

# Product information

## PJ-43.2en

### Disk-Type Tool Turret

**without** tool drive

Series 0.5.440.xxx

**with** tool drive

Series 0.5.433./436.xxx

0.5.435.xxx

**revision 2023/09/20**

Attention

High pressure turret exceeding 50bar: For safety purpose, it is required to use high pressure tool holders which match specifications of turret.

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# Disk-Type Tool Turret

## Series 0.5.440.xxx without Tool Drive

