24		
Direction of rotation Schwenkrichtung / Direzione di rotazione			Bidirectional / Bidirektional / Bidirezionale		
Max Moment of Inertia Max. Massenträgheitsmoment / Massimo momento di inerzia		**kgm²**	1,8	8	
Max tangential torque Max. tangentiales Lastmoment / Massima coppia tangenziale		**Nm**	5400	10300	24200
Max Overturning torque (pressing) Max. Lastmoment Vorwärtsbearbeitung / Massima Coppia ribaltante a premere			2100	6000	12000
Max Overturning torque (lifting) Max. Lastmoment Rückwärtsbearbeitung / Massima Coppia ribaltante a sollevare			3800	7100	15600
Max Unbalancing torque Maximales Unwuchtmoment / Massima Coppia			15	40	60
Positioning accuracy Positioniergenauigkeit / Precisione di posizionamento		**Deg.**	±4"		
Accuracy of repeatability Wiederholgenauigkeit / Accuratezza di ripetibilità			±1,6"		
Positioning time* Positionierzeit* Tempi di posizionamento*	**30°**	**sec**	0,13÷0,24	0,20÷0,34	
	45°		0,17÷0,28	0,25÷0,38	
	180°		0,34÷0,50	0,53÷0,73	
Unlocking time* Entriegelungszeit* / Tempi di sbloccaggio*			0,20	0.25	
Locking time* Verriegelungszeit* / Tempi di bloccaggio*			0,23	0.28	
Hydraulic Locking Pressure Hydraulischer verriegelungsdruck / Pressione idraulica bloccaggio		**bar**	50 ±3		
Max coolant pressure (standard version) Max. kühlmitteldruck (Standard) / Max Pressione refrigerante (Standard)			35		
Max coolant pressure (special version) Max. kühlmitteldruck (Sonderausführung) / Max Pressione refrigerante (Speciale)			80		
Ambient temperature range Temperaturbereich /Temperatura ambiente di lavoro		**°C**	0-40		
Protection degree Schutzklasse / Gradi di protezione		**IP**	65		
Turret weight (without disc) Revolver gewicht (ohne Werkzeughalterscheibe) / Peso (torretta senza disco)		**kg**	50	70	95

*The times could change according to the configuration and characteristic of the hydraulic circuit of the machine

** Die Zeiten können je nach Konfiguration und Eigenschaften des Hydraulikkreislaufs der Maschine variieren*

**I tempi possono variare a seconda della configurazione e delle caratteristiche del circuito idraulico della macchina*

TC Turrets - Tool Discs Type

Arten von Werkzeughalterscheiben - Tipi dischi portautensili

The Linea Leonardo Turrets might be equipped with several Tool Holders Discs type:

Die Werkzeugrevolver der Leonardo-Line können mit unterschiedlichsten Werkzeugscheiben ausgerüstet werden:

Le torrette Linea Leonardo possono essere equipaggiate con diversi tipi di dischi portautensili:



VDI Axial Discs (Standard)
VDI-Axialscheibe (Standard)

Polygonal Slotted Discs
Polygonscheiben mit 4-kant Aufnahmen





VDI Radial Discs
VDI-Radialscheiben

BMT Radial Discs
Radial-Scheiben für BMT





VDI Axial Discs with double PCD
VDI-Axialscheibe mit 2-fach. Teilkreis)

Capto Discs (Radial or Axial)
Scheiben für Capto (radial oder axial





VDI Axial Discs + Side Slots
Disco Assiale VDI + sedi fresate laterali)

VDI Axial Discs + Frontal/Side Slots
VDI-Axialscheiben mit 4-kant Aufnahmen



Other tool discs or other solutions are available on request, please contact our sales office (sales.mtc@baruffaldi.it) or check our tool disc catalog.

Weitere Ausführungen sind auf Anfrage erhältlich. Kontaktieren Sie einfach unser Vertriebsbüro (sales.mtc@baruffaldi.it) oder beachten Sie unseren separaten Scheiben-Katalog.

Altri dischi Portautensili o altre soluzioni sono disponibili su richiesta, si prega di contattare il nostro ufficio vendite (sales.mtc@baruffaldi.it) o consultare il nostro catalogo di dischi per utensili.



TC Turrets - Loading Capacity

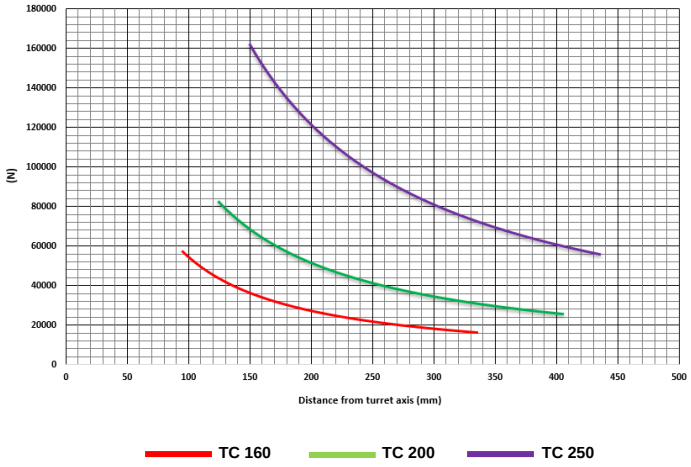
Zulässige Belastungen – Capacità di carico

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

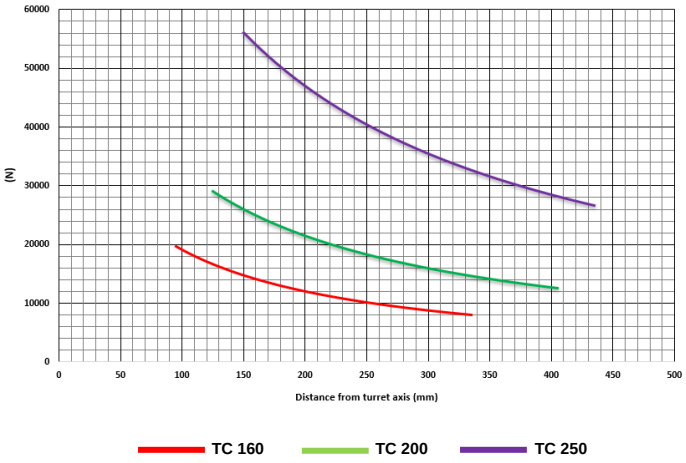
Die nachfolgenden Diagramme beziehen sich auf die zulässigen Belastungen auf die Werkzeugscheibe.

I seguenti diagrammi si riferiscono alle forze applicate al disco portautensili. Per la capacità di carico dei portautensili statici, fare riferimento alla scheda tecnica del produttore.

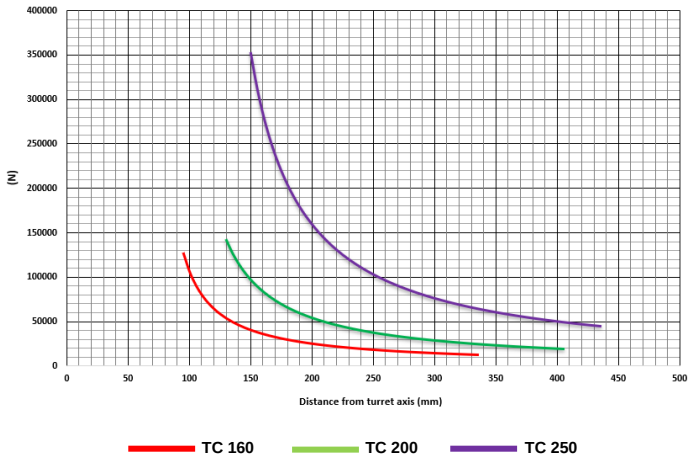
F / F1 - Tangential

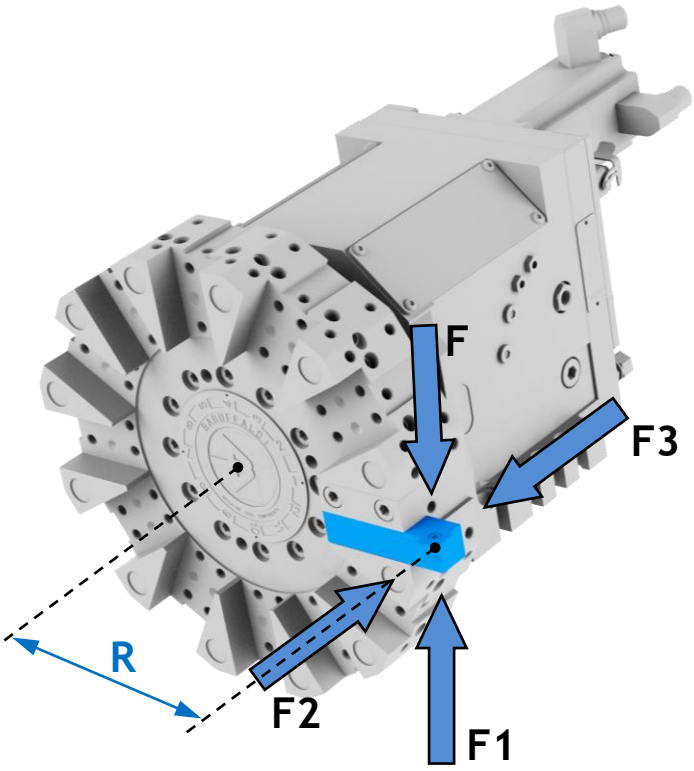


F2 - To Push



F3 - To Lift





TC Turrets - Ordering Code

Produktcode - Codice ordine

N° OF DIVISIONS *Anzahl Positionen* *Numero di divisioni*	*Code*
8/12	0
8	1
12	2
16	3
24	5

TURRET COOLANT INTERFACE *Kühlmittelschnittstelle* Interfaccia refrigerante torretta	*Code*
WITHOUT COOLANT RING *Ohne Kühlmittel-Ring* *Senza collettore refrigerante*	0
WITH UNIVERSAL COOLANT RING (STANDARD) for 4-6-8-12 positions *Mit Universal-Kühlmittel-Ring (standard) für 4-6-8-12 positionen* *Con collettore refrigerante universale (standard) per 4-6-8-12 posizioni*	1
WITH COOLANT RING (SPECIAL) for 16 positions *Mit Sonder-Kühlmittel-Ring (sonder) für 16 Positionen* *Con collettore refrigerante (speciale) per 16 posizioni*	2
WITH COOLANT RING (SPECIAL) for 24 positions *Mit Sonder-Kühlmittel-Ring (Sonder) für 24 positionen* *Con collettore refrigerante (speciale) per 24 posizioni*	3

TOOL DISC *Werkzeugscheibe* *Disco portautensili*	*Code*
WITHOUT TOOL DISC *Ohne Werkzeugscheibe* *Senza disco*	0
WITH TOOL DISC *Mit Werkzeugscheibe* *Con disco*	**A LETTER ACCORDING TO THE DISC TYPE** **Ausführung gemäß Buchstaben-Code** **Una lettera a seconda della tipologia disco**

VARIOUS *Ausführungen* *Varie*	*Code*
HIGH COOLANT PRESSURE *Erhöhter Kühlmitteldruck* *Alta pressione refrigerante*	P
MQL (MINIMUM QUANTITY LUBRICATION) *MQL (Minimalmengenschmierung)* *MQL (Minima Quantità Refrigerante)*	M

K	L	C	.					.				.		

TURRET TYPE *Revolvertyp* *Tipologia torretta*	*Code*
TC Turret (Standard)	LC
TCF Turret (Hollow shaft)	LF

VERSION *Version* *Versione*	*Code*
STANDARD	01
SPECIAL APPLICATION (on request) *Sonder-Anwendung (auf Anfrage)* *Applicazioni speciali (su richiesta)*	*

TURRET SIZE *Revolvergröße* *Taglia torretta*	*Code*
TC 160	160
TC 200	200
TC 250	250

WORKING POSITION *Arbeitsposition* *Posizione di lavoro*	*Code*
RIGHT *Rechts* *Destra*	R
LEFT *Links* *Sinistra*	L

INDEXING MOTOR AND DRIVE **Schwenkmotor und Steuerung** **Motore index e drive**	**Code**
STANDARD MOTOR AND DRIVE BARUFFALDI *Standard – Mit Baruffaldi Schwenkmotor und Steuerung* *Motore e drive standard Baruffaldi*	0
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR SIEMENS MOTOR 1FK7-042 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Siemens 1FK7-042* *Senza motore e drive Baruffaldi, predisposta per motore Siemens 1FK7-042*	2
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR FANUC MOTOR Alpha Is 4/5000 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Fanuc Alpha Is 4/5000* *Senza motore e drive, predisposta per motore Fanuc Alpha Is 4/5000*	3
WITHOUT MOTOR AND DRIVE BARUFFALDI *Ohne Baruffaldi Schwenkmotor und Steuerung* *Senza motore e drive Baruffaldi*	4
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR CUSTOMIZED MOTOR *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Kunden-Motor* *Senza motore e drive Baruffaldi, predisposta con kit motore speciale*	5

Special Application - High Coolant pressure

Kühlmittel-Hochdruck - Alta pressione refrigerante

The Leonardo Line turrets can be used as standard with a coolant pressure through the disc up to 35bar (1st stage) and on request can be upgraded up to 80bar (2nd stage).

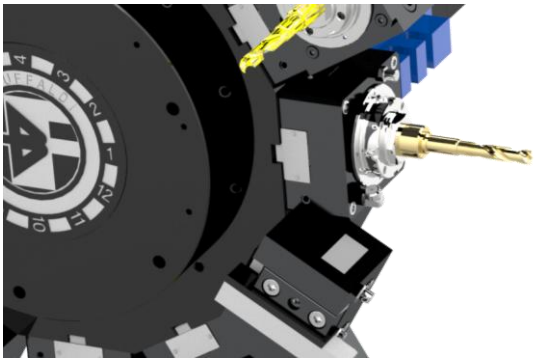
Baruffaldi has also developed a special solution that allows to reach coolant pressures even up to 120bar (3rd stage).

Die Revolver der Leonardo-Line können standardmäßig mit einem Kühlmitteldruck von 35bar über die Werkzeugscheibe betrieben werden. In einer zweiten Stufe ist ein Druck (optional) von 80 bar möglich.

Darüber hinaus sind in einer weiteren, dritten Stufe auch bis zu 120bar möglich.

Le torrette della Linea Leonardo possono essere utilizzate, in configurazione standard, con una pressione del refrigerante attraverso il disco fino a 35 bar (1° stadio) e, su richiesta, possono essere potenziate fino a 80 bar (2° stadio).

Baruffaldi ha inoltre sviluppato una soluzione speciale che consente di raggiungere pressioni del refrigerante fino a 120 bar (3° stadio).



120 bar

TURRET WITH HIGH COOLANT PRESSURE

Special Application - MQL Minium Quantity Lubrication

Minimalmengenschmierung - Minima quantità di refrigerante

All the Turrets type TC can be used with MQL systems.
MQL is the acronym of **Minimum Quantity Lubrication** and consists in minimizing the use of coolant by spraying the mixture of **compressed air** and cutting fluid (**mineral oils or vegetable oils**) instead of flood cooling.
The advantages of this application are:

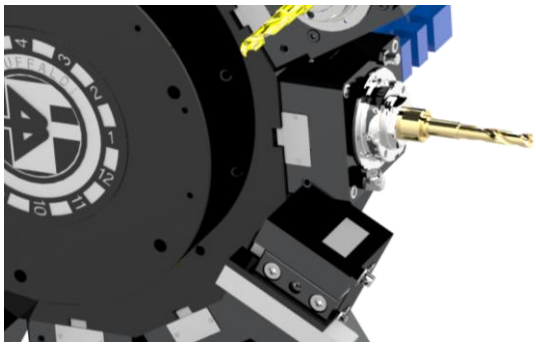
- reduced temperature of the cutting area
- better workpiece surface
- reduced tool wear
- reduced cutting forces
- lower impact in pollution

Alle Revolver der Leonardo-Line lassen sich mit einem MQL-System kombinieren.
Die Minimalmengenschmierung dient dazu den Einsatz von Kühlmittel auf ein Minimum zu reduzieren, indem ein zerstäubtes Luft-Öl-Gemisch (mineral. oder planz. Öl möglich) anstelle von herkömmlichem Kühlschmierstoff verwendet wird.
The advantages of this application are:

- Verringerte Temperaturen bei der Spanabhebung
- Bessere Oberflächengüte
- Geringerer Werkzeugverschleiß
- Reduzierte Schnittkräfte
- Niedrigere Umweltbelastung

Tutte le torrette di tipo **TC** possono essere utilizzate con sistemi **MQL**. **MQL** è l'acronimo di *Minimum Quantity Lubrication* (lubrificazione a quantità minima) e consiste nel **ridurre al minimo l'uso del refrigerante**, nebulizzando una **miscela di aria compressa e fluido da taglio** (oli minerali o vegetali) invece del tradizionale raffreddamento a getto continuo.
I vantaggi di questa applicazione sono:

- riduzione temperatura nella zona di taglio
- migliore finitura superficiale del pezzo
- minore usura dell'utensile
- riduzione delle forze di taglio
- minore impatto ambientale

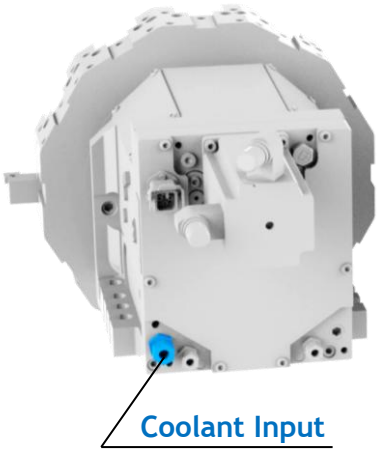


M Q L

MINIMUM QUANTITY LUBRICATION

TC Turrets - Coolant connections

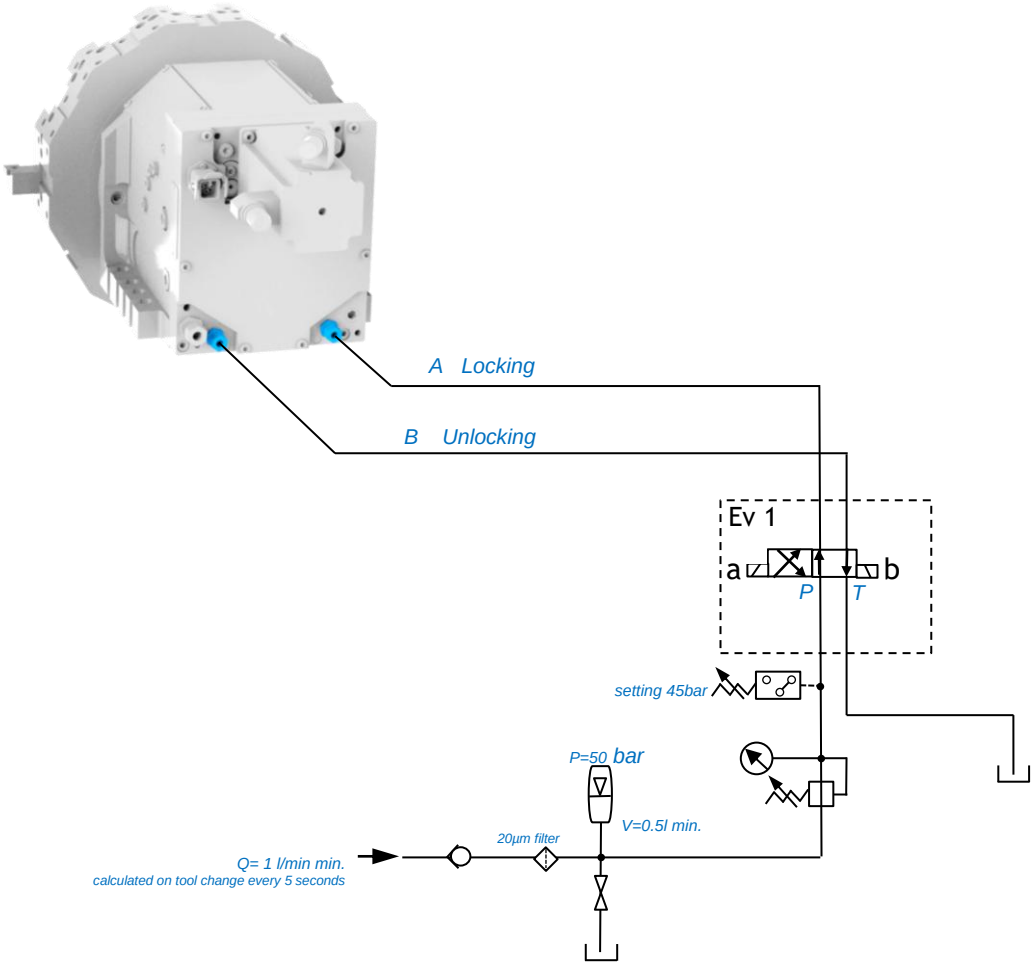
Kühlmittelanschlüsse - Connessioni refrigerante



COOLANT CONNECTIONS Kühlmittelanschlüsse / Connessioni refrigerante		
TURRET SIZE Baugröße / Taglia torretta		160-200-250
INPUT CONNECTION Anschlussgröße / Connessioni di entrata	**G”**	1/2”
PRESSURE 1st Stage (standard) Kühlmitteldruck 1. Stufe (standard) / Pressione 1o Stadio (standard)	**bar**	35
PRESSURE 2nd Stage (on request) Kühlmitteldruck 2. Stufe (a. Anfr.) / Pressione 2o Stadio (su richiesta)		80
PRESSURE 3rd Stage (on request) Kühlmitteldruck 3. Stufe (a. Anfr.) / Pressione 3o Stadio (su richiesta)		120
FILTERING Filter / Filtraggio	**µm**	20

TC Turrets - Hydraulic connections & Diagram

Hydraulikanschlüsse - Connessioni idrauliche



TC Turrets -Electrical connections

Elektrischer Anschluss - Connessioni elettriche

The Leonardo Line Turrets have been designed to be installed in a easy and quick way.

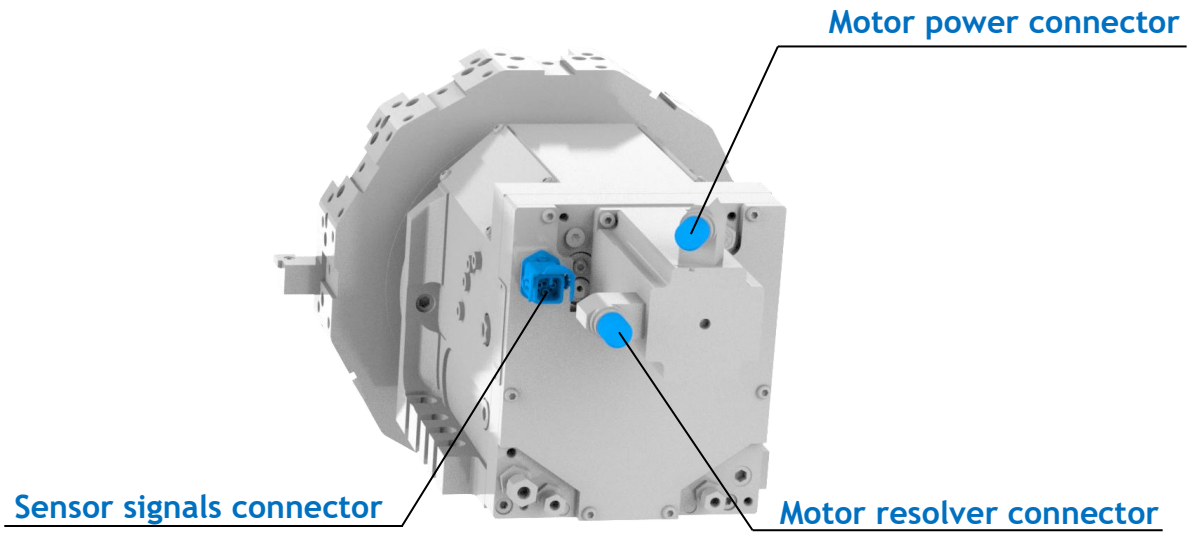
All electrical connections are plug-in with benefits in installation.

Die Leonardo-Revolver wurden für einen schnellen und einfach Einbau konzipiert

Alle elektrischen Anschlüsse werden mit Steckverbindungen realisiert.

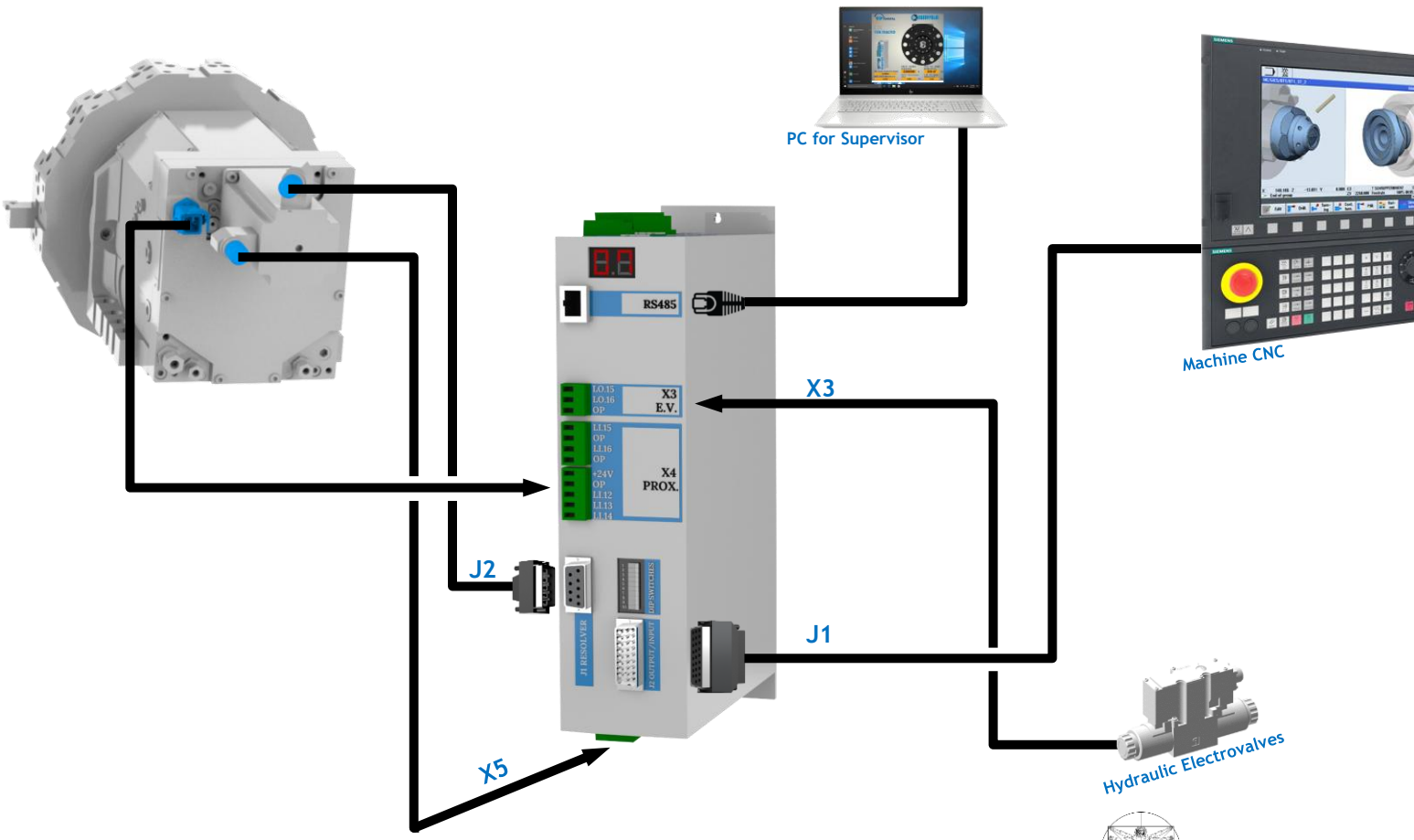
Le torrette **Leonardo** sono state progettate per un'**installazione rapida e semplice**.

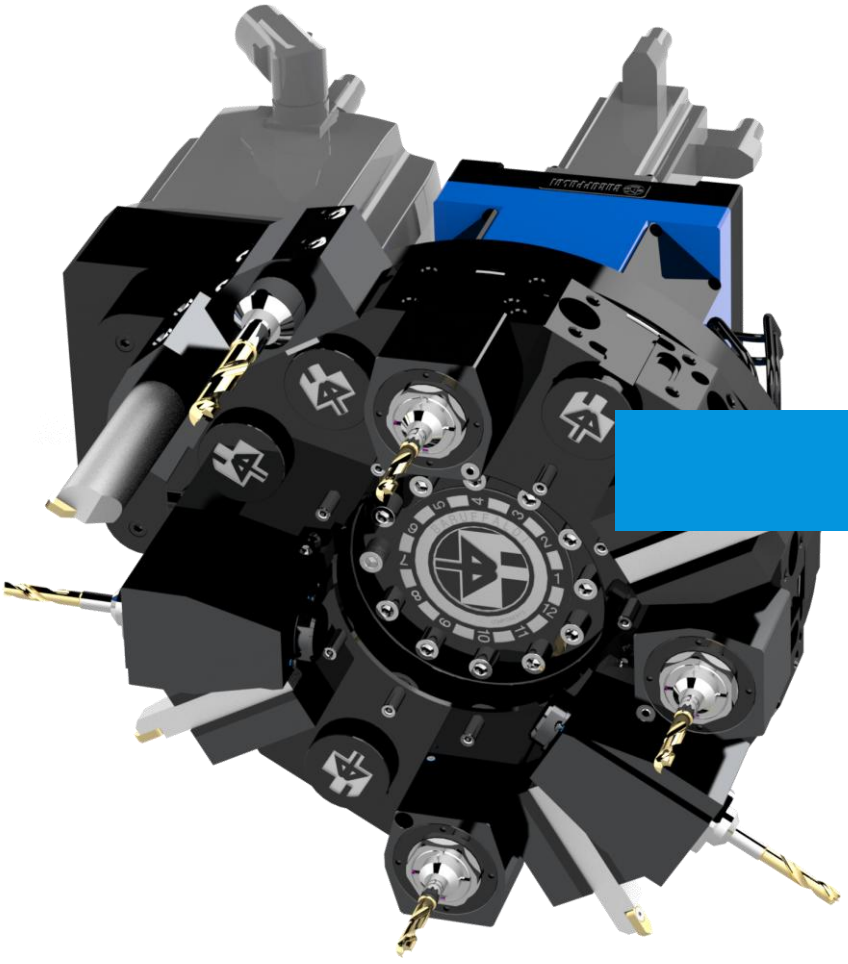
Tutti i **collegamenti elettrici** vengono realizzati tramite **connettori a innesto**.



TC Turrets - ServoDrive connections

Anschluss Servo-Steuerung - Connessioni Servoazionamento





TCMA TURRETS

TCMA Turrets - Driven tool unit description

Funktionsbeschreibung – Descrizione motorizzata

The *driven tool motor* (M) drives the *tool holder* (U) by means of a *transmission gearing* (I) and a frontal *Hirth-like Clutch* (H).

Before disc indexing procedure the *coupling* (H) disengages automatically *tool holder* (U) (shaft as per ISO 10889 norms) moving backward by means of *piston* (P2).

During the locking sequence of the turret, the opposite stroke of the *piston* (P2) moves the *coupling* (H) forward that engages as well the *tool holder* (U).

The locking and unlocking status of the live tool clutch is constantly monitored by 2 inductive sensors.

Der *Werkzeugantriebsmotor* (M) treibt den *Werkzeughalter* (U) über mehrere *Getriebestufen* (I) und die *Werkzeug-Antriebskupplung* (H) an.

Vor dem Werkzeugwechsel wir die *Kupplung* (H) durch hydraulische Betätigung des *Hub-Kolbens* (P2) geöffnet (Ausführung gemäß ISO 10889).

Während der Verriegelung des Revolvers wird zeitgleich der *Hub-Kolben* (P2) gegenläufig beaufschlagt und rückt die *Kupplung* (H) in den *Werkzeughalter* (U) ein.

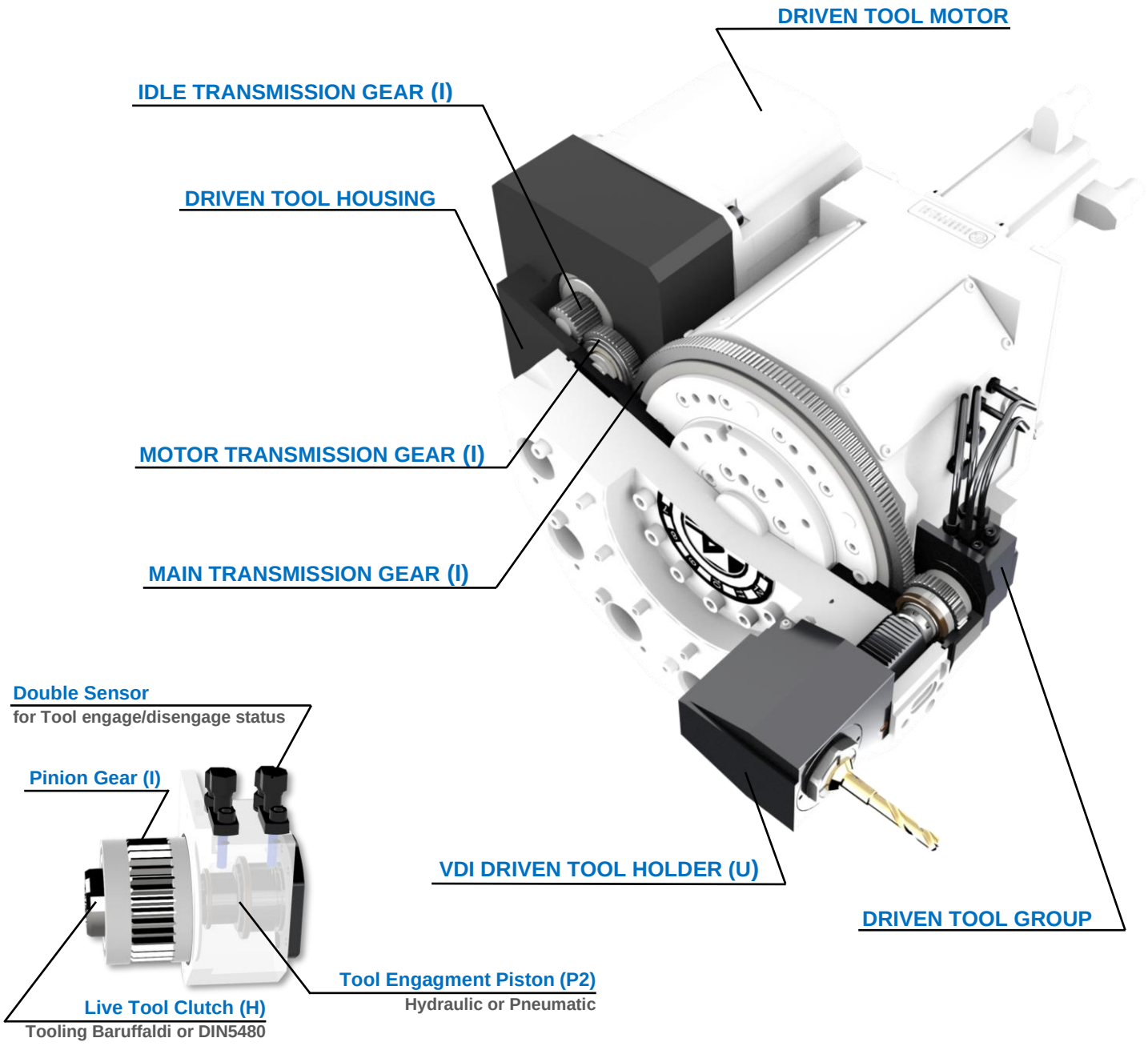
Der Schaltzustand der Kupplung wird permanent von zwei induktiven Sensoren überwacht.

Il motore (M) attiva la rotazione dell' Utensile Rotante (U) tramite una serie di ingranaggi (I) e l'Innesto Presa di Moto (H).

Prima del cambio utensile, l'Innesto (H) si sgancia automaticamente dall'Utensile Rotante (U) (albero conforme a norma ISO 10889) arretrando grazie al Pistone (P2).

Durante l'operazione di bloccaggio, il movimento in senso contrario del Pistone (P2) spinge l'Innesto (H) in avanti permettendo l'aggancio dello stesso in automatico con l'Utensile Rotante (U).

Lo stato di bloccaggio e sbloccaggio dell'Innesto è costantemente monitorato da due sensori induttivi.



TURRET size Baugröße / Taglia torretta		**TCMA 160**	**TCMA 200**	**TCMA 250**
VDI size VDI-Größe / Taglia VDI		30-40	40-50-30	50-60
Max speed of driven tool (forced lubrication version)* Max. Drehzahl Werkzeugantrieb (m. Zusatz-Kühlung)* Velocità massima motorizzazione (lubr.forzata)*	**rpm**	*10.000*		*9.000*
Max speed of driven tool (standard) Max. Drehzahl Werkzeugantrieb (standard) Velocità massima motorizzazione (standard)		6000	5000	
Max input torque** Max. Eingangsdrehmoment** Massima coppia in entrata**	**Nm**	*26*	*65*	*70*
Max nominal input torque (S1) Max. Eingangsnenndrehmoment (S1) / Massima coppia nominale (S1)		20	50	55
Max nominal power Max. Nennleistung / Massima Potenza nominale	**kW**	6	9	10
Ratio: rpm Motor: rpm take power Übersetzung Motor zu Werkzeugkupplung Rapporto: Giri/min Motore: giri/min presa di moto		1:1 or 1:1.25	1:1 or 1:1.315	1:1 or 1:1.52
VDI Live Tooling System VDI-Schnittstellen Sistema innesto motorizzato		Baruffaldi (standard) - DIN5480 (on request) ***		

*Application need to be discussed and analyzed with Baruffaldi technical/sales office

**Die Anwendung muss mit dem technischen/verkaufsseitigen Büro von Baruffaldi besprochen und analysiert werden*

**L'applicazione deve essere discussa e analizzata con l'ufficio tecnico/commerciale di Baruffaldi*

**Max 20% working time in a 10min duty cycle

*** Maximale Einschaltdauer 20 % bei einem Arbeitszyklus von 10 Minuten*

***Massimo utilizzo 20% su ciclo di lavoro di 10min*

***Special tooling system only on request

**** Spezialsystem mit motorisiertem Kupplungsantrieb nur auf Anfrage*

****Sistema innesto motorizzato speciale solo su richiesta*

TCMA Turrets - Tool Discs Type

Arten von Werkzeughalterscheiben- Tipi dischi portautensili

The Linea Leonardo Turrets might be equipped with several Tool Holders Discs type:

Die Werkzeugrevolver der Leonardo-Line können mit unterschiedlichsten Werkzeugscheiben ausgerüstet werden:

Le torrette Linea Leonardo possono essere equipaggiate con diversi tipi di dischi portautensili:



VDI Axial Discs (Standard)
VDI-Axialscheibe (Standard)

VDI Axial Discs with double PCD
VDI-Axialscheibe mit 2-fach. Teilkreis)





VDI Axial Discs + Side Slots
Disco Assiale VDI + sedi fresate laterali)

VDI Axial Discs + Frontal/Side Slots
VDI-Axialscheiben mit 4-kant Aufnahmen



Other tool discs or other solutions are available on request, please contact our sales office (sales.mtc@baruffaldi.it) or check our tool disc catalog.

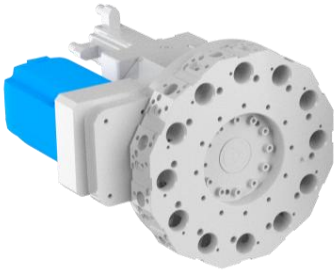
Weitere Ausführungen sind auf Anfrage erhältlich. Kontaktieren Sie einfach unser Vertriebsbüro (sales.mtc@baruffaldi.it) oder beachten Sie unseren separaten Scheiben-Katalog.

Altri dischi Portautensili o altre soluzioni sono disponibili su richiesta, si prega di contattare il nostro ufficio vendite (sales.mtc@baruffaldi.it)o consultare il nostro catalogo di dischi per utensili.

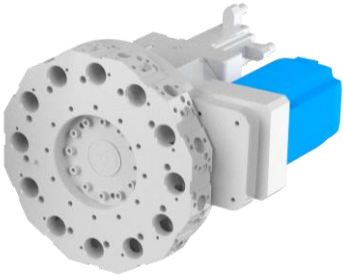


TCMA Turrets - Motor position configuration

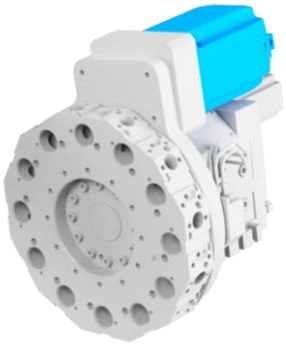
Position Werkzeugantriebsmotoren - Posizione Motore motorizzazione



LEFT*
(Standard)



RIGHT*
(Standard)



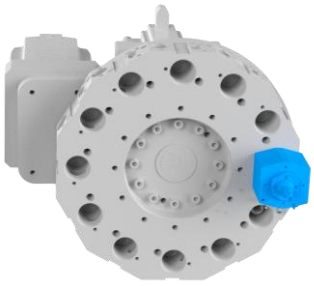
TOP*
(On request)



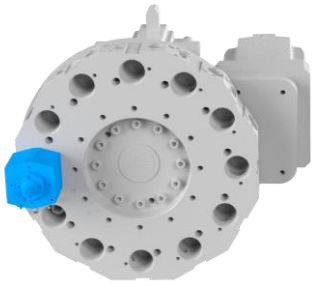
Y-AXIS VERSION*
(Standard)

TCMA Turrets - Working position

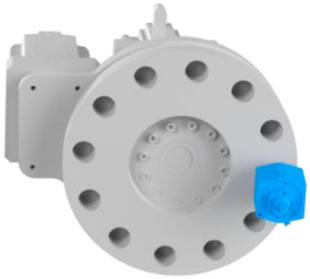
Arbeitspositionen - Posizione di lavoro



RIGHT*
(Standard)



LEFT*
(Standard)



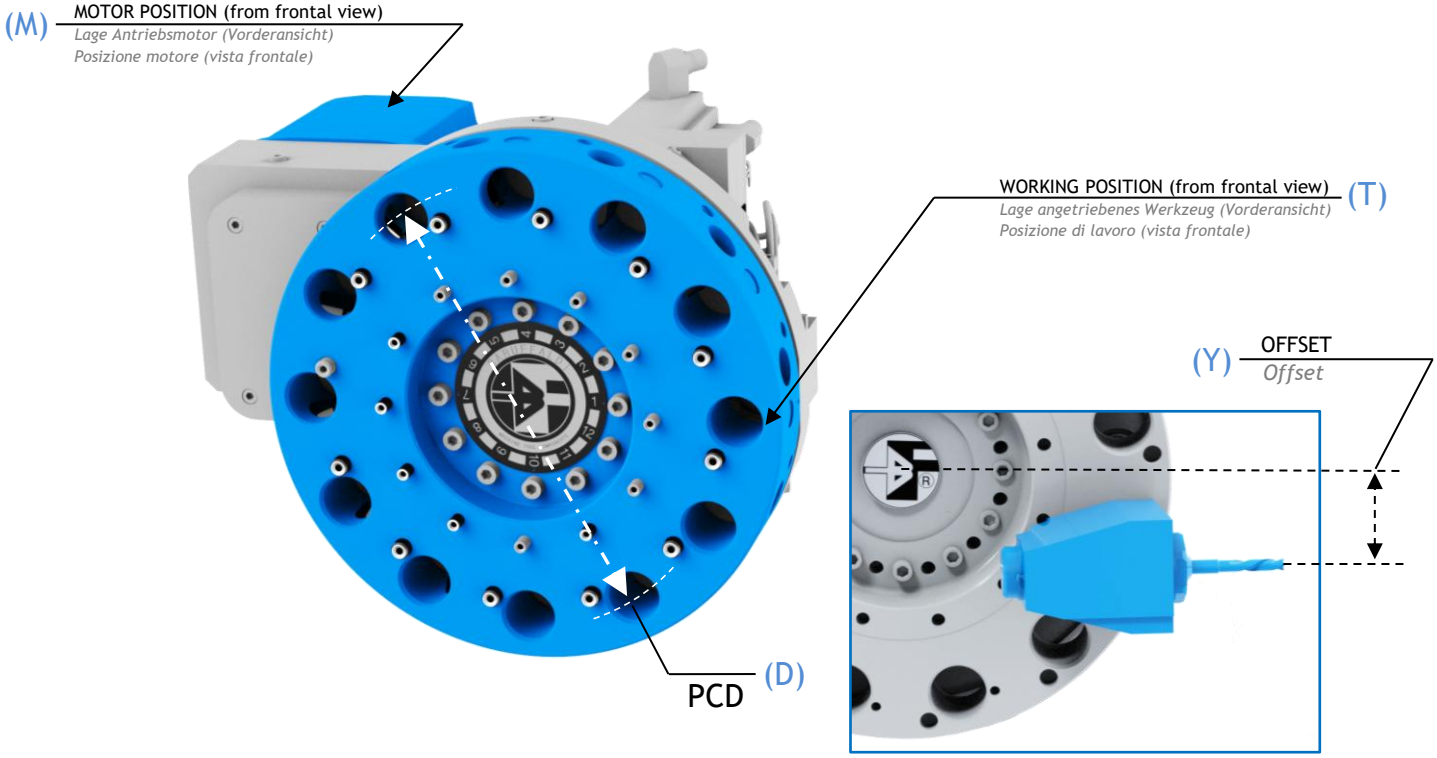
RIGHT WITH OFFSET*
(On request)



LEFT WITH OFFSET*
(On request)

TCMA Turrets - Driven Tool Configuration

Ausführungen Werkzeugantrieb - Configurazione Motorizzata



Turret Revolvertye Torretta	Working side Arbeitsposition Lato di lavoro	Motor Position Lage Antriebsmotor Posizione motore	PCD	OFFSET Offset	Version Version	standard /on request Standard/auf Anfrage
	(T)	(M)	(D)	(Y)		
TCMA 160	RIGHT	LEFT	270	00	01	standard
	RIGHT	LEFT	270	25	02	standard
	LEFT	RIGHT	270	00	06	standard
	LEFT	RIGHT	270	25	03	on request
	RIGHT	LEFT	300	00	04	standard
	RIGHT	LEFT	340	00	20	on request
	RIGHT	TOP	270	35	/	on request
	LEFT	TOP	270	00	/	on request
TCMA 200	RIGHT	LEFT	340	0	01	standard
	RIGHT	LEFT	340	32	02	on request
	LEFT	RIGHT	340	0	04	standard
	LEFT	RIGHT	340	32	08	on request
	RIGHT	LEFT	380	0	06	standard
	LEFT	RIGHT	380	0	/	on request
	RIGHT	TOP	340	0	/	on request
	LEFT	TOP	340	0	/	on request
	RIGHT	TOP	340	40	/	on request
	LEFT	TOP	340	40	/	on request
	RIGHT	TOP	380	0	/	on request
TCMA 250	RIGHT	LEFT	400	0	01	standard
	RIGHT	LEFT	400	35	02	on request
	RIGHT	LEFT	400	20	03	on request
	LEFT	RIGHT	400	0	06	standard
	RIGHT	LEFT	445,5	0	04	standard
	RIGHT	LEFT	445,5	35	10	on request
	RIGHT	LEFT	445,5	80	05	on request
	LEFT	RIGHT	445,5	0	15	on request
	RIGHT	TOP	400	50	/	on request
	LEFT	TOP	400	0	/	on request

Other versions are available on request, please contact our sales office: sales.mtc@baruffaldi.it

Weitere Ausführungen auf Anfrage erhältlich unter: sales.mtc@baruffaldi.it

Altre versioni sono disponibili su richiesta, contattando i nostri uffici commerciali: sales.mtc@baruffaldi.it

TCMA Turrets - Driven Tool Motor

Angetriebener Werkzeugmotor - Motore Motorizzata

The driven tool motors applied to the TCMA turrets should comply with the following specifications:
- Size, power and torque admitted by the turret specifications
- Motor form **V1/V3** for vertical installation position (DIN 42950)
- Motor form **B5 (with flange)** for horizontal installation position (DIN 42950)
- Construction Tolerances according to **DIN 42955-R**
- Vibration level **R**
- Motor with seal on the shaft (the motor shaft is in an area with lubrication oil of the driven tool)

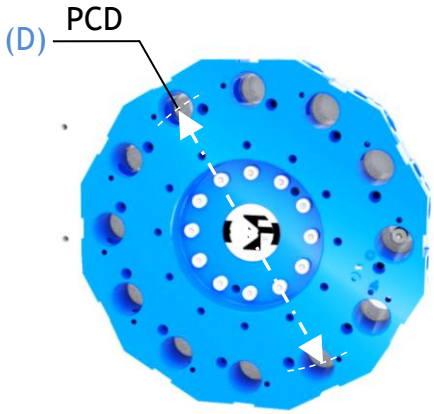
Coupling between motor and turret is achieved by means of an hub (key shaft motor) or by clamping pinion (plain motor shaft)

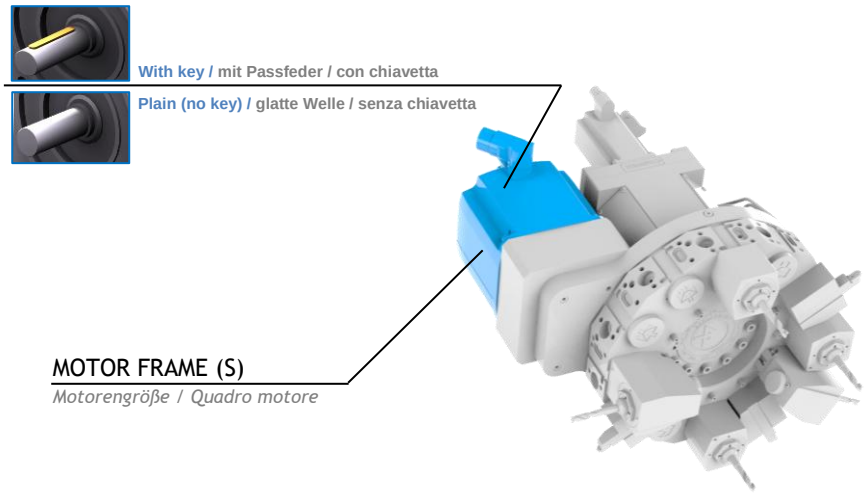
Die verwendeten Werkzeugantriebsmotoren sollten den folgenden Anforderungen entsprechen:
- Größe, Leistung und Drehmoment gemäß den zulässigen Werten des Revolvers
- Motorenbauform **V1/V3** für vertikalen Einbau (DIN42950)
- Motorenbauform **B5** (mit Flansch) für horizontalen Einbau, DIN 42950)
- Toleranzklassen gemäß **DIN 42955-R**
- Vibrationsklasse **R**
- Motor mit Wellendichtung (Einsatz erfolgt in Bereichen mit Kontakt zu Schmieröl)

Der Anschluss der Motorwelle an den Revolver kann über eine Passfeder-Verbindung oder ein Klemmelement erfolgen

I motori utilizzati sulle torrette TCMA devono essere conformi alle seguenti specifiche:
- Taglia, potenza e coppia secondo le specifiche delle torrette
- Forma motore V1/V3 per installazioni verticali (DIN 42950)
- Forma motore B5 (con flangiatura) per installazioni orizzontali (DIN 42950)
- Tolleranze costruttive secondo DIN 42955-R
- Livello di vibrazione R
- Motore con guarnizione sull'albero (l'albero motore è a contatto con olio di lubrificazione del gruppo motorizzato)

L'accoppiamento tra albero motore e torrette è fatto da un pignone (per motori con albero con chiavetta) o tramite pignone a calettatori (per motori con albero liscio)





Turret TCMA	Continuos torque (S1)* *Drehmoment (S1)* Coppia nominale (S1)**	Turret PCD *Teilkreisdurchmesser Interasse torretta (D)*	Max Motor Square *Max. Motorengröße Max Quadro motore (S)*	Indication of Drive Tool Motor ** *Motortyp Werkzeugantrieb** Motori utensil motorizzati indicativi **
	Nm	(mm)	(mm)	
160	20	270	174	Fanuc α 2
				Fanuc αis 12/22
				Siemens 1PH8 083
				Siemens 1FT7 084/086
		300	189	Fanuc α 2
				Fanuc αis 12/22
				Siemens 1PH8 083
				Siemens 1FT7 084/086
200	50	340	174	Fanuc α 3
				Fanuc αis 30/40
				Siemens 1PH8 83/87
				Siemens 1FT7 082/084/086
		380	210	Fanuc α 6/8
				Fanuc αis 30/40
				Siemens 1PH8 103/105
				Siemens 1FT7 102/105
250	55	400 445.52	230 270	Fanuc α 6/8
				Fanuc αis 30/40
				Siemens 1PH8 103/105
				Siemens 1FT7 102/105

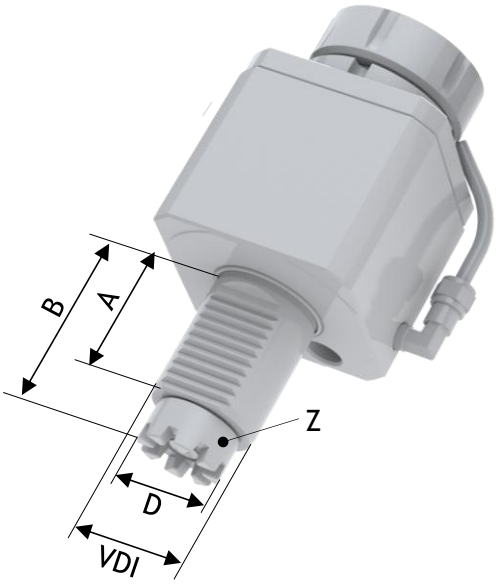
*The max input turret torque, into the driven tool unit, cannot exceed the 20% of the nominal torque indicated
**Das in die Werkzeugantriebseinheit abgegebene Drehmoment darf den angegebenen Nennwert um nicht mehr als 20% überschreiten.*
**The motor indication is only a reference, in case of order please contact and discuss it with our sales office
***Die Angabe der Motortypen erfolgt nur zur beispielhaften Orientierung. Bitte sprechen Sie die finale Auswahl mit unserem Vertriebsbüro ab.*

TCMA Turrets - Driven Tool Coupling

Werkzeugkupplungen - Tipi di presa di moto



Live tool clutch - BARUFFALDI				
VDI	A	B	D	Z
20	35	44	19	6
30	45/53	59	24	6
40	53	68	32	8
50	70	84	40	8
60	83	100	43	8



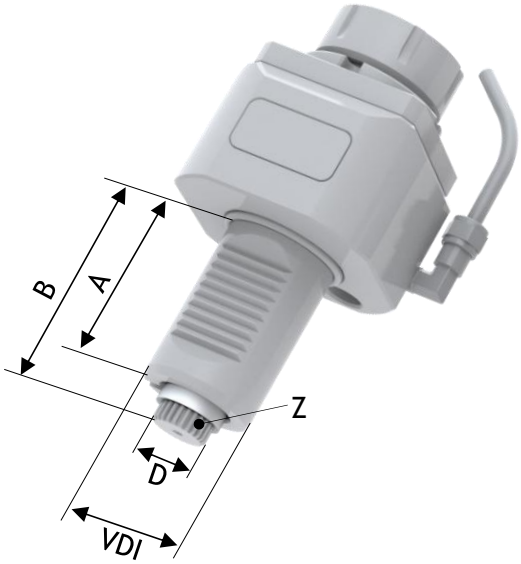


Live tool clutch - DIN 5480*					
VDI	A	B	D	E	Z
20	35	51	10.8	W11x0.8	12
25	48	57	13.8	W14x0.8	16
30	55	67	15.8	W16x0.8	18
40	63	75	19.8	W20x0.8	24
50	78	93	23.8	W24x1.25	18

*only on request



Live tool clutch - DIN 5482*					
VDI	A	B	D	E	Z
30	45	55	14.5	W15X12	8
40	53	63	16.5	W17X14	9
50	78	93	19.5	W20X17	12
60	94	108	24.5	W25x22	14



TCMA Turrets - Loading Capacity

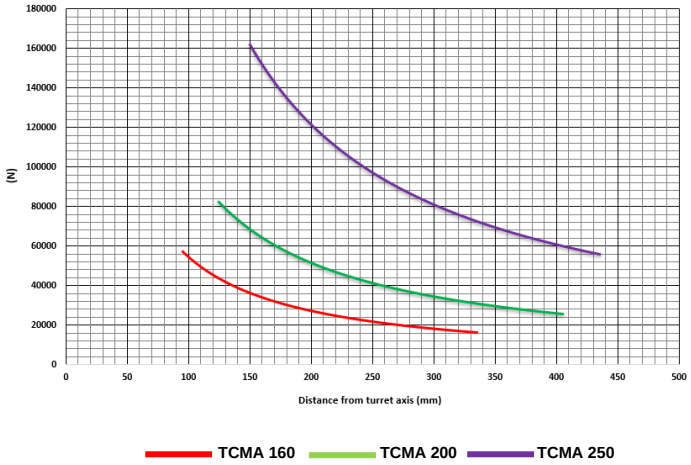
Zulässige Belastungen – Capacità di carico

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

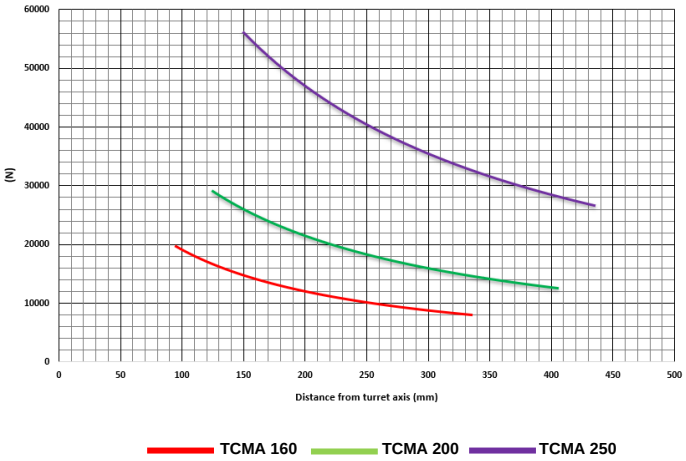
Die nachfolgenden Diagramme beziehen sich auf die zulässigen Belastungen auf die Werkzeugscheibe.

I seguenti diagrammi si riferiscono alle forze applicate al disco portautensili. Per la capacità di carico dei portautensili statici, fare riferimento alla scheda tecnica del produttore.

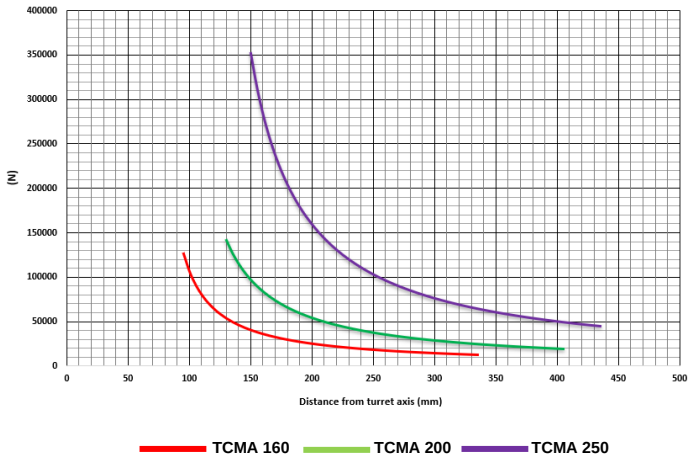
F / F1 - Tangential

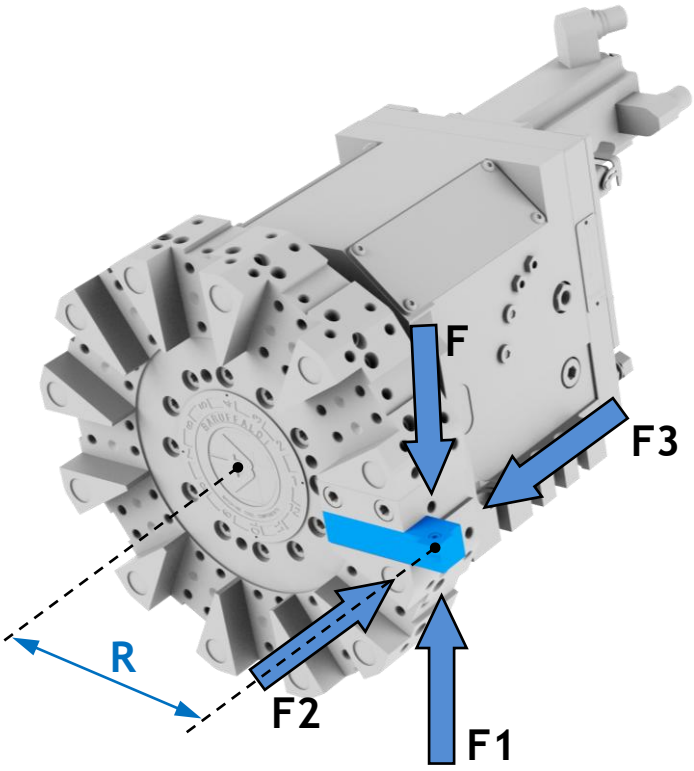


F2 - To Push



F3 - To Lift





TCMA Turrets - Ordering Code

Produktcode - Codice ordine

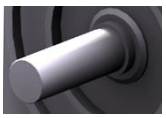
INDEXING MOTOR AND DRIVE Schwenkmotor und Steuerung Motore index e drive	Code
STANDARD MOTOR AND DRIVE BARUFFALDI *Standard – Mit Baruffaldi Schwenkmotor und Steuerung* *Motore e drive standard Baruffaldi*	0
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR SIEMENS MOTOR 1FK7-042 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Siemens 1FK7-042* *Senza motore e drive Baruffaldi, predisposta per motore Siemens 1FK7-042*	2
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR FANUC MOTOR Alpha Is 4/5000 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Fanuc Alpha Is 4/5000* *Senza motore e drive Baruffaldi, predisposta per motore Fanuc Alpha Is 4/5000*	3
WITHOUT MOTOR AND DRIVE BARUFFALDI *Ohne Baruffaldi Schwenkmotor und Steuerung* *Senza motore e drive Baruffaldi*	4
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR CUSTOMIZED MOTOR *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Kunden-Motor* *Senza motore e drive Baruffaldi, predisposta con kit motore speciale*	5

TURRET SIZE *Revolvergröße* *Taglia torretta*	*Code*
TCMA 160	160
TCMA 200	200
TCMA 250	250

N° OF DIVISIONS *Anzahl Positionen* *Numero di divisioni*	*Code*
8/12	0
8	1
12	2
16	3
24	5

VERSION *Version* *Versione*	*Code*
REFER TO THE DRAWINGS *Gemäß Zeichnungsnummer* *Fare riferimento ai disegni*	*
MORE VERSIONS ARE AVAILABLE ON REQUEST *Zahlreiche Varianten auf Anfrage verfügbar* *Altre versioni sono disponibili su richiesta*	

TURRET TYPE *Revolvertyp* *Tipo torretta*	*Code*
TCMA	LA

DRIVEN MOTOR SHAFT TYPE *Wellen-Typ Werkzeugantriebsmotor* *Tipo albero motore per utensili mot.*		*Code*
WITHOUT KEY *Ohne Passfeder* *Senza chiavetta*		0
WITH KEY *Mit Passfeder* *Con chiavetta*		1

K □□ . □ □□□ . □ □ □ □ □□ □ . □□ ■

TOOL DISC *Werkzeugscheibe* *Disco portautensili*	*Code*
WITHOUT TOOL DISC *Ohne Werkzeugscheibe* *Senza disco*	0
WITH TOOL DISC *Mit Werkzeugscheibe* *Con disco*	**A LETTER ACCORDING TO THE DISC TYPE** **Ausführung gemäß Buchstaben-Code** **Una lettera a seconda della tipologia di disco**

TRANSMISSION RATIO INPUT: OUTPUT *Übersetzung Werkzeugantrieb* *Rapporto di trasmisisone Entrata:Uscita*	*Code*
1:1	1
REDUCTION – see pg. 19 *Reduzierung– siehe Seite 19* *Riduzione – vedi pag. 17*	2

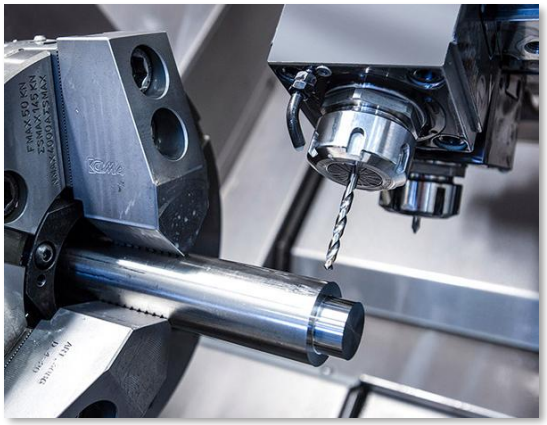
WORKING POSITION *Arbeitsposition* *Posizione di lavoro*	*Code*
RIGHT *Rechts* *Destra*	R
LEFT *Links* *Sinistra*	L

DRIVEN MOTOR BRAND AND TYPE *Ausführung Werkzeugantriebsmotor* *Tipo e merca motore utensile mot.*	*Code*
*	**A LETTER ACCORDING TO THE MOTOR TYPE AND BRAND** **Buchstaben-Code gemäß Motorenausführung** **Una lettera a seconda del tipo e marca motore**

VARIOUS *Ausführungen* *Varie*	*Code*
FORCED LUBRICATION *Zusatzschmierung* *Lubrificazione Forzata*	F
VERTICAL ASSEMBLING *Vertikaler Einbau* *Montaggio verticale*	G
HIGH COOLANT PRESSURE *Erhöhter Kühlmitteldruck* *Alta pressione refrigerante*	P
MQL (MINIMUM QUANTITY LUBRICATION) *MQL (Minimalmengenschmierung)* *MQL (Minima Quantità di Lubrificante)*	M

TCMA Turrets - Driven Tool Duty Cycle (with standard lubrication)

Arbeitszyklen (mit Standardschmierung) - Ciclo utilizzo motorizzati (Lubr. standard)



When operating live tools with the standard TCMA (without Oil Cooling) please consider *tool "torque/speed" diagram* and "*working time" reference diagram* (10 min.) shown below to adjust working parameters

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

Turret information on mechanical capabilities are indicated on chapter *"TCMA TURRETS – Driven Tool Unit technical data", for more info contact our Sales Office.*

Beim Betrieb eines Standard TCMA (ohne Zusatzschmierung) sind die nebenstehenden Betriebsdiagramme zwingend zu beachten und die Arbeitsprozesse entsprechend einzurichten.

Im Hinblick auf den Betrieb mit zunehmenden Geschwindigkeiten ist darauf zu achten, dass die Einsatzdauer entsprechend reduziert wird. Bitte ermitteln Sie hierzu den "k"-Wert (Verhältnis Arbeitsdrehzahl/Maximaldrehzahl) – siehe hierzu das nebenstehende Diagramm. Die beiden dargestellten Kurven umschreiben den Bereich für schwere und leichte Bearbeitungen. Bitte verwenden Sie einen Mittelschnittswert.

Die Leistungsdaten zu unseren Revolvern finden Sie im Kapitel zu den techn. Daten der TCMA -Typen. Für mehr Informationen kontaktieren Sie uns bitte direkt.

Quando si utilizzano gli utensili motorizzati con la torretta standard TCMA (senza raffreddamento ad olio), è necessario considerare il diagramma "coppia/velocità" e il diagramma di riferimento del "tempo di lavoro" (10 minuti) riportati di seguito, al fine di regolare correttamente i parametri di lavorazione.

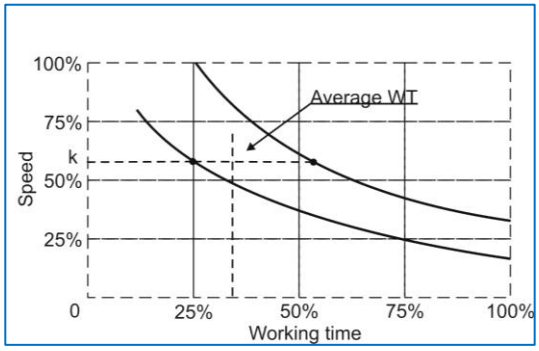
Per quanto riguarda la velocità, maggiore è la velocità, minore deve essere il tempo di lavoro consentito.

Una volta calcolato il parametro k come rapporto tra la velocità effettiva e la velocità massima, il tempo di lavoro può essere determinato dal grafico illustrato di seguito. La curva di sinistra corrisponde a una sollecitazione meccanica inferiore, mentre la curva di destra corrisponde a una sollecitazione meccanica superiore: si raccomanda di adottare un valore intermedio.

Le informazioni sulle capacità meccaniche della torretta sono indicate nel capitolo *"TCMA TURRETS – Dati tecnici unità utensili motorizzati".*
Per ulteriori informazioni, contattare il nostro Ufficio Vendite.

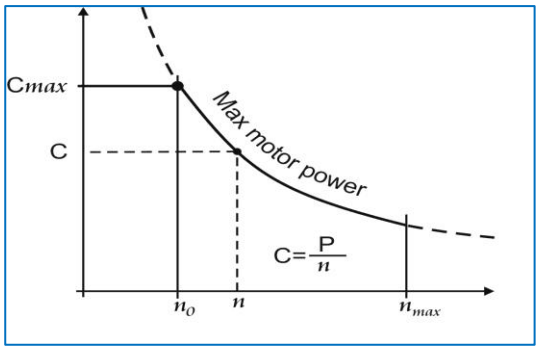
WORKING TIME REFERENCE DIAGRAM

Referenzdiagramm Einsatzdauer
Diagramma di riferimento Tempi di lavorazione

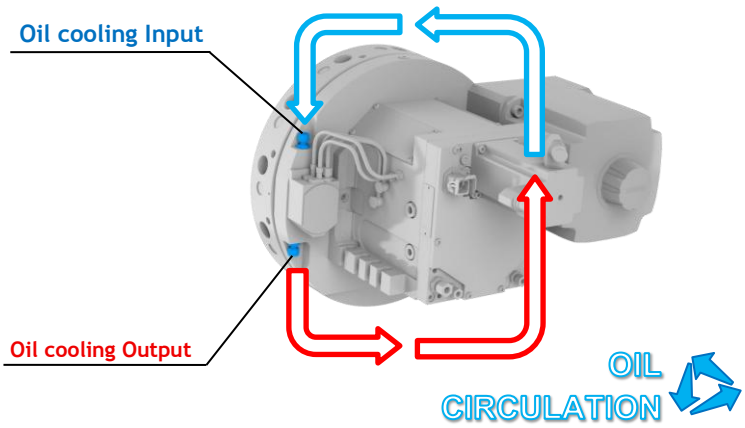


TOOL TORQUE/SPEED DIAGRAM

Diagramm Drehmoment/Drehzahl (Werkzeug)
Diagramma Coppia/Velocità



Also available: TCMA Oil Cooling Version for HIGH SPEED and 100% WORKING TIME



Special Application - High Coolant pressure

Kühlmittel-Hochdruck - Alta pressione refrigerante

The Leonardo Line turrets can be used as standard with a coolant pressure through the disc up to 35bar (1st stage) and on request can be upgraded up to 80bar (2nd stage).

Baruffaldi has also developed a special solution that allows to reach coolant pressures even up to 120bar (3rd stage).

Die Revolver der Leonardo-Line können standardmäßig mit einem Kühlmitteldruck von 35bar über die Werkzeugscheibe betrieben werden. In einer zweiten Stufe ist ein Druck (optional) von 80 bar möglich.

Darüber hinaus sind in einer weiteren, dritten Stufe auch bis zu 120bar möglich.

Le torrette della Linea Leonardo possono essere utilizzate, in configurazione standard, con una pressione del refrigerante attraverso il disco fino a 35 bar (1° stadio) e, su richiesta, possono essere potenziate fino a 80 bar (2° stadio).

Baruffaldi ha inoltre sviluppato una soluzione speciale che consente di raggiungere pressioni del refrigerante fino a 120 bar (3° stadio).



Special Application - MQL MiniumQuantity Lubrication

Minimalmengenschmierung - Minima quantità di refrigerante

All the Turrets type TCMA can be used with MQL systems.
MQL is the acronym of **Minimum Quantity Lubrication** and consists in minimizing the use of coolant by spraying the mixture of **compressed air** and cutting fluid (**mineral oils or vegetable oils**) instead of flood cooling.
The advantages of this application are:

- reduced temperature of the cutting area
- better workpiece surface
- reduced tool wear
- reduced cutting forces
- lower impact in pollution

Alle Revolver der Leonardo-Line lassen sich mit einem MQL-System kombinieren.
Die Minimalmengenschmierung dient dazu den Einsatz von Kühlmittel auf ein Minimum zu reduzieren, indem ein zerstäubtes Luft-Öl-Gemisch (mineral. oder planz. Öl möglich) anstelle von herkömmlichem Kühlschmierstoff verwendet wird.
The advantages of this application are:

- Verringerte Temperaturen bei der Spanabhebung
- Bessere Oberflächengüte
- Geringerer Werkzeugverschleiß
- Reduzierte Schnittkräfte
- Niedrigere Umweltbelastung

Tutte le torrette di tipo **TCMA** possono essere utilizzate con sistemi **MQL**. **MQL** è l'acronimo di *Minimum Quantity Lubrication* (lubrificazione a quantità minima) e consiste nel **ridurre al minimo l'uso del refrigerante**, nebulizzando una **miscela di aria compressa e fluido da taglio** (oli minerali o vegetali) invece del tradizionale raffreddamento a getto continuo.
I vantaggi di questa applicazione sono:

- riduzione temperatura nella zona di taglio
- migliore finitura superficiale del pezzo
- minore usura dell'utensile
- riduzione delle forze di taglio
- minore impatto ambientale



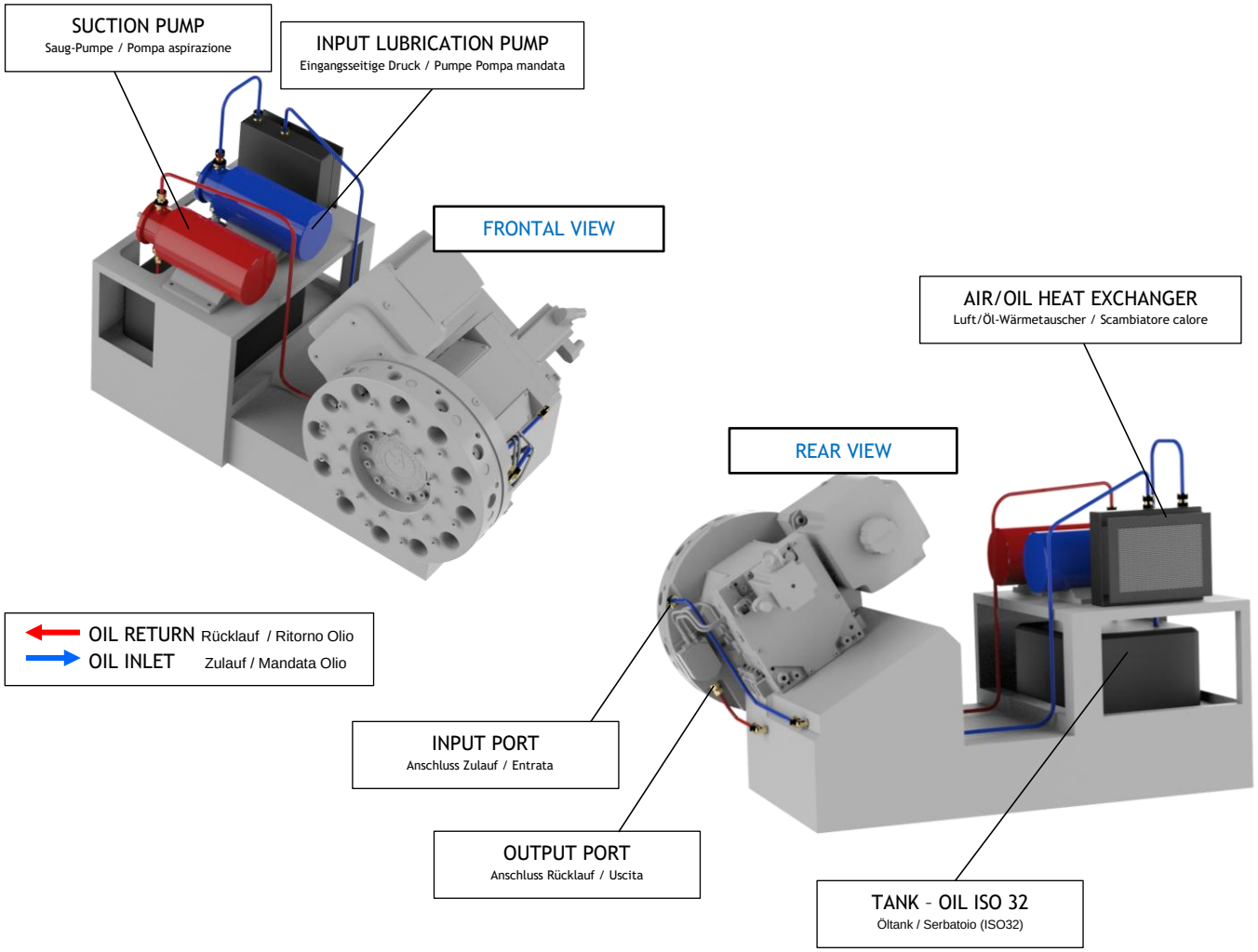
Special Application - Oil Cooling (High speed and continuous mode)

Zusatz-Ölkühlung - Lubrificazione a olio

The Leonardo Line is equipped as standard with an internal system to be upgraded on the machine, according to the final user request, with **Forced Lubrication.**
An Oil recirculation circuit applied to the turret allows Tool Driving at High Speed (up to **10.000 rpm***) in continuous mode (up to **100%**).
The turret is thus upgraded to a Milling Unit.

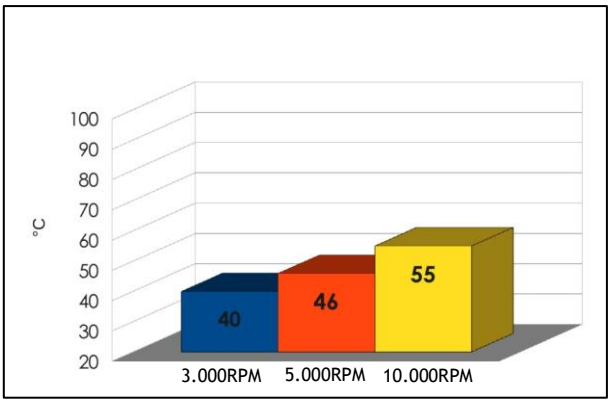
Die Revolver der Leonardo-Line sind standardmäßig mit einem zusätzlichen, internen Kreislauf für eine erweiterte Öl-Kühlung ausgestattet.
Eine von außen gesteuerte Öl-Zirkulation ermöglicht dabei hohe Geschwindigkeiten am angetriebenen Werkzeug (bis 10.000 U/min*) bei dauerhaftem Einsatz (bis zu ED 100%).
Der Revolver eignet sich somit auch für Fräsarbeiten.

La linea Leonardo è dotata di di un sistema interno di lubrificazione forzata, che può essere integrato sulla macchina in base alle esigenze dell'utente finale.
Un circuito di ricircolo dell'olio applicato alla torretta consente l'azionamento dell'utensile ad alta velocità (fino a 10.000 giri/min*) in modalità continua (fino al 100%).
La torretta diventa quindi un'unità di fresatura.



TURRET SIZE Baugröße / Taglia torretta		160-200-250
Flow Oil Rate (minimum) Min. Ölfluss / Flusso olio (min.)	l/min	1/1,5
Oil viscosity Öl-Viskosität / Viscosità olio	ISO VG	32
Filtering Filter / Filtraggio	µm	20
Input connection Anschluss Eingang /Connessione entrata	G"	1/8''
Output connection Anschluss Ausgang / Connessione uscita		1/8''

TEMPERATURE DIAGRAM / *TEMPERATUR DIAGRAMM*



*the speed depends about the turret size and application need to be discussed and analysed with Baruffaldi technical/sales office
*die Geschwindigkeit hängt vom Einsatzrahmen und der Revolvergröße ab. Weitere Informationen in Rücksprache mit Baruffaldi
*la velocità dipende dalle dimensioni della torretta e l'applicazione deve essere discussa e analizzata con l'ufficio tecnico/commerciale Baruffaldi

Special Application - Pressurizing Air system Changers)

Überdruck-System - Sistema di pressurizzazione

Every TCMA turret 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, consequently, avoid infiltration of coolant and/or other pollutants into the Turrets and its Driven Tool Unit.

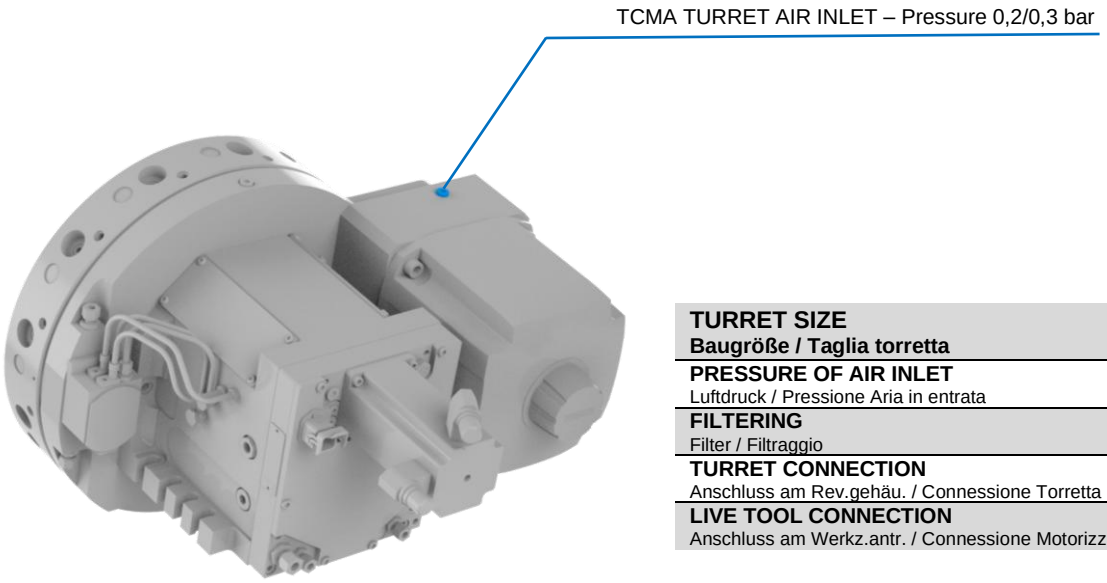
This function is recommended in case of machining of materials that create dust or high corrosion (bronze, aluminium, graphite, etc..)

Jeder Revolver der Leonardo-Line (TCMA) ist mit einer Überdruckfunktion ausgerüstet. Über eigene Anschlusspunkte kann das Innere des Revolvers mit Druckluft beaufschlagt werden und schützt diesen dabei vor eindringenden Verschmutzungen.

Der Einsatz dieser Funktion empfiehlt sich bei der Bearbeitung von staub- oder korrosionsverursachenden Werkstoffen (z.B. Bronze, Aluminium, Graphite etc.)

Tutte le torrette TCMA sono predisposte per la „“funzione di pressurizzazione“, che può essere adottata per prevenire la contaminazione di agenti esterni nell’area guarnizione della presa di moto e, di fatto, evitare infiltrazioni di refrigerante nella torretta e nella sua motorizzazione.

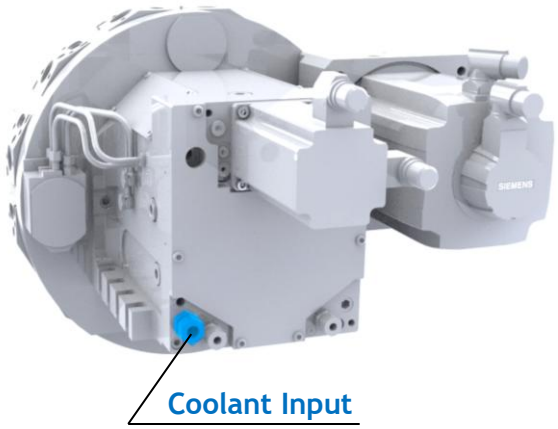
Questa funzione è consigliata in caso di lavorazioni su material ich ecreano polveri o con alto potere corrosivo (bronzo, alluminio, grafite, ecc.)



TURRET SIZE **Baugröße / Taglia torretta**		**160-200-250**
PRESSURE OF AIR INLET Luftdruck / Pressione Aria in entrata	bar	0,2/0,3
FILTERING Filter / Filtraggio	µm	20
TURRET CONNECTION Anschluss am Rev.gehäu. / Connessione Torretta	gas	1/2’’
LIVE TOOL CONNECTION Anschluss am Werkz.antr. / Connessione Motorizzata	gas	1/8’’

TCMA Turrets - Coolant connections

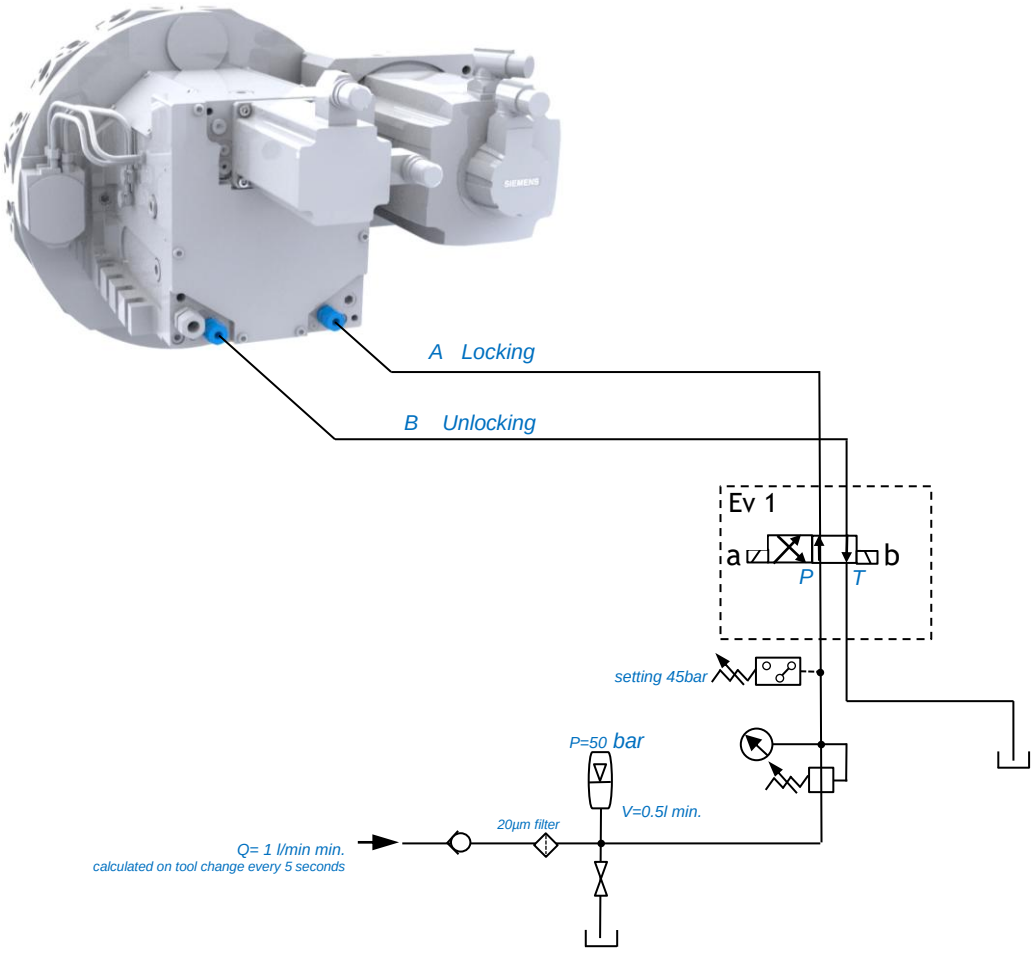
Kühlmittelanschlüsse - Connessioni refrigerante



COOLANT CONNECTIONS Kühlmittelanschlüsse / Connessioni refrigerante		
TURRET SIZE Baugröße / Taglia torretta		160-200-250
INPUT CONNECTION Anschlussgröße / Connessioni di entrata	**G”**	1/2”
PRESSURE 1st Stage (standard) Kühlmitteldruck 1. Stufe (standard) / Pressione 1o Stadio (standard)	**bar**	35
PRESSURE 2nd Stage (on request) Kühlmitteldruck 2. Stufe (a. Anfr.) / Pressione 2o Stadio (su richiesta)		80
PRESSURE 3rd Stage (on request) Kühlmitteldruck 3. Stufe (a. Anfr.) / Pressione 3o Stadio (su richiesta)		120
FILTERING Filter / Filtraggio	**µm**	20

TCMA Turrets - Hydraulic connections & Diagram

Hydraulikanschlüsse - Connessioni idrauliche



TCMA Turrets -Electrical connections
Elektrischer Anschluss - Connessioni elettriche

The Leonardo Line Turrets have been designed to be installed in a easy and quick way.

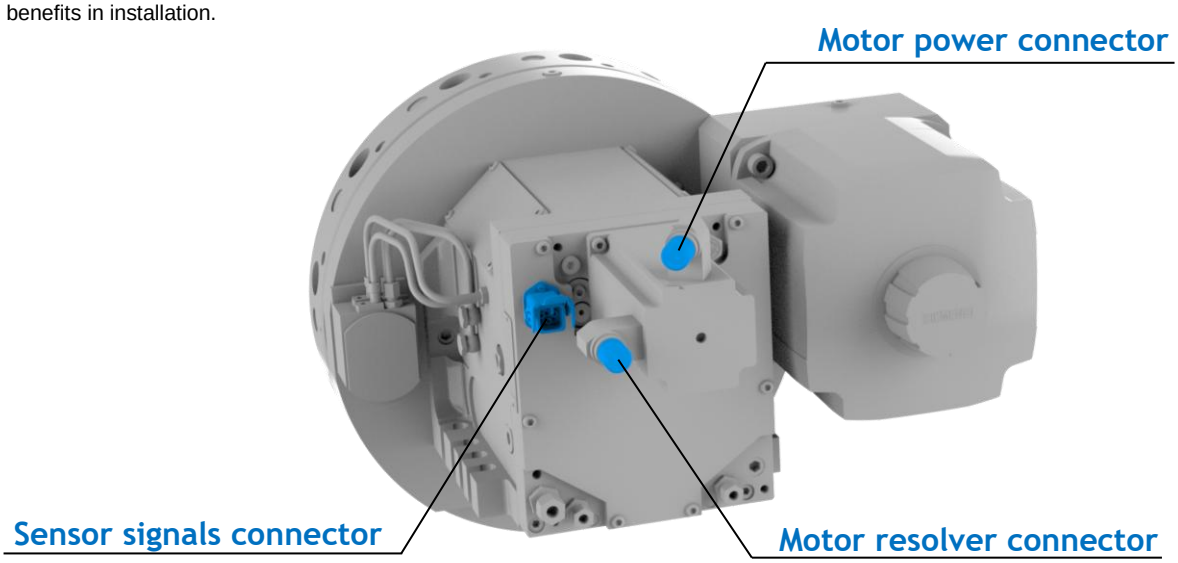
All electrical connections are plug-in with benefits in installation.

Die Leonardo-Revolver wurden für einen schnellen und einfach Einbau konzipiert

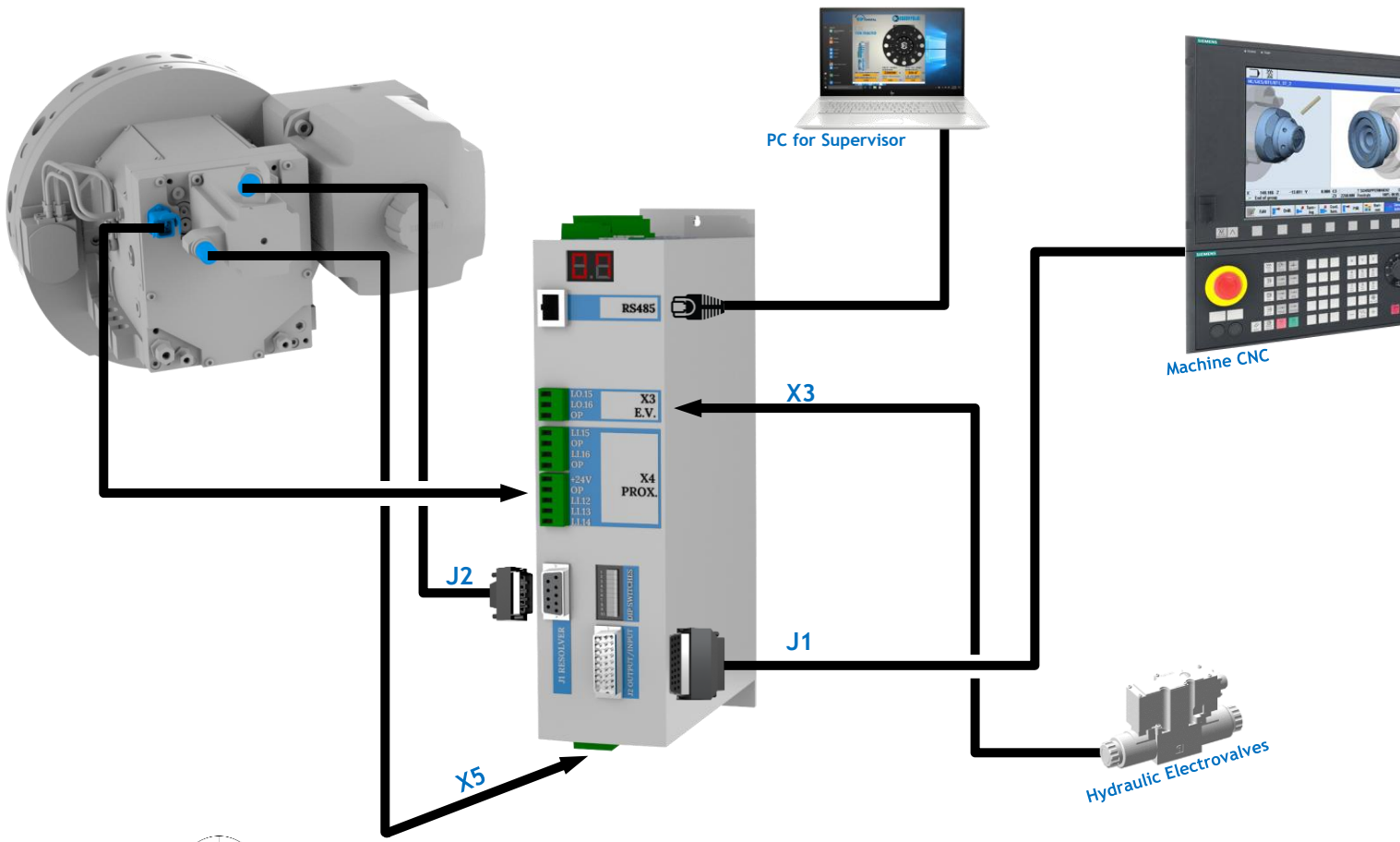
Alle elektrischen Anschlüsse werden mit Steckverbindungen realisiert.

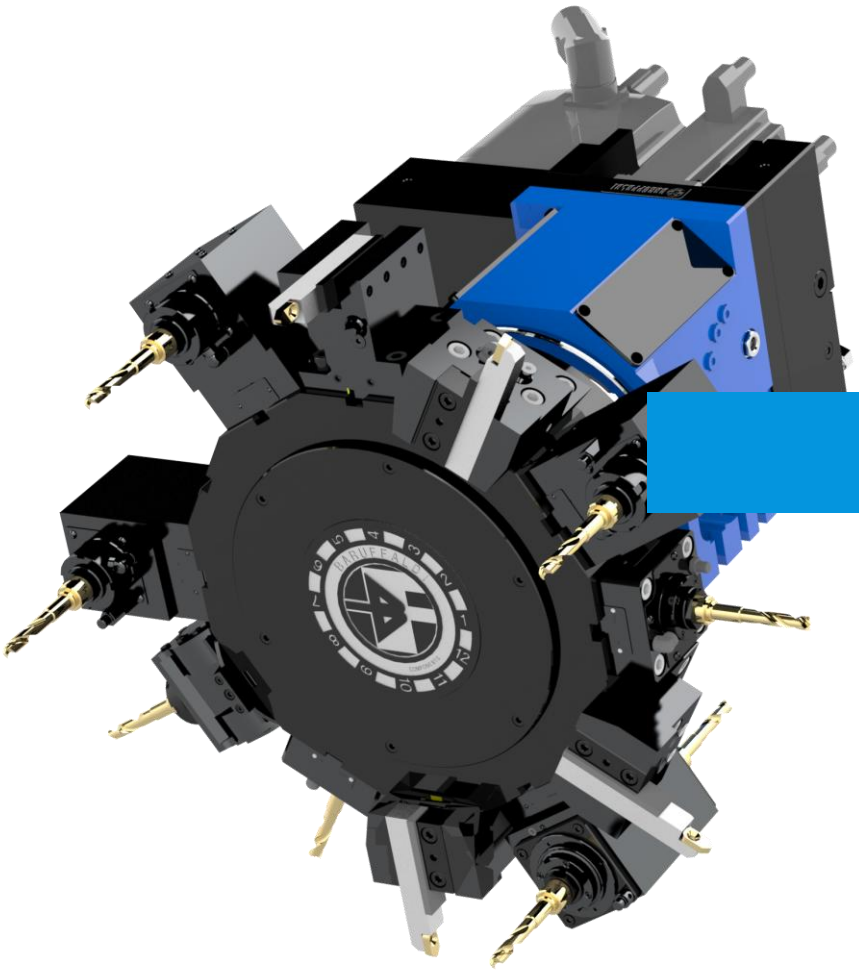
Le torrette **Leonardo** sono state progettate per un'**installazione rapida e semplice**.

Tutti i **collegamenti elettrici** vengono realizzati tramite **connettori a innesto**.



TCMA Turrets - ServoDrive connections
Anschluss Servo-Steuerung - Connessioni Servoazionamento





TCMR TURRETS

TCMR Turrets - Driven tool unit description

Funktionsbeschreibung - Descrizione motorizzata

In the TCMR (VDI and BMT types) the driven tool motor drives the **transmission belt**, **transmission shaft**, **bevel gears** and finally the turret **live tool clutch**.

In the TCMR the driven tool motor can also be mounted **Inline,** without using a belt transmission (only in the BMT version).

In the **TCMR BMT type**, the driven tool clutch (as per DIN1809 norm) must be oriented with the live tool motor and engages directly and automatically the tenon of the driven tools.

In the **TCMR VDI type**, the live tool clutch (Baruffaldi or DIN5480) is actuated by means of a hydraulic piston, integrated into the **turret driven tool group,** that engages and disengages automatically driven tools (as per ISO 10889 – ex DIN 69880).
The locking and unlocking status of the driven tool clutch is constantly monitored by **two inductive sensors.**

Beim TCMR-Revolver (VDI oder BMT) wird über einen **Riemenantrieb**, eine **Antriebswelle** sowie **zwei Kegelräder** die Werkzeugkupplung angetrieben.

Der Werkzeugantriebsmotor kann auch in Reihe (zur Antriebswelle) montiert werden, wodurch der Riemenantrieb entfallen kann.

Bei der **BMT-Ausführung** (nach DIN1809) muss die Werkzeugkupplung über den Antriebsmotor ausgerichtet werden. Das Einkuppeln der Werkzeuge erfolgt anschließend automatisch.

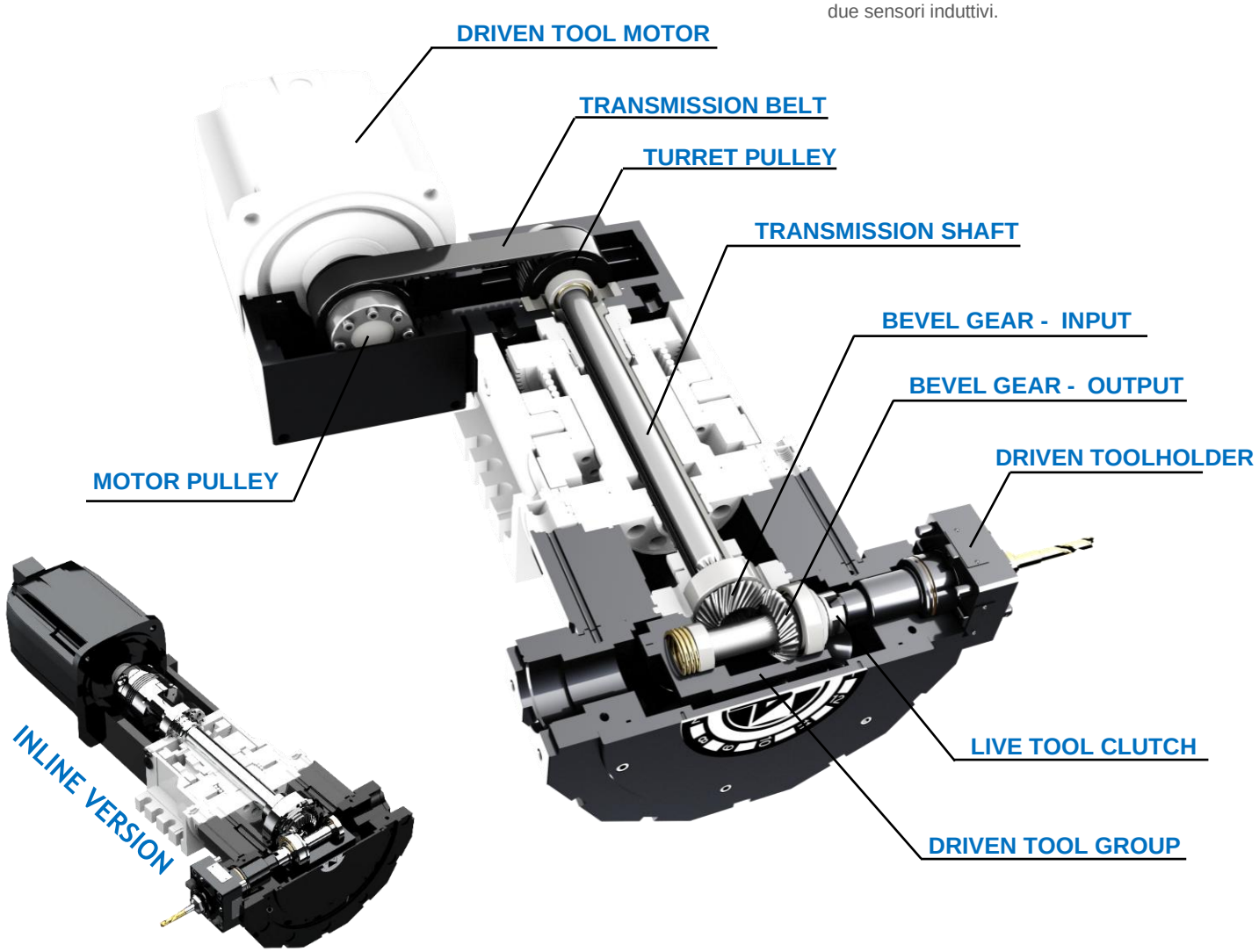
Bei der **VDI-Ausführung** (ISO 10889/DIN 69880; Kupplungstyp Baruffaldi oder DIN5480) wir die Werkzeugkupplung über einen **integrierten, hydraulischen Kolben** betätigt.
Der Schaltzustand der Werkzeugkupplung wird dabei permanent von **zwei Sensoren** überwacht.

Nelle torrette TCMR (di tipo VDI e BMT), il motore dell'utensile motorizzato aziona la cinghia di trasmissione, l'albero di trasmissione, gli ingranaggi conici e l'innesto presa di moto.

Il motore dell'utensile motorizzato può anche essere montato in versione Inline, senza utilizzare una trasmissione a cinghia (solo nella versione BMT).

Nelle TCMR di tipo BMT, la presa di moto (secondo la norma DIN 1809) deve essere orientata con il motore dell'utensile motorizzato e si innesta direttamente e automaticamente con il tenone degli utensili motorizzati.

Nelle TCMR di tipo VDI, la presa di moto (Baruffaldi o DIN 5480) è azionata mediante un pistone idraulico, integrato nel gruppo utensile motorizzato della torretta, che innesta e disinnesta automaticamente gli utensili motorizzati (secondo la norma ISO 10889 – ex DIN 69880). Lo stato di bloccaggio e sbloccaggio della frizione dell'utensile motorizzato è costantemente monitorato da due sensori induttivi.



TCMR VDI Turrets - Driven Tool Unit Technical Data

VDITechnische Daten – Dati Tecnici VDI

TURRET size Baugröße / Taglia torretta		**TCMR 160**	**TCMR 200**	**TCMR 250**
VDI size VDI-Größe / Taglia VDI		30	34 - 40	40 - 50
Max speed of driven tool (forced lubrication version)* Max. Drehzahl Werkzeugantrieb (m. Zusatz-Kühlung)* Velocità massima motorizzazione (lubr.forzata)*	**rpm**	*10.000*		*7.500*
Max speed of driven tool (standard) Max. Drehzahl Werkzeugantrieb (standard) Velocità massima motorizzazione (standard)		6000	5000	
Max input torque** Max. Eingangsdrehmoment** / Massima coppia in entrata**	**Nm**	*28*	*70*	*80*
Max nominal input torque (S1) Max. Eingangsnenndrehmoment (S1) / Massima coppia nominale (S1)		20	50	55
Max nominal power Max. Nennleistung / Massima Potenza nominale	**kW**	6	9	10
Ratio: rpm Motor: rpm take power Übersetzung Motor zu Werkzeugkupplung Rapporto: Giri/min Motore: giri/min presa di moto		1:1	1:1	1:1
VDI Live Tooling System VDI-Schnittstellen / Sistema innesto motorizzato		Baruffaldi (standard) - DIN5480 (on request) ***		

TCMR BMT Turrets - Driven Tool Unit Technical Data

BMT Technische Daten – Dati Tecnici BMT

TURRET size Baugröße / Taglia torretta		**TCMR 160**	**TCMR 200**	**TCMR 250**
BMT size BMT-Größe / Taglia BMT		30	30 - 40	40 - 50
Max speed of driven tool (forced lubrication version)* Max. Drehzahl Werkzeugantrieb (m. Zusatz-Kühlung)* Velocità massima motorizzazione (lubr.forzata)*	**rpm**	*10.000*		*7.500*
Max speed of driven tool (standard) Max. Drehzahl Werkzeugantrieb (standard) Velocità massima motorizzazione (standard)		6000	5000	
Max input torque** Max. Eingangsdrehmoment** / Massima coppia in entrata**	**Nm**	*28*	*70*	*80*
Max nominal input torque (S1) Max. Eingangsnenndrehmoment (S1) / Massima coppia nominale (S1)		20	50	55
Max nominal power Max. Nennleistung / Massima Potenza nominale	**kW**	6	9	10
Ratio: rpm Motor: rpm take power Übersetzung Motor zu Werkzeugkupplung Rapporto: Giri/min Motore: giri/min presa di moto		1:1	1:1	1:1
Live Tooling System Schnittstellen / Sistema innesto motorizzato		BMT (standard)		

*Application need to be discussed and analyzed with Baruffaldi technical/sales office

**Die Anwendung muss mit dem technischen/verkaufsseitigen Büro von Baruffaldi besprochen und analysiert werden*

**L'applicazione deve essere discussa e analizzata con l'ufficio tecnico/commerciale di Baruffaldi*

**Max 20% working time in a 10min duty cycle

*** Maximale Einschaltdauer 20 % bei einem Arbeitszyklus von 10 Minuten*

***Massimo utilizzo 20% su ciclo di lavoro di 10min*

***Special tooling system only on request

**** Spezialsystem mit motorisiertem Kupplungsantrieb nur auf Anfrage*

****Sistema innesto motorizzato speciale solo su richiesta*

TCMR Turrets - Tool Discs Type

Arten von Werkzeughalterscheiben - Tipi dischi portautensili

The Linea Leonardo Turrets might be equipped with several Tool Holders Discs type:

Die Werkzeugrevolver der Leonardo-Line können mit unterschiedlichsten Werkzeugscheiben ausgerüstet werden:

Le torrette Linea Leonardo possono essere equipaggiate con diversi tipi di dischi portautensili:



VDI Radial Discs
VDI-Radialscheiben / Disco radiale VDI

BMT Radial Discs
Radial-Scheiben für BMT / Disco Radiale BMT



Other tool discs or other solutions are available on request, please contact our sales office (sales.mtc@baruffaldi.it or check our tool disc catalog.

Weitere Ausführungen sind auf Anfrage erhältlich. Kontaktieren Sie einfach unser Vertriebsbüro (sales.mtc@baruffaldi.it) oder beachten Sie unseren separaten Scheiben-Katalog.

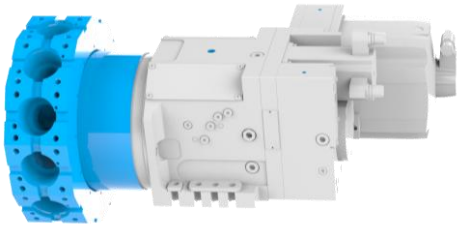
Altri dischi Portautensili o altre soluzioni sono disponibili su richiesta, si prega di contattare il nostro ufficio vendite (sales.mtc@baruffaldi.it o consultare il nostro catalogo di dischi per utensili.



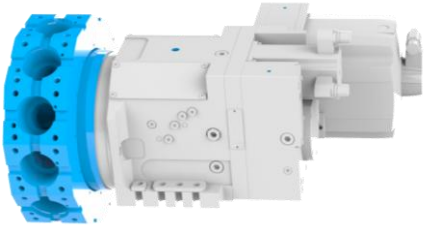
TCMR Turrets - Neck lenght extension

Längenausführungen - Collo torretta

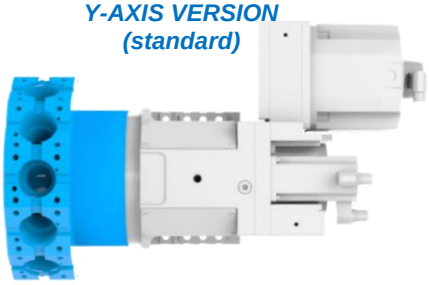
BACK MACHINING VERSION (standard)



SHORT NECK VERSION (standard)



Y-AXIS VERSION (standard)



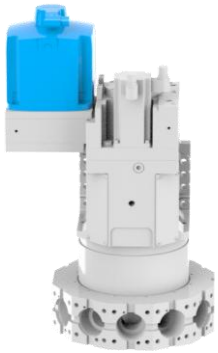
TCMR Turrets - Motor position configuration

Position Werkzeugantriebsmotoren - Posizione Motore motorizzazione

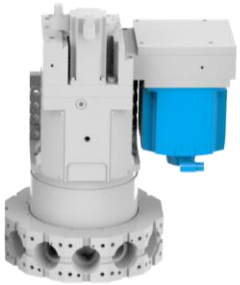
RIGHT (standard)



LEFT (standard)



SCORPION RIGHT (on request)



SCORPION LEFT (on request)



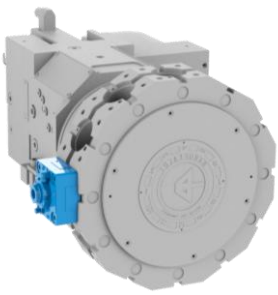
INLINE (on request)



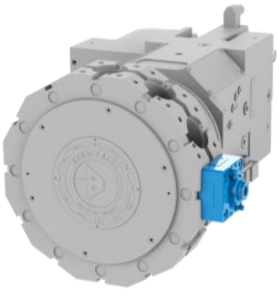
TCMR Turrets - Working position

Arbeitspositionen - Posizione di lavoro

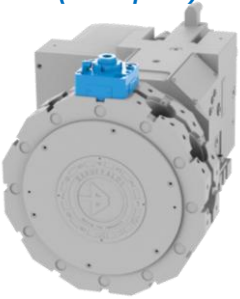
LEFT (standard)



RIGHT (standard)



TOP (on request)



LEFT 30° (on request)

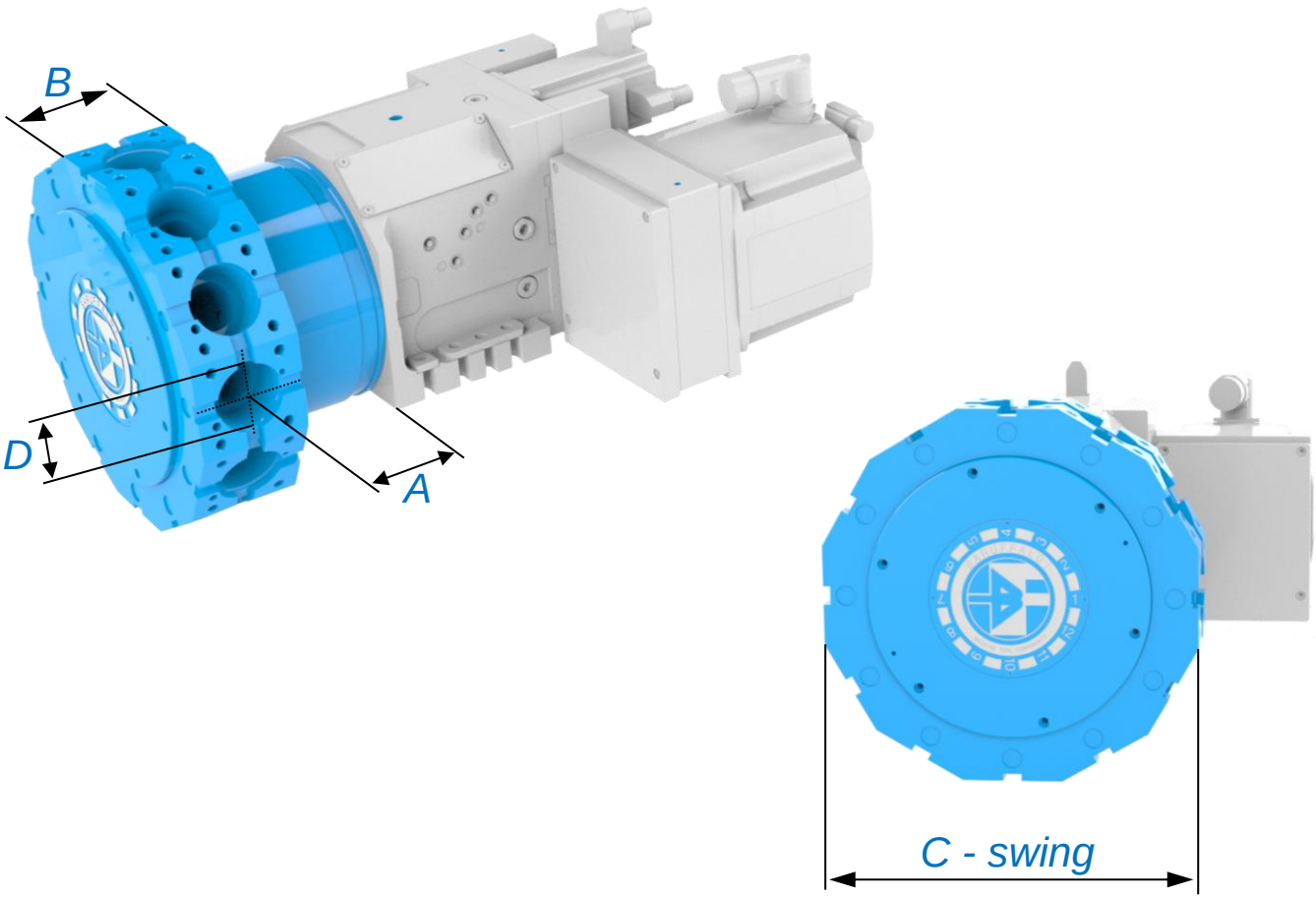


RIGHT 30° (on request)



TCMR Turrets - Driven Tool Configuration

Ausführungen Werkzeugantrieb - Configurazione Motorizzata



Turret Revolvertyp Torretta	**Tooling Type** *Werkzeug-schnittstelle* *Tipo Utensile*	**N° of division** *Anzahl Werkzeuge* *Numero di posizioni*	**D** **Tool size** *Werkzeug-Größe* *Taglia Portautensile*	**A** **Turret Neck** *Hals-LängePortau* *Collo torretta*	**B** **Disc Width** *Scheibendicke* *Spessore disco*	**C** **Disc Swing** *Schwingkreise* *Chiave disco*
TCMR 160	**BMT**	12	45	100	90	290
		12	45	160	90	290
		12	55	100	100	320
		12	55	160	100	320
	VDI	12	30	100	70	270
		12	30	160	70	270
TCMR 200	**BMT**	12	55	105	100	350
		12	55	175	100	350
		12	65	105	110	365
		12	65	175	110	365
	VDI	12	40	105	85	320
		12	40	175	85	320
TCMR 250	**BMT**	12	65	125	110	365
		12	65	250	110	365
		12	75	125	125	430
		12	75	250	125	430
	VDI	12	50	125	100	380
		12	50	250	100	380

Other versions are available on request, please contact our sales office: sales.mtc@baruffaldi.it

Andere Ausführungen auf Anfrage erhältlich. Kontaktieren Sie hierzu unser Vertriebsbüro: sales.mtc@baruffaldi.it

Altre versioni sono disponibili su richiesta, si prega di contattare il nostro ufficio vendite: sales.mtc@baruffaldi.it

TCMR Turrets - Driven Tool Motor

Werkzeugantriebsmotoren - Motore motorizzazione

The driven tool motors applied to the TCMR turrets should comply with the following specifications:
- Size, power and torque admitted by the turret specifications
- Motor form **V1/V3** for vertical installation position (DIN 42950)
- Motor form **B5 (with flange)** for horizontal installation position (DIN 42950)
- Construction Tolerances according to **DIN 42955-R**
- Vibration level **R**
- Motor with seal on the shaft (the motor shaft is in an area with lubrication oil of the driven tool)

Coupling between motor and turret is achieved by means of an hub (key shaft motor) or by clamping pinion (plain motor shaft)

Die verwendeten Werkzeugantriebsmotoren sollten den folgenden Anforderungen entsprechen:
- Größe, Leistung und Drehmoment gemäß den zulässigen Werten des Revolvers
- Motorenbauform **V1/V3** für vertikalen Einbau (DIN42950)
- Motorenbauform **B5** (mit Flansch) für horizontalen Einbau, DIN 42950)
- Toleranzklassen gemäß **DIN 42955-R**
- Vibrationsklasse **R**
- Motor mit Wellendichtung (Einsatz erfolgt in Bereichen mit Kontakt zu Schmieröl)

Der Anschluss der Motorwelle an den Revolver kann über eine Passfeder-Verbindung oder ein Klemmelement erfolgen

I motori utilizzati sulle torrette TCMR devono essere conformi alle seguenti specifiche:
- Taglia, potenza e coppia secondo le specifiche delle torrette
- Forma motore V1/V3 per installazioni verticali (DIN 42950)
- Forma motore B5 (con flangiatura) per installazioni orizzontali (DIN 42950)
- Tolleranze costruttive secondo DIN 42955-R
- Livello di vibrazione R
- Motore con guarnizione sull'albero (l'albero motore è a contatto con olio di lubrificazione del gruppo motorizzato)

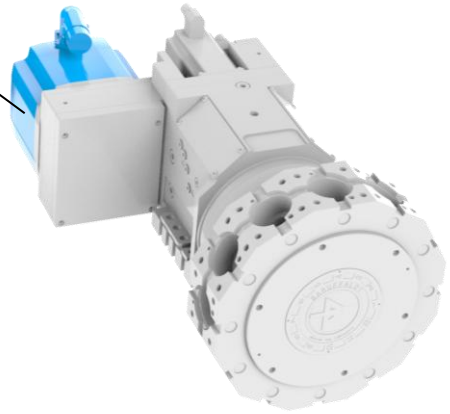
L'accoppiamento tra albero motore e torrette è fatto da un pignone (per motori con albero con chiavetta) o tramite pignone a calettatori (per motori con albero liscio).



With key / mit Passfeder / con chiavetta



Plain (no key) / glatte Welle / senza chiavetta



Turret TCMR	**Continuos torque (S1)*** *Drehmoment (S1)** *Coppia nominale (S1)** **Nm**	**Indication of Drive Tool Motor **** *Motortyp Werkzeugantrieb*** *Motori utensil motorizzati indicativi **
160	20	Fanuc α 2
		Fanuc αis 12/22
		Siemens 1PH8 083
		Siemens 1FT7 084/086
		Fanuc α 2
		Fanuc αis 12/22
		Siemens 1PH8 083
		Siemens 1FT7 084/086
200	50	Fanuc α 3
		Fanuc αis 30/40
		Siemens 1PH8 83/87
		Siemens 1FT7 082/084/086
		Fanuc α 6/8
		Fanuc αis 30/40
		Siemens 1PH8 103/105
		Siemens 1FT7 102/105
250	55	Fanuc α 6/8
		Fanuc αis 30/40
		Siemens 1PH8 103/105
		Siemens 1FT7 102/105

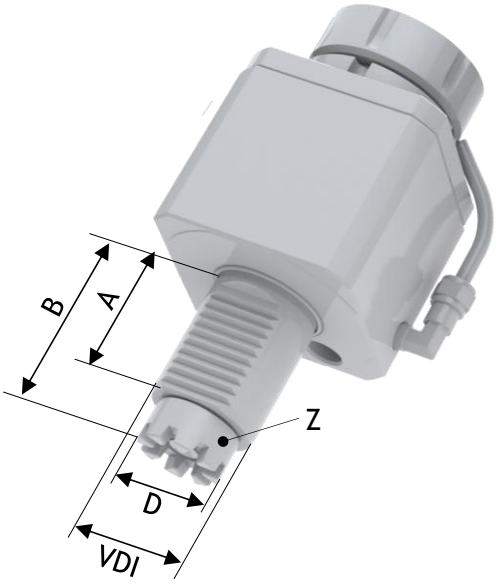
*The max input turret torque, into the driven tool unit, cannot exceed the 20% of the nominal torque indicated
**Das in die Werkzeugantriebseinheit abgegebene Drehmoment darf den angegebenen Nennwert um nicht mehr als 20% überschreiten*
**La coppia massima in entrata sulla motorizzata della torretta può eccedere massimo il 20% del valore di coppia nominale indicato*
**The motor indication is only a reference, in case of order please contact and discuss it with our sales office
***Die Angabe der Motortypen erfolgt nur zur beispielhaften Orientierung. Bitte sprechen Sie die finale Auswahl mit unserem Vertriebsbüro ab.*
***L'indicazione del motore è solo come referenza, in caso di ordine contattare e discuterne con il nostro Ufficio commerciale*

TCMR Turrets - Driven Tool Coupling

Werkzeugkupplungen - Tipi di presa di moto



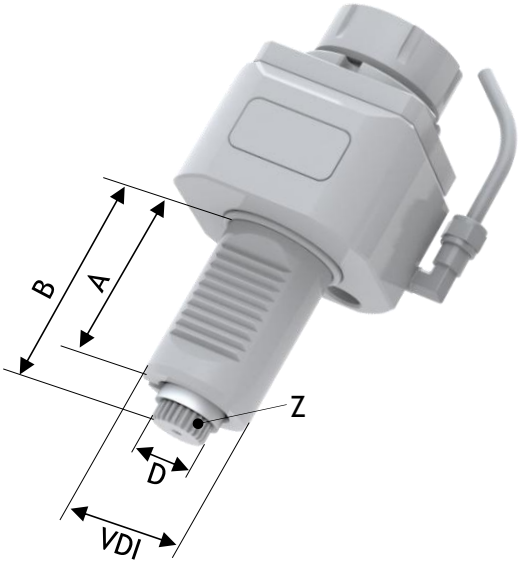
Live tool clutch - BARUFFALDI				
VDI	A	B	D	Z
20	35	44	19	6
30	45/53	59	24	6
40	53	68	32	8
50	70	84	40	8
60	83	100	43	8





Live tool clutch - DIN 5480*					
VDI	A	B	D	E	Z
20	35	51	10.8	W11x0.8	12
25	48	57	13.8	W14x0.8	16
30	55	67	15.8	W16x0.8	18
40	63	75	19.8	W20x0.8	24
50	78	93	23.8	W24x1.25	18

*only on request



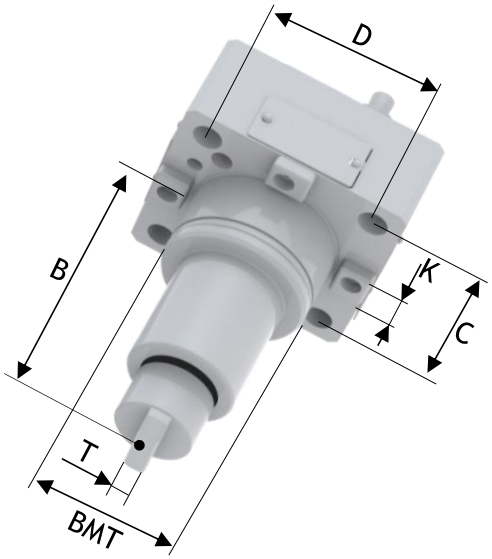


Live tool clutch - DIN 5482*					
VDI	A	B	D	E	Z
30	45	55	14.5	W15X12	8
40	53	63	16.5	W17X14	9
50	78	93	19.5	W20X17	12
60	94	108	24.5	W25x22	14

*only on request



Live tool clutch - BMT					
BMT	B	T	K	C	D
45	84	6	15	58	58
55	104	8	18	64	64
65	112	10	18	70	73
75	110	14	25	90	90
85	140	16	25	100	100



TCMR Turrets - Loading Capacity

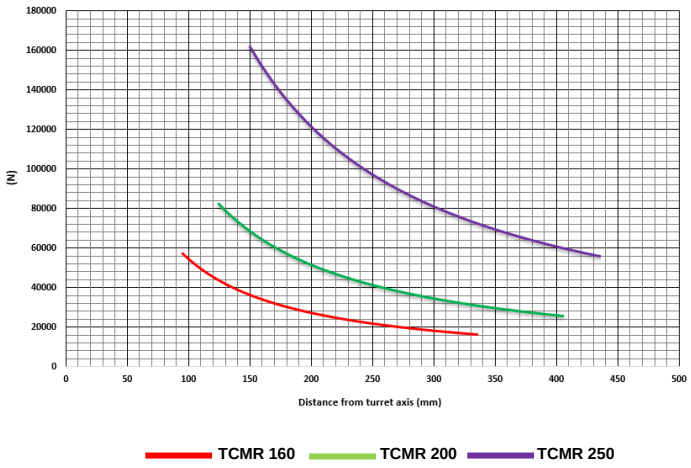
Zulässige Belastungen - Capacità di carico

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

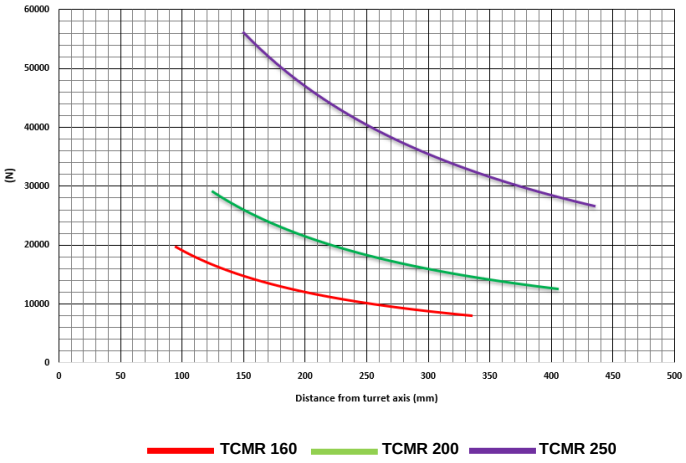
Die nachfolgenden Diagramme beziehen sich auf die zulässigen Belastungen auf die Werkzeugscheibe.

I seguenti diagrammi si riferiscono alle forze applicate al disco portautensili. Per la capacità di carico dei portautensili statici, fare riferimento alla scheda tecnica del produttore.

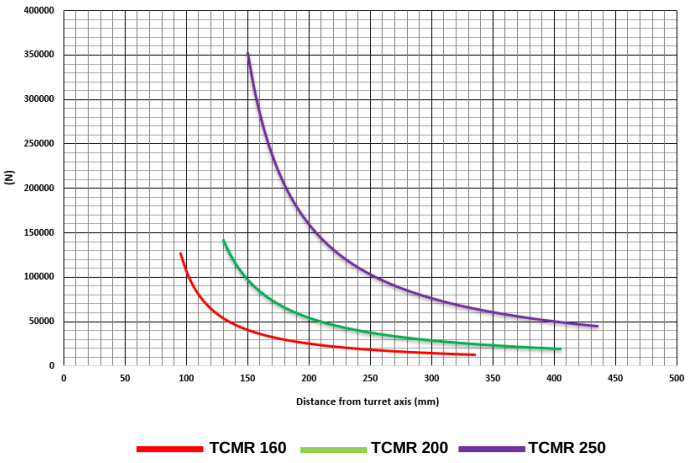
F / F1 - Tangential

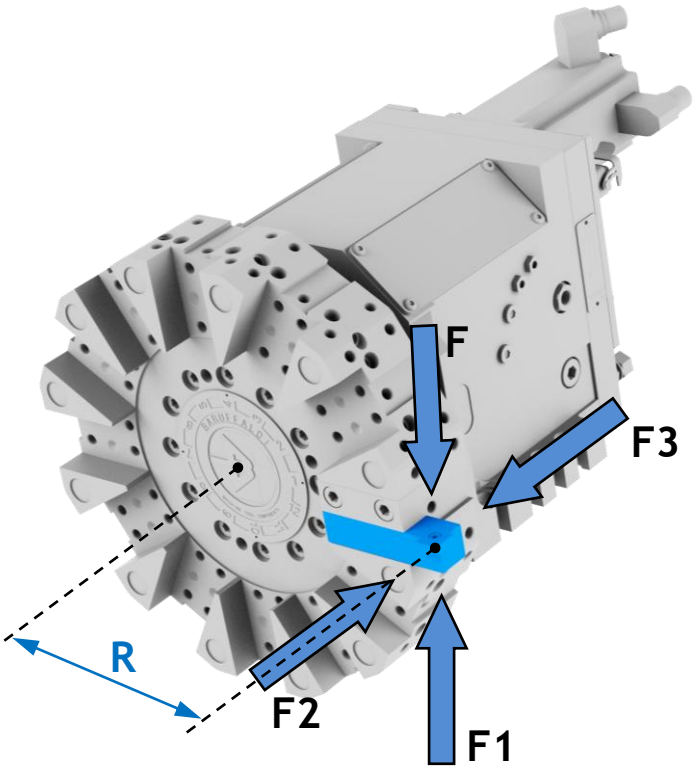


F2 - To Push



F3 - To Lift





TCMR Turrets - Ordering Code

Produktcode - Codice ordine

WORKING POSITION Arbeitsposition Posizione di lavoro	Code
RIGHT *Rechts* *Destra*	**R**
LEFT *Links* *Sinistra*	**L**

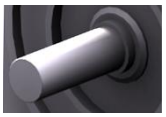
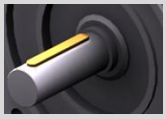
TURRET SIZE Baugröße Taglia torretta	Code
TCMR 160	**16**
TCMR 200	**20**
TCMR 250	**25**

INDEXING MOTOR AND DRIVE Schwenkmotor und Steuerung Motore index e drive	Code
STANDARD MOTOR AND DRIVE BARUFFALDI *Standard – Mit Baruffaldi Schwenkmotor und Steuerung* *Motore e drive standard Baruffaldi*	**0**
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR SIEMENS MOTOR 1FK7-042 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Siemens 1FK7-042* *Senza motore e drive Baruffaldi, predisposta per motore Siemens 1FK7-042*	**2**
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR FANUC MOTOR Alpha Is 4/5000 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Fanuc Alpha Is 4/5000* *Senza motore e drive Baruffaldi, predisposta per motore FANUC Alpha Is 4/5000*	**3**
WITHOUT MOTOR AND DRIVE BARUFFALDI *Ohne Baruffaldi Schwenkmotor und Steuerung* *Senza motore e drive Baruffaldi*	**4**
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR CUSTOMIZED MOTOR *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Kunden-Motor* *Senza motore e drive Baruffaldi, predisposta con kit motore speciale*	**5**

VERSION Version Versione	Code
REFER TO THE DRAWINGS *Gemäß Zeichnungsnr.* *Fare riferimento ai disegni*	*****
MORE VERSIONS ARE AVAILABLE ON REQUEST *Zahlreiche Varianten auf Anfrage verfügbar* *Altre versioni sono disponibili su richiesta*	

TURRET TYPE Revolvertyp Tipo torretta	Code
TCMR VDI	**LR**
TCMR BMT	**LB**

N° OF DIVISIONS Anzahl Positionen Numero di divisioni	Code
8/12	**0**
8	**1**
12	**2**
16	**3**
24	**5**

DRIVEN MOTOR SHAFT TYPE Wellen-Typ Werkzeugantriebsmotor Tipo albero motore per utensili mot.		Code
WITHOUT KEY *Ohne Passfeder* *Senza chiavetta*		**0**
WITH KEY *Mit Passfeder* *Con chiavetta*		**1**

K ☐☐ . ☐ ☐☐ ☐ . ☐ ☐ ☐ ☐☐ ☐ ☐ . ☐☐ ■

TOOL DISC Werkzeugscheibe Disco portautensili	Code
WITHOUT TOOL DISC *Ohne Werkzeugscheibe* *Senza disco*	**0**
WITH TOOL DISC *Mit Werkzeugscheibe* *Con disco*	**A LETTER ACCORDING TO DISC TYPE** **Ausführung gemäß Buchstaben-Code** **Una lettera a seconda della tipologia di disco**

NECK EXTENSION Längenausführungen Collo Torretta	Code
SHORT NECK *Kurzer Hals* *Collo corto*	**S**
LONG NECK *Langer Hals* *Collo lungo*	**L**

DRIVEN MOTOR BRAND AND TYPE Ausführung Werkzeugantriebsmotor Tipo e marca motore utensile mot.	Code
*****	**A LETTER ACCORDING TO THE MOTOR TYPE AND BRAND** **Buchstaben-Code gemäß Motorenausführung** **Una lettera a seconda del tipo e marca motore**

VARIOUS Ausführungen Varie	Code
Forced Lubrication *Zusatzschmierung* *Lubrificazione forzata*	**F**
Forced Lubrication + High Speed *Zusatzschmierung + hohe Geschw.* ***Lubrificazione forzata + alta velocità***	**H**
High coolant pressure *Erhöhter Kühlmitteldruck* *Alta pressione refrigerante*	**P**
MQL (Minimum Quantity Lubrication) *MQL (Minimalmengenschmierung)* *MQL (Minima Quantità di Lubrificante)*	**M**

TURRET CONFIGURATION Revolver-Konfiguration Werkzeugantrieb		Code
WORKING POSITION **Arbeitsposition** **Posizione di lavoro**	**MOTOR POSITION** **Motorposition** **Posizione motore**	
RIGHT Rechts / Destra	LEFT Links - Sinistra	**1**
LEFT Links / Sinistra	RIGHT Rechts / Destra	**2**
RIGHT Rechts / Destra	RIGHT Rechts / Destra	**3**
LEFT Links / Sinistra	LEFT Links / Sinistra	**4**
RIGHT Rechts / Destra	TOP Oben / In alto	**5**
LEFT Links / Sinistra	TOP Oben / In alto	**6**
TOP Oben / In alto	LEFT Links / Sinistra	**7**
DOWN Offset unten / In basso	TOP Oben / In alto	**8**
TOP Offset oben / In alto	RIGHT Rechts / Destra	**9**

MORE CONFIGURATION ARE AVAILABLE ON REQUEST, CHECK AT PG. 37
Zusätzliche Ausführungen erhältlich, siehe auch Seite 37
Altre configurazioni sono disponbiili su richiesta, si veda pag. 37

TCMR Turrets - Driven Tool Duty Cycle (with standard lubrication)

Arbeitszyklen (mit Standardschmierung) - Ciclo utilizzo motorizzati (Lubr. standard)



Beim Betrieb eines Standard TCMR (ohne Zusatzschmierung) sind die nebenstehenden Betriebsdiagramme zwingend zu beachten und die Arbeitsprozesse entsprechend einzurichten.

Im Hinblick auf den Betrieb mit zunehmenden Geschwindigkeiten ist darauf zu achten, dass die Einsatzdauer entsprechend reduziert wird. Bitte ermitteln Sie hierzu den "k"-Wert (Verhältnis Arbeitsdrehzahl/Maximaldrehzahl) – siehe hierzu das nebenstehende Diagramm. Die beiden dargestellten Kurven umschreiben den Bereich für schwere und leichte Bearbeitungen. Bitte verwenden Sie einen Mittelschnittswert.

Die Leistungsdaten zu unseren Revolvern finden Sie im Kapitel zu den techn. Daten der TCMR -Typen. Für mehr Informationen kontaktieren Sie uns bitte direkt.

When operating live tools with the standard TCMR (without Oil Cooling) please consider *tool "torque/speed" diagram* and "*working time" reference diagram* (10 min.) shown below to adjust working parameters

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

Turret information on mechanical capabilities are indicated on chapter *"TCMR TURRETS – Driven Tool Unit technical data", for more info contact our Sales Office.*

Quando si utilizzano gli utensili motorizzati con la torretta standard TCMR (senza raffreddamento ad olio), è necessario considerare il diagramma "coppia/velocità" e il diagramma di riferimento del "tempo di lavoro" (10 minuti) riportati di seguito, al fine di regolare correttamente i parametri di lavorazione.

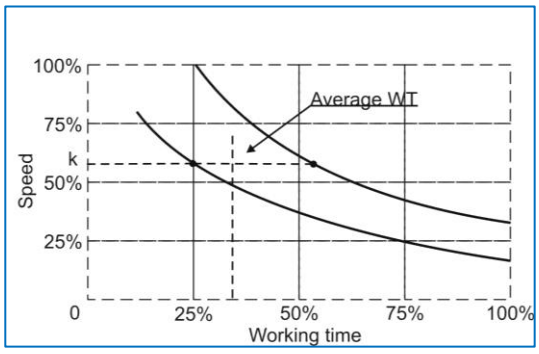
Per quanto riguarda la velocità, maggiore è la velocità, minore deve essere il tempo di lavoro consentito.

Una volta calcolato il parametro k come rapporto tra la velocità effettiva e la velocità massima, il tempo di lavoro può essere determinato dal grafico illustrato di seguito. La curva di sinistra corrisponde a una sollecitazione meccanica inferiore, mentre la curva di destra corrisponde a una sollecitazione meccanica superiore: si raccomanda di adottare un valore intermedio.

Le informazioni sulle capacità meccaniche della torretta sono indicate nel capitolo *"TCMR TURRETS – Dati tecnici unità utensili motorizzati".*
Per ulteriori informazioni, contattare il nostro Ufficio Vendite.

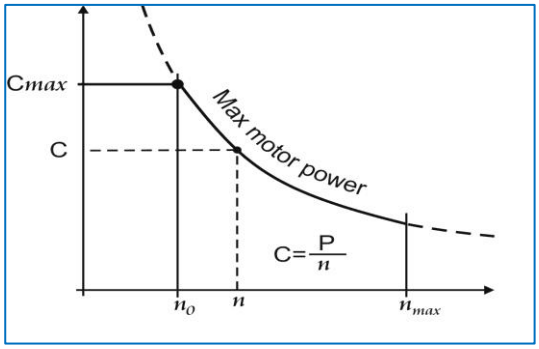
WORKING TIME REFERENCE DIAGRAM

Referenzdiagramm Einsatzdauer
Diagramma di riferimento Tempi di lavorazione

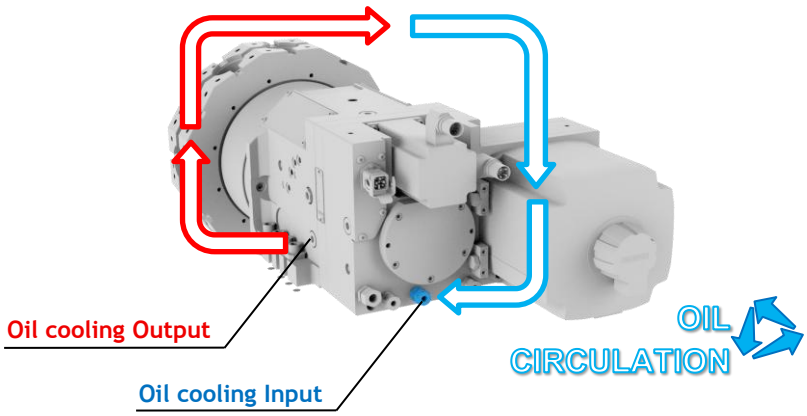


TOOL TORQUE/SPEED DIAGRAM

Diagramm Drehmoment/Drehzahl (Werkzeug)
Diagramma Coppia/Velocità



Also available: TCMR Oil Cooling Version for HIGH SPEED and 100% WORKING TIME



Special Application - High Coolant pressure

Kühlmittel-Hochdruck - Alta pressione refrigerante

The Leonardo Line turrets can be used as standard with a coolant pressure through the disc up to 35bar (1st stage) and on request can be upgraded up to 80bar (2nd stage).

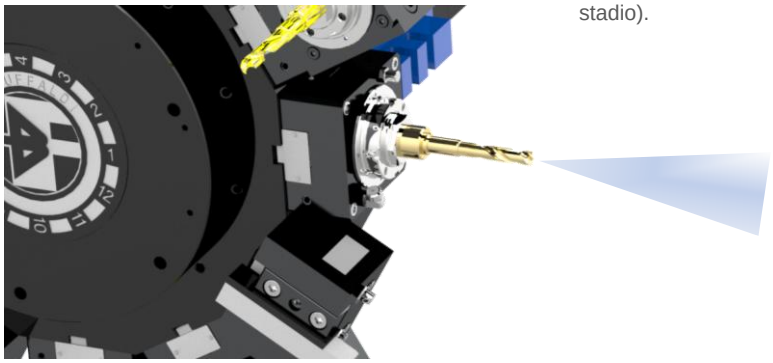
Baruffaldi has also developed a special solution that allows to reach coolant pressures even up to 120bar (3rd stage).

Die Revolver der Leonardo-Line können standardmäßig mit einem Kühlmitteldruck von 35bar über die Werkzeugscheibe betrieben werden. In einer zweiten Stufe ist ein Druck (optional) von 80 bar möglich.

Darüber hinaus sind in einer weiteren, dritten Stufe auch bis zu 120bar möglich.

Le torrette della Linea Leonardo possono essere utilizzate, in configurazione standard, con una pressione del refrigerante attraverso il disco fino a 35 bar (1° stadio) e, su richiesta, possono essere potenziate fino a 80 bar (2° stadio).

Baruffaldi ha inoltre sviluppato una soluzione speciale che consente di raggiungere pressioni del refrigerante fino a 120 bar (3° stadio).



120 bar

HIGH COOLANT PRESSURE

Special Application - MQL Minium Quantity Lubrication

Minimalmengenschmierung - Minima quantità di refrigerante

All the Turrets type TCMR can be used with MQL systems.
MQL is the acronym of **Minimum Quantity Lubrication** and consists in minimizing the use of coolant by spraying the mixture of **compressed air** and cutting fluid (**mineral oils or vegetable oils**) instead of flood cooling.
The advantages of this application are:

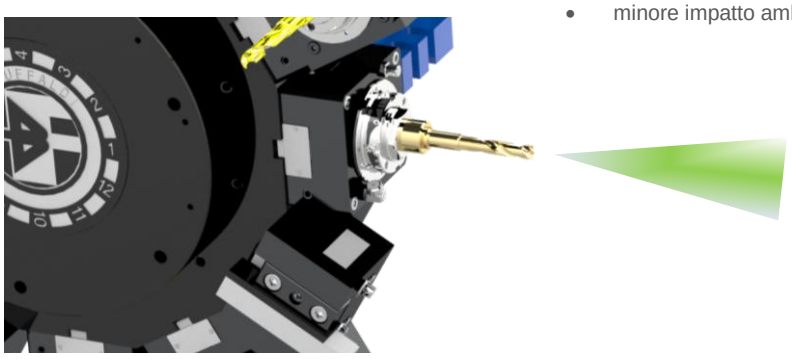
- reduced temperature of the cutting area
- better workpiece surface
- reduced tool wear
- reduced cutting forces
- lower impact in pollution

Alle Revolver der Leonardo-Line lassen sich mit einem MQL-System kombinieren.
Die Minimalmengenschmierung dient dazu den Einsatz von Kühlmittel auf ein Minimum zu reduzieren, indem ein zerstäubtes Luft-Öl-Gemisch (mineral. oder planz. Öl möglich) anstelle von herkömmlichem Kühlschmierstoff verwendet wird.
The advantages of this application are:

- Verringerte Temperaturen bei der Spanabhebung
- Bessere Oberflächengüte
- Geringerer Werkzeugverschleiß
- Reduzierte Schnittkräfte
- Niedrigere Umweltbelastung

Tutte le torrette di tipo **TCMR** possono essere utilizzate con sistemi **MQL**. **MQL** è l'acronimo di *Minimum Quantity Lubrication* (lubrificazione a quantità minima) e consiste nel **ridurre al minimo l'uso del refrigerante**, nebulizzando una **miscela di aria compressa e fluido da taglio** (oli minerali o vegetali) invece del tradizionale raffreddamento a getto continuo.
I vantaggi di questa applicazione sono:

- riduzione temperatura nella zona di taglio
- migliore finitura superficiale del pezzo
- minore usura dell'utensile
- riduzione delle forze di taglio
- minore impatto ambientale



M Q L

MINIMUM QUANTITY LUBRICATION

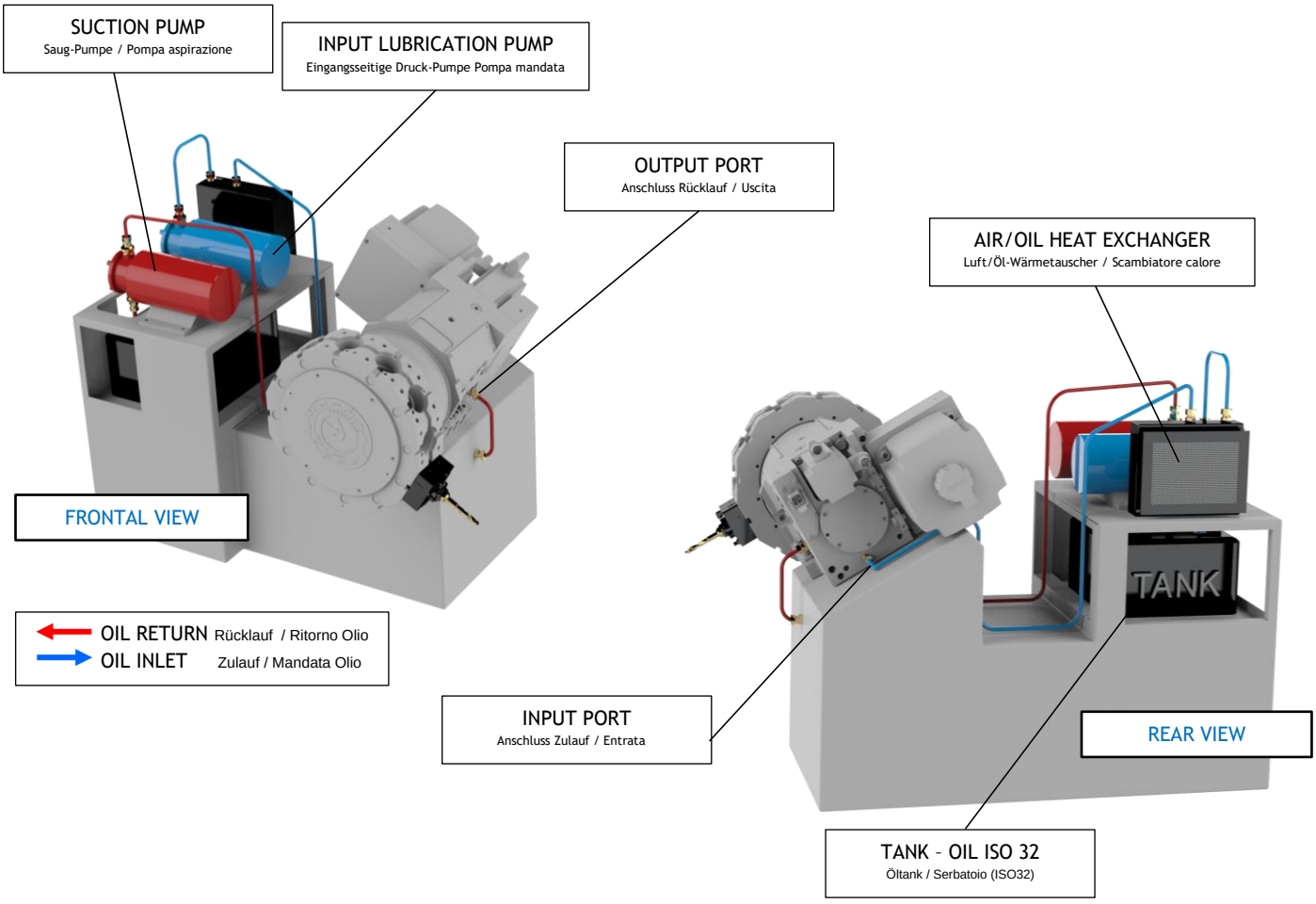
Special Application - Oil Cooling (High speed and continuous mode)

Zusatz-Ölkühlung - Lubrificazione a olio

The Leonardo Line is equipped as standard with an internal system to be upgraded on the machine, according to the final user request, with **Forced Lubrication.**
An Oil recirculation circuit applied to the turret allows Tool Driving at High Speed (up to **10.000 rpm***) in continuous mode (up to **100%**).
The turret is thus upgraded to a Milling Unit.

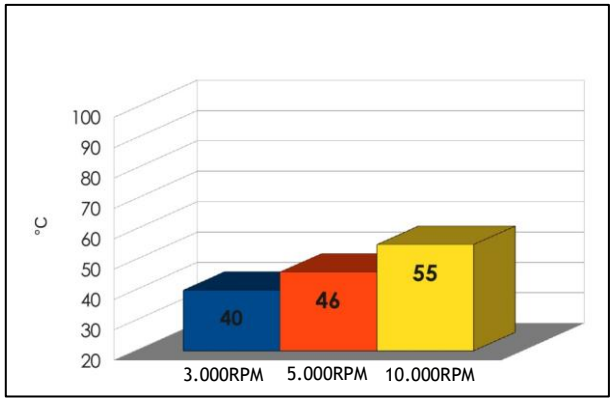
Die Revolver der Leonardo-Line sind standardmäßig mit einem zusätzlichen, internen Kreislauf für eine erweiterte Öl-Kühlung ausgestattet.
Eine von außen gesteuerte Öl-Zirkulation ermöglicht dabei hohe Geschwindigkeiten am angetriebenen Werkzeug (bis 10.000 U/min*) bei dauerhaftem Einsatz (bis zu ED 100%).
Der Revolver eignet sich somit auch für Fräsarbeiten.

La linea Leonardo è dotata di di un sistema interno di lubrificazione forzata, che può essere integrato sulla macchina in base alle esigenze dell'utente finale.
Un circuito di ricircolo dell'olio applicato alla torretta consente l'azionamento dell'utensile ad alta velocità (fino a 10.000 giri/min*) in modalità continua (fino al 100%).
La torretta diventa quindi un'unità di fresatura.



TURRET SIZE Baugröße / Taglia torretta		160-200-250
Flow Oil Rate (minimum) Min. Ölfluss / Flusso olio (min.)	l/min	1/1,5
Oil viscosity Öl-Viskosität / Viscosità olio	ISO VG	32
Filtering Filter / Filtraggio	µm	20
Input connection Anschluss Eingang /Connessione entrata	G"	1/8''
Output connection Anschluss Ausgang / Connessione uscita		1/8''

TEMPERATURE DIAGRAM / *TEMPERATUR DIAGRAMM*



*the speed depends about the turret size and application need to be discussed and analysed with Baruffaldi technical/sales office
*die Geschwindigkeit hängt vom Einsatzrahmen und der Revolvergröße ab. Weitere Informationen in Rücksprache mit Baruffaldi
*la velocità dipende dalle dimensioni della torretta e l'applicazione deve essere discussa e analizzata con l'ufficio tecnico/commerciale Baruffaldi

Special Application - Pressurizing Air system Changers)

Überdruck-System – Sistema di pressurizzazione

Every TCMR turret 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, consequently, avoid infiltration of coolant and/or other pollutants into the Turrets and its Driven Tool Unit.

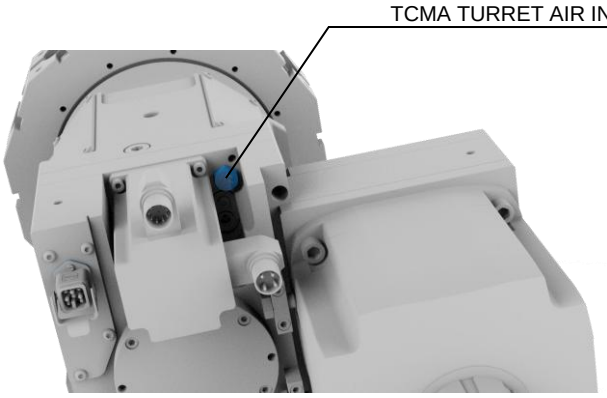
This function is recommended in case of machining of materials that create dust or high corrosion (bronze, aluminium, graphite, etc..)

Jeder Revolver der Leonardo-Line TCMR ist mit einer Überdruckfunktion ausgerüstet. Über eigene Anschlusspunkte kann das Innere des Revolvers mit Druckluft beaufschlagt werden und schützt diesen dabei vor eindringenden Verschmutzungen.

Der Einsatz dieser Funktion empfiehlt sich bei der Bearbeitung von staub- oder korrosionsverursachenden Werkstoffen (z.B. Bronze, Aluminium, Graphite etc.)

Tutte le torrette TCMR sono predisposte per la „“funzione di pressurizzazione“, che può essere adottata per prevenire la contaminazione di agenti esterni nell’area guarnizione della presa di moto e, di fatto, evitare infiltrazioni di refrigerante nella torretta e nella sua motorizzazione.

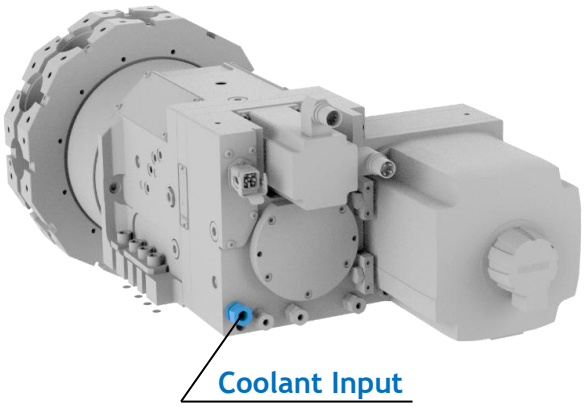
Questa funzione è consigliata in caso di lavorazioni su material ich ecreano polveri o con alto potere corrosivo (bronzo, alluminio, grafite, ecc.)



TURRET SIZE **Baugröße / Taglia torretta**		**160-200-250**
PRESSURE OF AIR INLET Luftdruck / Pressione Aria in entrata	bar	0,2/0,3
FILTERING Filter / Filtraggio	µm	20
TURRET CONNECTION Anschluss am Rev.gehäu. / Connessione Torretta	gas	1/2’’
LIVE TOOL CONNECTION Anschluss am Werkz.antr. / Connessione Motorizzata	gas	1/8’’

TCMR Turrets - Coolant connections

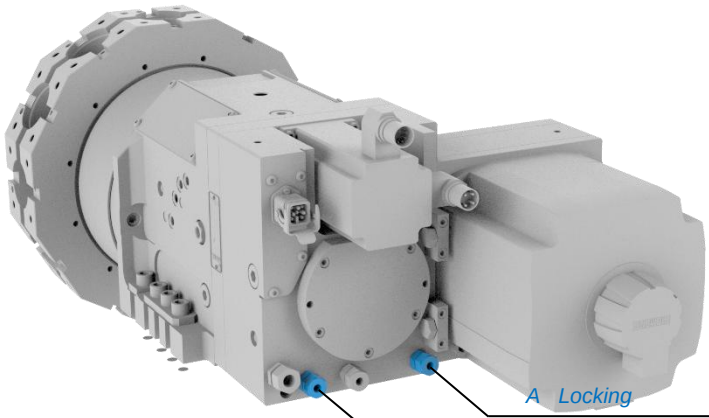
Kühlmittelanschlüsse - Connessioni refrigerante

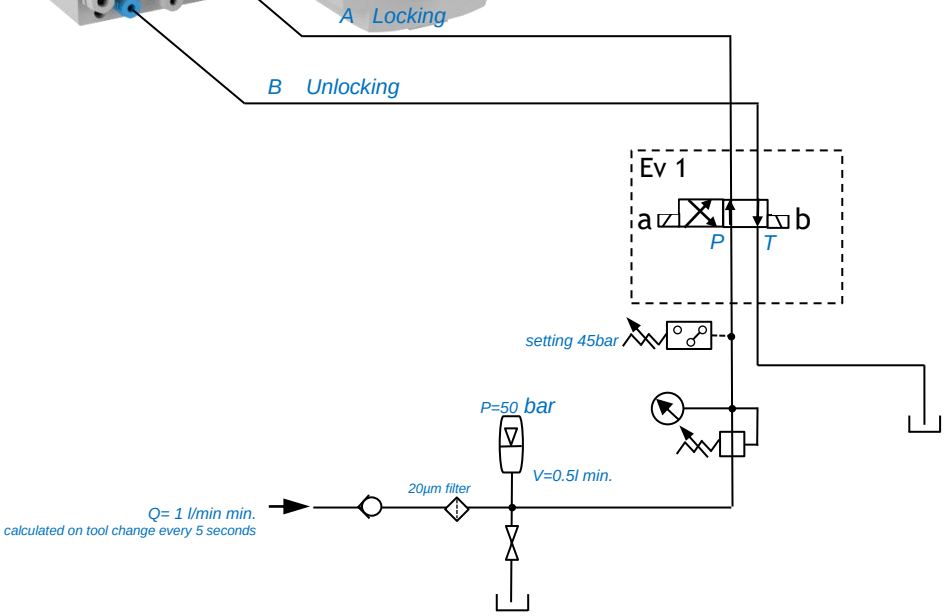


COOLANT CONNECTIONS Kühlmittelanschlüsse / Connessioni refrigerante		
TURRET SIZE Baugröße / Taglia torretta		160-200-250
INPUT CONNECTION Anschlussgröße / Connessioni di entrata	**G”**	1/2”
PRESSURE 1st Stage (standard) Kühlmitteldruck 1. Stufe (standard) / Press. 1o Stadio (standard)	**bar**	35
PRESSURE 2nd Stage (on request) Kühlmitteldruck 2. Stufe (a. Anfr.) / Press. 2o Stadio (su richiesta)		80
PRESSURE 3rd Stage (on request) Kühlmitteldruck 3. Stufe (a. Anfr.) / Press. 3o Stadio (su richiesta)		120
FILTERING Filter / Filtraggio	**µm**	20

TCMR Turrets - Hydraulic connections & Diagram

Hydraulikanschlüsse - Connessioni idrauliche





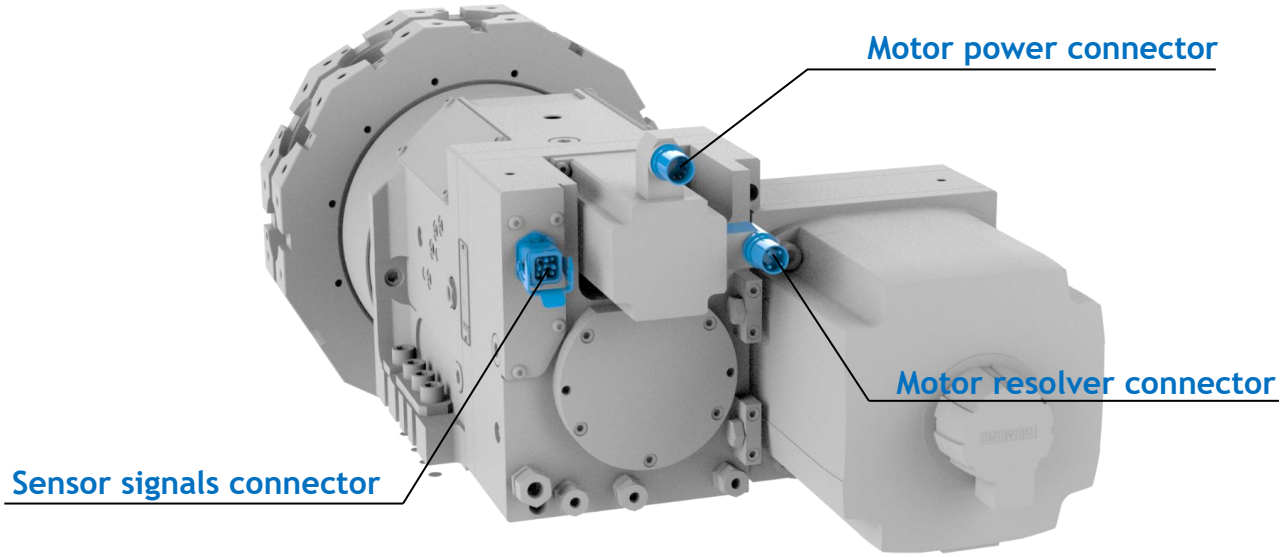
TCMR Turrets -Electrical connections

Elektrischer Anschluss - Connessioni elettriche

The Leonardo Line Turrets have been designed to be installed in a easy and quick way.
All electrical connections are plug-in with benefits in installation.

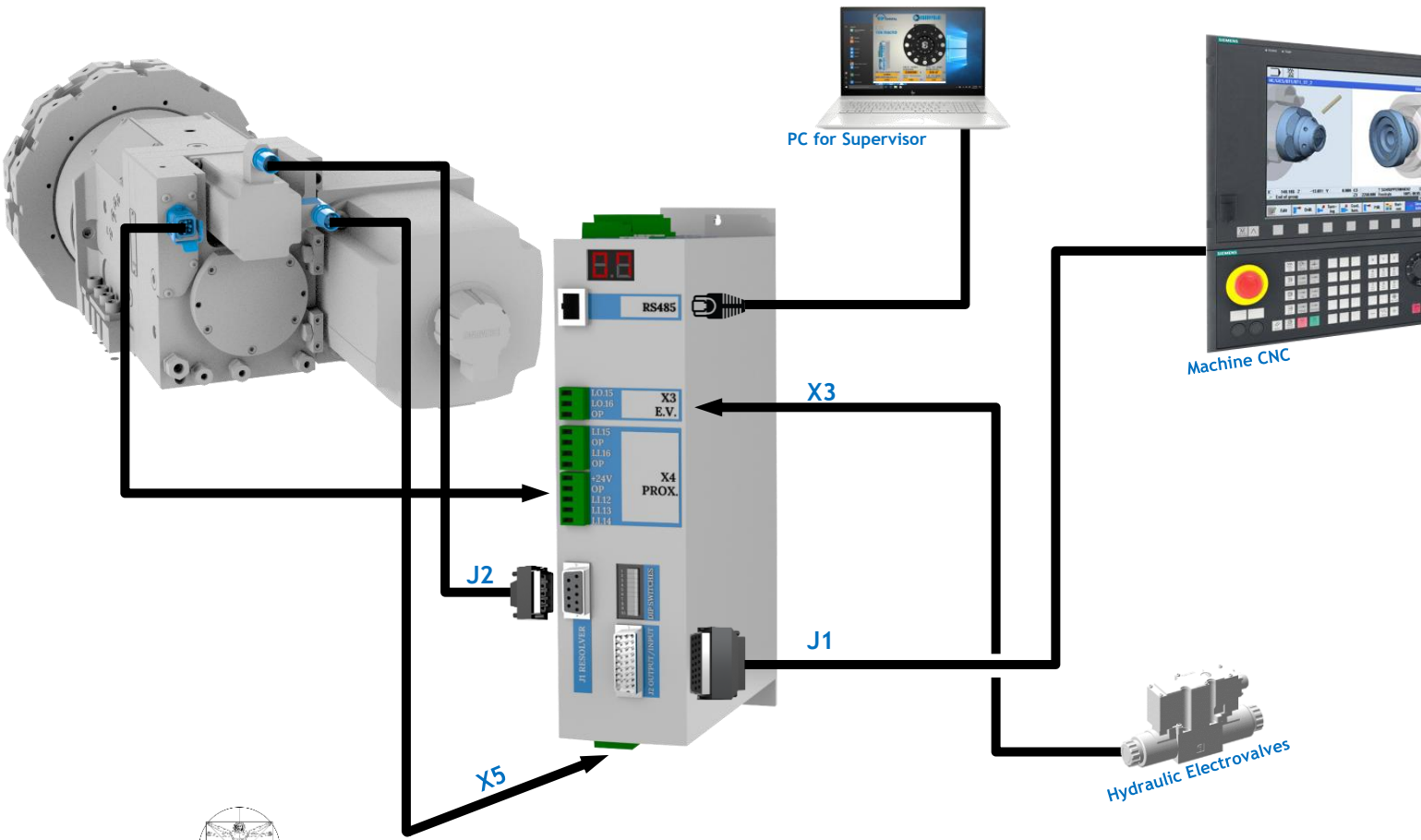
Die Leonardo-Revolver wurden für einen schnellen und einfach Einbau konzipiert
Alle elektrischen Anschlüsse werden mit Steckverbindungen realisiert.

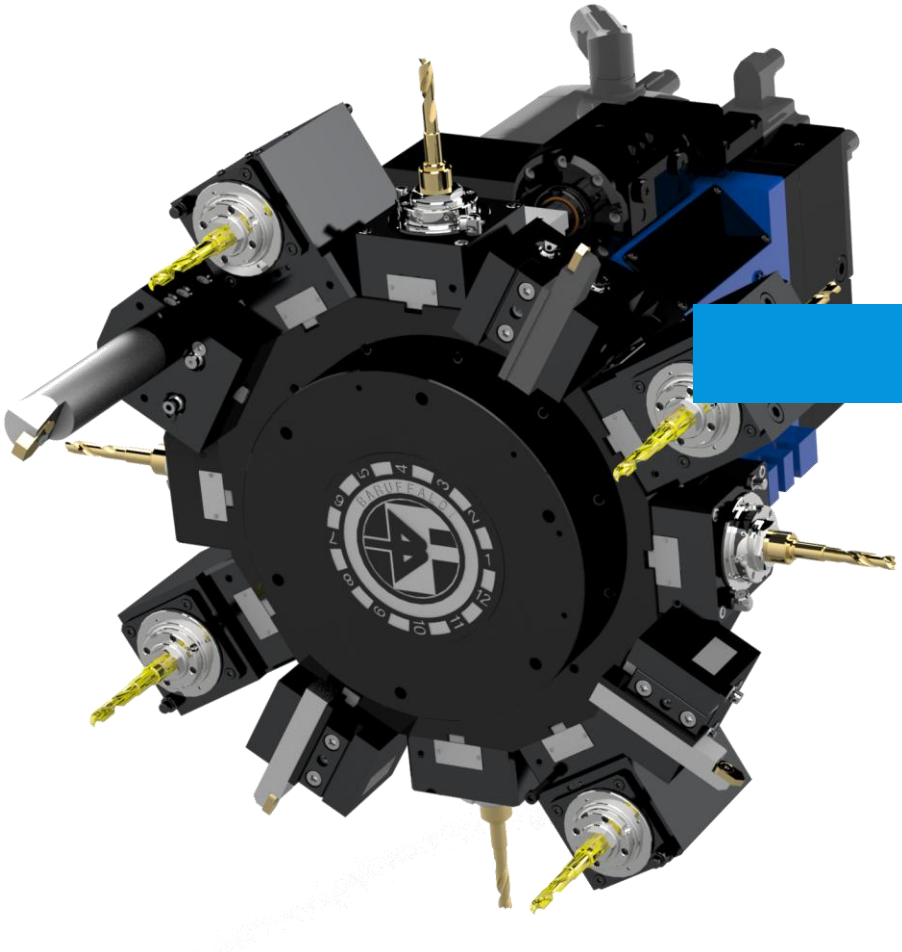
Le torrette **Leonardo** sono state progettate per un'**installazione rapida e semplice**.
Tutti i **collegamenti elettrici** vengono realizzati tramite **connettori a innesto**.



TCMR Turrets - ServoDrive connections

Anschluss Servo-Steuerung - Connessioni Servoazionamento





TCMQ TURRETS

TCMQ Turrets - for ATC machines (Automatic Tool Changers)

für automatisierbare Werkzeugwechsel - per sistemi ATC (Cambio utensile automatico)

The standard TCMR of Leonardo Line Turrets, can be equipped and upgraded with EPPINGER QUICKLOCK® becoming a TCMQ turret.

A special hydraulic actuator with an integrated drawbar, mounted on the top of the turret, drives the engagement and the disengagement of special keys into the turret tool disc.

These keys, when are inserted into the tool disc, automatically lock the toolholders in position without any movement during machining. In the same time when the keys are removed from the disc the toolholder is ready for the tool change.

Thus, the turret can be integrated in machines with ATC System (Automatic Tool Change) where the tool holders are automatically changed by a robot or by the operator.

Unsere Standard-TCMR-Revolver können optional mit dem EPPINGER QUICKLOCK®-System zu einem Revolver der TCMQ-Baureihe ausgerüstet werden.

Ein zusätzlicher Hydraulikkolben auf der Gehäuse-Oberseite führt dabei je Werkzeug ein Schubelement in die Werkzeugscheibe ein.

Das Schubelement sichert und spannt den Werkzeughalter zuverlässig und erlaubt somit auch anspruchsvollste Zerspanungsarbeiten. Durch erneutes Lösen des Schubelements wird der Halter wieder zum Austausch freigegeben.

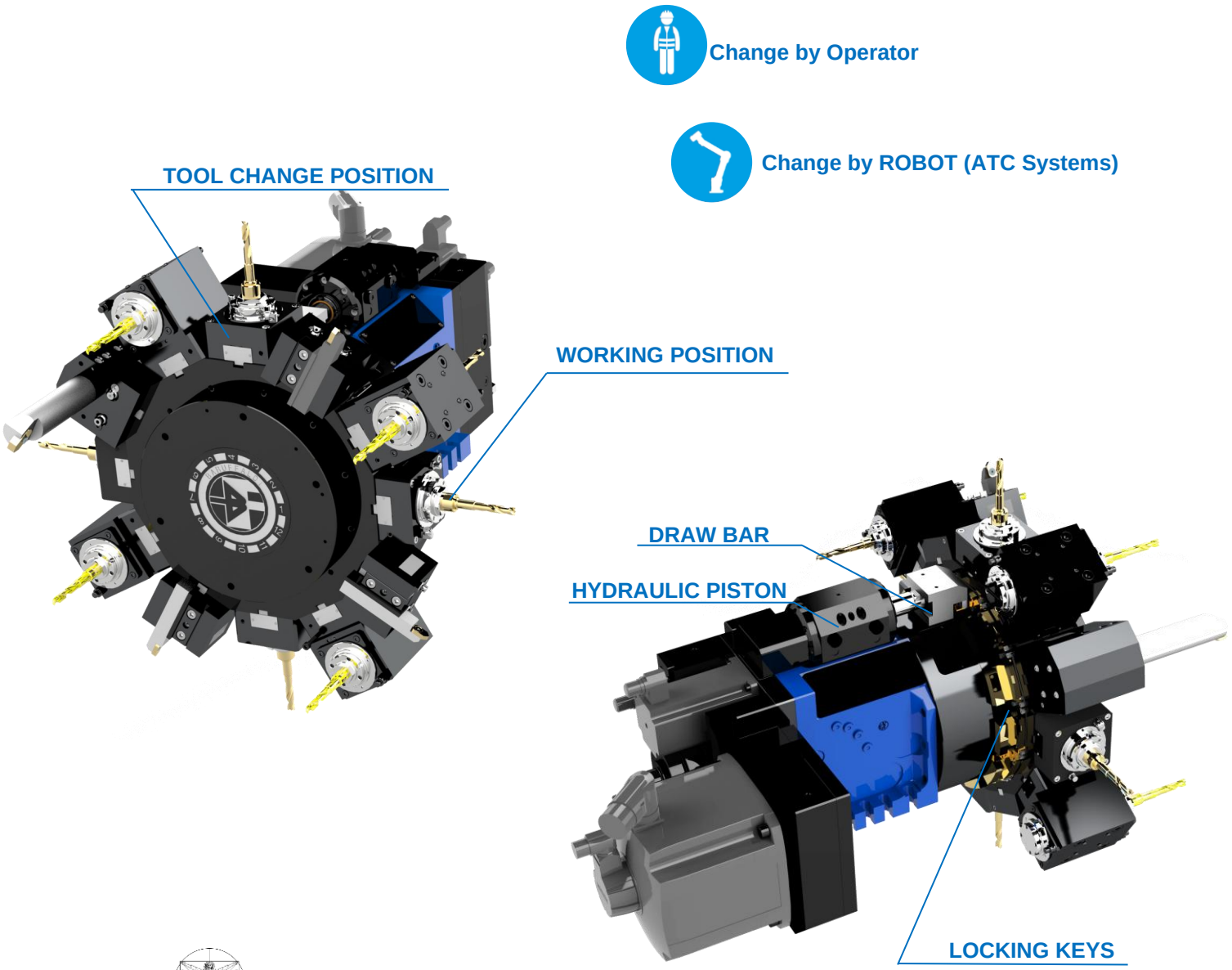
Der Revolver eignet sich daher ideal für die Einbindung in automatisierte Fertigungsprozesse mit hohen Anforderungen an kürzeste Werkzeugwechselzeiten. Dabei kann der Werkzeugtausch entweder durch einen Roboter oder einen Maschinenbediener durchgeführt werden.

Le torrette standard TCMR della linea Leonardo possono essere equipaggiate e aggiornate con il sistema EPPINGER QUICKLOCK®, diventando così torrette TCMQ.

Uno speciale attuatore idraulico con tirante integrato, montato sulla parte superiore della torretta, controlla l'innesto e il disinnesto di speciali cunei nel disco portautensili della torretta.

Quando questi cunei vengono inserite nel disco portautensili, i portautensili vengono automaticamente bloccati in posizione senza alcun movimento durante la lavorazione. Allo stesso tempo, quando i cunei vengono disinseriti dal disco, il portautensile è pronto per il cambio utensile.

In questo modo, la torretta può essere integrata in macchine dotate di sistema ATC (Automatic Tool Change), dove i portautensili vengono sostituiti automaticamente da un robot oppure manualmente dall'operatore.



TCMQ Turrets - for ATC machines (Automatic Tool Changers)

für automatisierbare Werkzeugwechsel - per sistemi ATC (Cambio utensile automatico)

Here below an explanation about the EPPINGER QUICKLOCK® working principal.

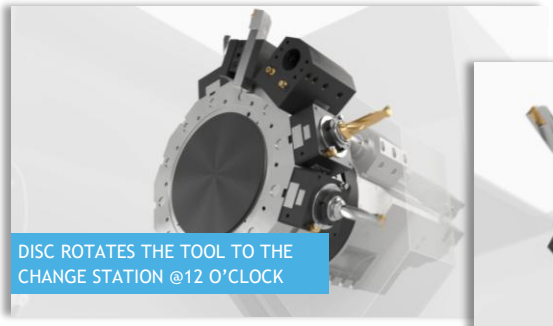
The TCMQ turret can be integrated with machines with ATC systems (Automatic Tool Change) where the tool holders are changed by a robot or with direct contorl of the operator.

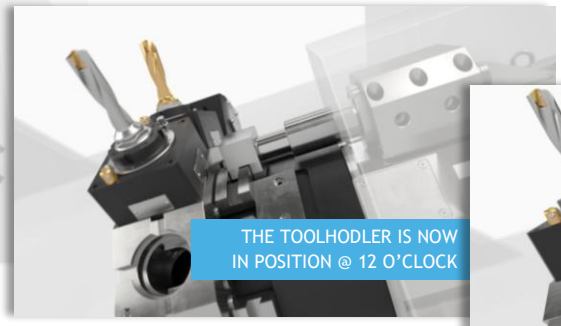
Nachfolgend finden Sie eine Erklärung des Funktionsprinzips des EPPINGER QUICKLOCK® Systems.

Die TCMQ-Revolvertrommel kann in Maschinen mit ATC-Systemen (Automatic Tool Change) integriert werden, bei denen die Werkzeughalter automatisch durch einen Roboter oder direkt durch den Bediener gewechselt werden.

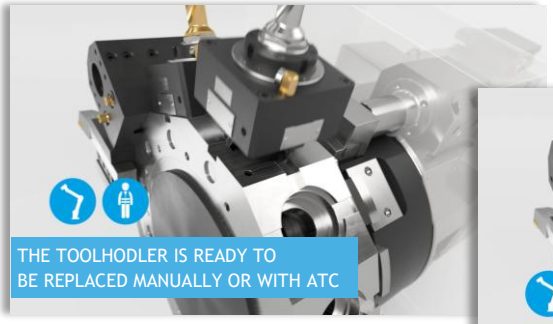
Di seguito è riportata una spiegazione del principio di funzionamento del sistema EPPINGER QUICKLOCK®..

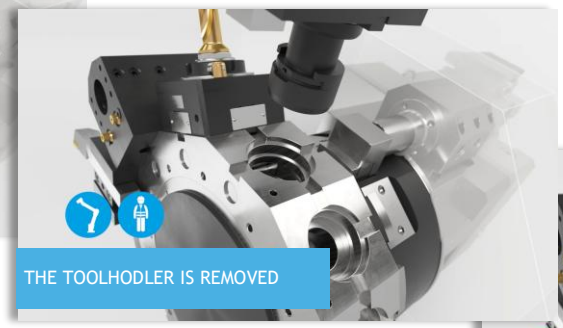
La torretta TCMQ può essere integrata in macchine dotate di sistemi ATC (Automatic Tool Change), nei quali i portautensili vengono sostituiti automaticamente da un robot oppure tramite controllo diretto dell'operatore.



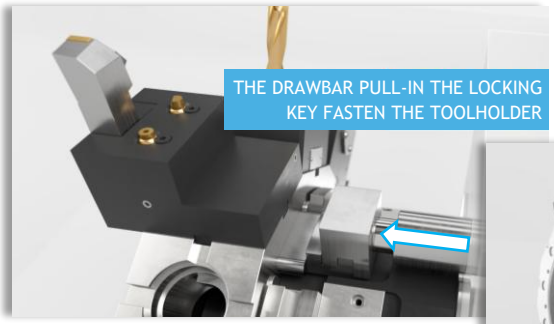




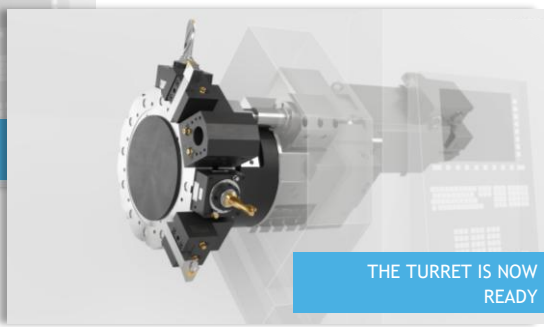












TCMQ Quicklock Turrets - Driven Tool Unit Technical

Technische Daten – Dati Tecnici

TURRET size Baugröße / Taglia torretta		**TCMQ 160**	**TCMQ200**	**TCMQ 250**
Eppinger BMT Quicklock size BMT Eppinger Quicklock-Größe / Taglia BMT Eppinger Quicklock		50	60	70
Max speed of driven tool (forced lubrication version)* Max. Drehzahl Werkzeugantrieb (m. Zusatz-Kühlung)* Velocità massima motorizzazione (lubr.forzata)*	**rpm**	*10.000*		*7.500*
Max speed of driven tool (standard) Max. Drehzahl Werkzeugantrieb (standard) Velocità massima motorizzazione (standard)		6000	5000	
Max input torque** Max. Eingangsdrehmoment** / Massima coppia in entrata**	**Nm**	*28*	*70*	*80*
Max nominal input torque (S1) Max. Eingangsnenndrehmoment (S1) / Massima coppia nominale (S1)		20	50	55
Max nominal power Max. Nennleistung / Massima Potenza nominale	**kW**	6	9	10
Ratio: rpm Motor: rpm take power Übersetzung Motor zu Werkzeugkupplung Rapporto: Giri/min Motore: giri/min presa di moto		1:1	1:1	1:1
Live Tooling System Schnittstellen / Sistema innesto motorizzato		BMT Eppinger Quicklock		

*Application need to be discussed and analyzed with Baruffaldi technical/sales office

**Die Anwendung muss mit dem technischen/verkaufsseitigen Büro von Baruffaldi besprochen und analysiert werden*

**L'applicazione deve essere discussa e analizzata con l'ufficio tecnico/commerciale di Baruffaldi*

**Max 20% working time in a 10min duty cycle

*** Maximale Einschaltdauer 20 % bei einem Arbeitszyklus von 10 Minuten*

***Massimo utilizzo 20% su ciclo di lavoro di 10min*

***Special tooling system only on request

**** Spezialsystem mit motorisiertem Kupplungsantrieb nur auf Anfrage*

****Sistema innesto motorizzato speciale solo su richiesta*

TCMQ Turrets - Ordering Code

Produktcode - Codice ordine

WORKING POSITION Arbeitsposition Posizione di lavoro	Code
RIGHT *Rechts* *Destra*	**R**
LEFT *Links* *Sinistra*	**L**

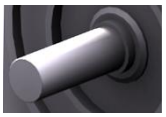
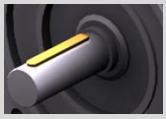
TURRET SIZE Baugröße Taglia torretta	Code
TCMQ 160	**16**
TCMQ 200	**20**
TCMQ 250	**25**

INDEXING MOTOR AND DRIVE Schwenkmotor und Steuerung Motore index e drive	Code
STANDARD MOTOR AND DRIVE BARUFFALDI *Standard – Mit Baruffaldi Schwenkmotor und Steuerung* *Motore e drive standard Baruffaldi*	**0**
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR SIEMENS MOTOR 1FK7-042 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Siemens 1FK7-042* *Senza motore e drive Baruffaldi, predisposta per motore Siemens 1FK7-042*	**2**
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR FANUC MOTOR Alpha Is 4/5000 *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Fanuc Alpha Is 4/5000* *Senza motore e drive Baruffaldi, predisposta per motore FANUC Alpha Is 4/5000*	**3**
WITHOUT MOTOR AND DRIVE BARUFFALDI *Ohne Baruffaldi Schwenkmotor und Steuerung* *Senza motore e drive Baruffaldi*	**4**
WITHOUT MOTOR AND DRIVE BARUFFALDI, KIT FOR CUSTOMIZED MOTOR *Ohne Baruffaldi Schwenkmotor und Steuerung, vorbereitet für Kunden-Motor* *Senza motore e drive Baruffaldi, predisposta con kit motore speciale*	**5**

VERSION Version Versione	Code
REFER TO THE DRAWINGS *Gemäß Zeichnungsnr.* *Fare riferimento ai disegni*	*****
MORE VERSIONS ARE AVAILABLE ON REQUEST *Zahlreiche Varianten auf Anfrage verfügbar* *Altre versioni sono disponibili su richiesta*	

TURRET TYPE Revolvertyp Tipo torretta	Code
TCMR QUICKLOCK	**LQ**

N° OF DIVISIONS Anzahl Positionen Numero di divisioni	Code
8/12	**0**
8	**1**
12	**2**
16	**3**
24	**5**

DRIVEN MOTOR SHAFT TYPE Wellen-Typ Werkzeugantriebsmotor Tipo albero motore per utensili mot.		Code
WITHOUT KEY *Ohne Passfeder* *Senza chiavetta*		**0**
WITH KEY *Mit Passfeder* *Con chiavetta*		**1**

K | | | . | | | . | | | | | | | . | | |

TOOL DISC Werkzeugscheibe Disco portautensili	Code
WITH TOOL DISC *Mit Werkzeugscheibe* *Con disco*	**A LETTER ACCORDING TO DISC TYPE** **Ausführung gemäß Buchstaben-Code** **Una lettera a seconda della tipologia di disco**

NECK EXTENSION Längenausführungen Collo Torretta	Code
SHORT NECK *Kurzer Hals* *Collo corto*	**S**
LONG NECK *Langer Hals* *Collo lungo*	**L**

VARIOUS Ausführungen Varie	Code
Forced Lubrication *Zusatzschmierung* *Lubrificazione forzata*	**F**
Forced Lubrication + High Speed *Zusatzschmierung + hohe Geschw.* ***Lubrificazione forzata + alta velocità***	**H**
High coolant pressure *Erhöhter Kühlmitteldruck* *Alta pressione refrigerante*	**P**
MQL (Minimum Quantity Lubrication) *MQL (Minimalmengenschmierung)* *MQL (Minima Quantità di Lubrificante)*	**M**

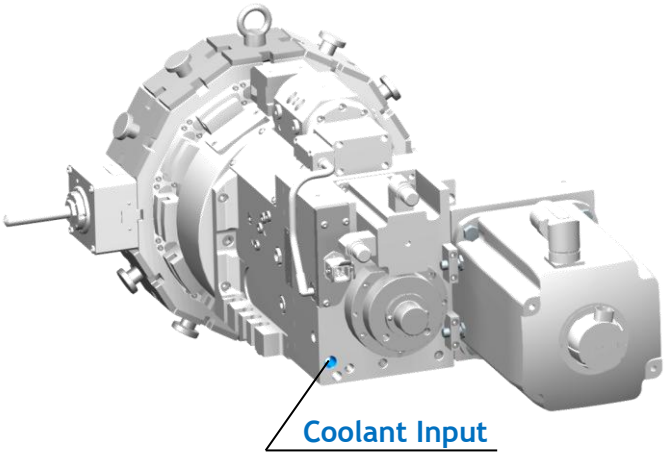
TURRET CONFIGURATION Revolver-Konfiguration Werkzeugantrieb		Code
WORKING POSITION Arbeitsposition Posizione di lavoro	MOTOR POSITION Motorposition Posizione motore	
RIGHT Rechts / Destra	LEFT Links / Sinistra	**1**
LEFT Links/ Sinistra	RIGHT Rechts / Destra	**2**
RIGHT Rechts / Destra	RIGHT Rechts / Destra	**3**
LEFT Links / Sinistra	LEFT Links / Sinistra	**4**
RIGHT Rechts / Destra	TOP Oben / In alto	**5**
LEFT Links / Sinistra	TOP Oben / In alto	**6**
TOP Oben / In alto	LEFT Links / Sinistra	**7**
DOWN Offset unten / In basso	TOP Oben / In alto	**8**
TOP Offset oben / In alto	RIGHT Rechts / Destra	**9**

MORE CONFIGURATION ARE AVAILABLE ON REQUEST, CHECK AT PG. 37
Zusätzliche Ausführungen erhältlich, siehe auch Seite 37
Altre configurazioni sono disponbiili su richiesta, si veda pag. 37

DRIVEN MOTOR BRAND AND TYPE Ausführung Werkzeugantriebsmotor Tipo e marca motore utensile mot.	Code
*****	**A LETTER ACCORDING TO THE MOTOR TYPE AND BRAND** **Buchstaben-Code gemäß Motorenausführung** **Una lettera a seconda del tipo e marca motore**

TCMQ Turrets - Coolant

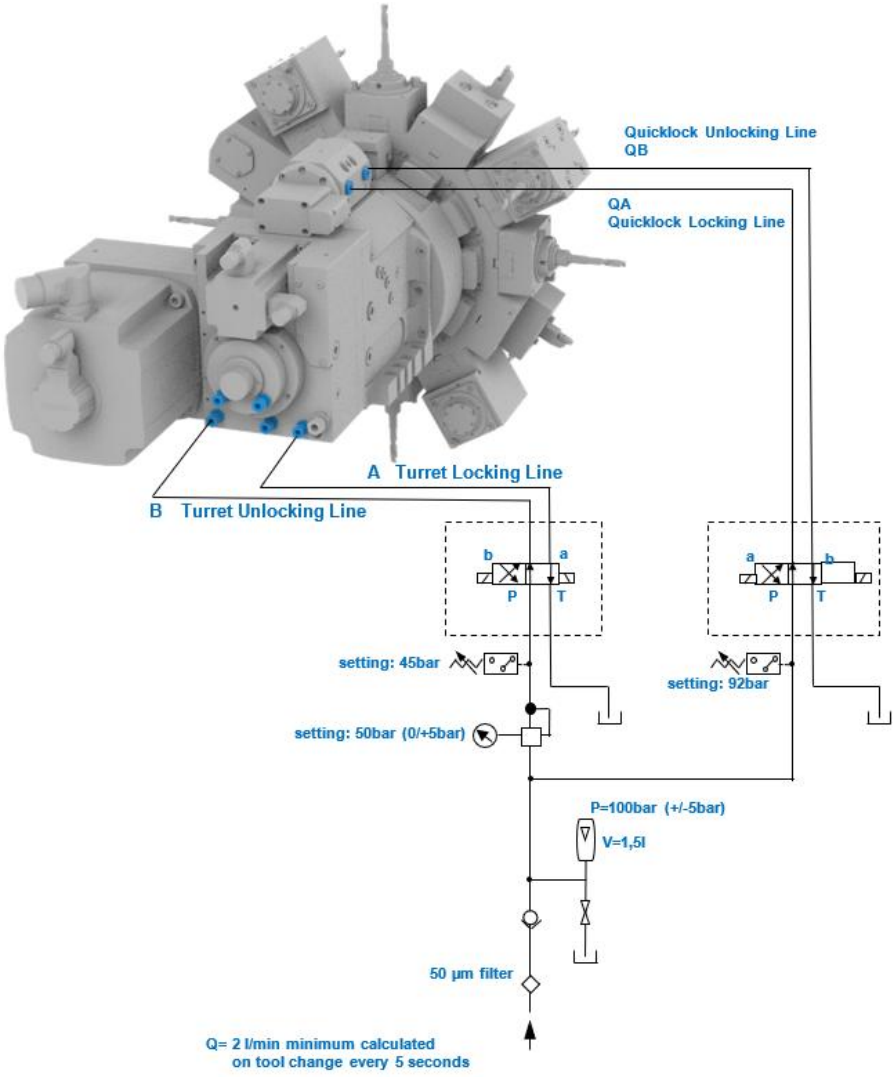
Kühlmittelanschlüsse - Connessioni refrigerante



COOLANT CONNECTIONS Kühlmittelanschlüsse / Connessioni refrigerante		
TURRET SIZE Baugröße / Taglia torretta		160-200-250
INPUT CONNECTION Anschlussgröße / Connessioni di entrata	**G”**	1/2”
PRESSURE 1st Stage (standard) Kühlmitteldruck 1. Stufe (standard) / Press. 1o Stadio (standard)	**bar**	35
PRESSURE 2nd Stage (on request) Kühlmitteldruck 2. Stufe (a. Anfr.) / Press. 2o Stadio (su richiesta)		80
PRESSURE 3rd Stage (on request) Kühlmitteldruck 3. Stufe (a. Anfr.) / Press. 3o Stadio (su richiesta)		120
FILTERING Filter / Filtraggio	**µm**	20

TCMQ Turrets - Hydraulic connections & Diagram

Hydraulikanschlüsse - Connessioni idrauliche



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The technical data, dimensions and weight are subject to change without notice. For all the techncial confirmation consult our sales and techncial office.
The illustrations are for reference only.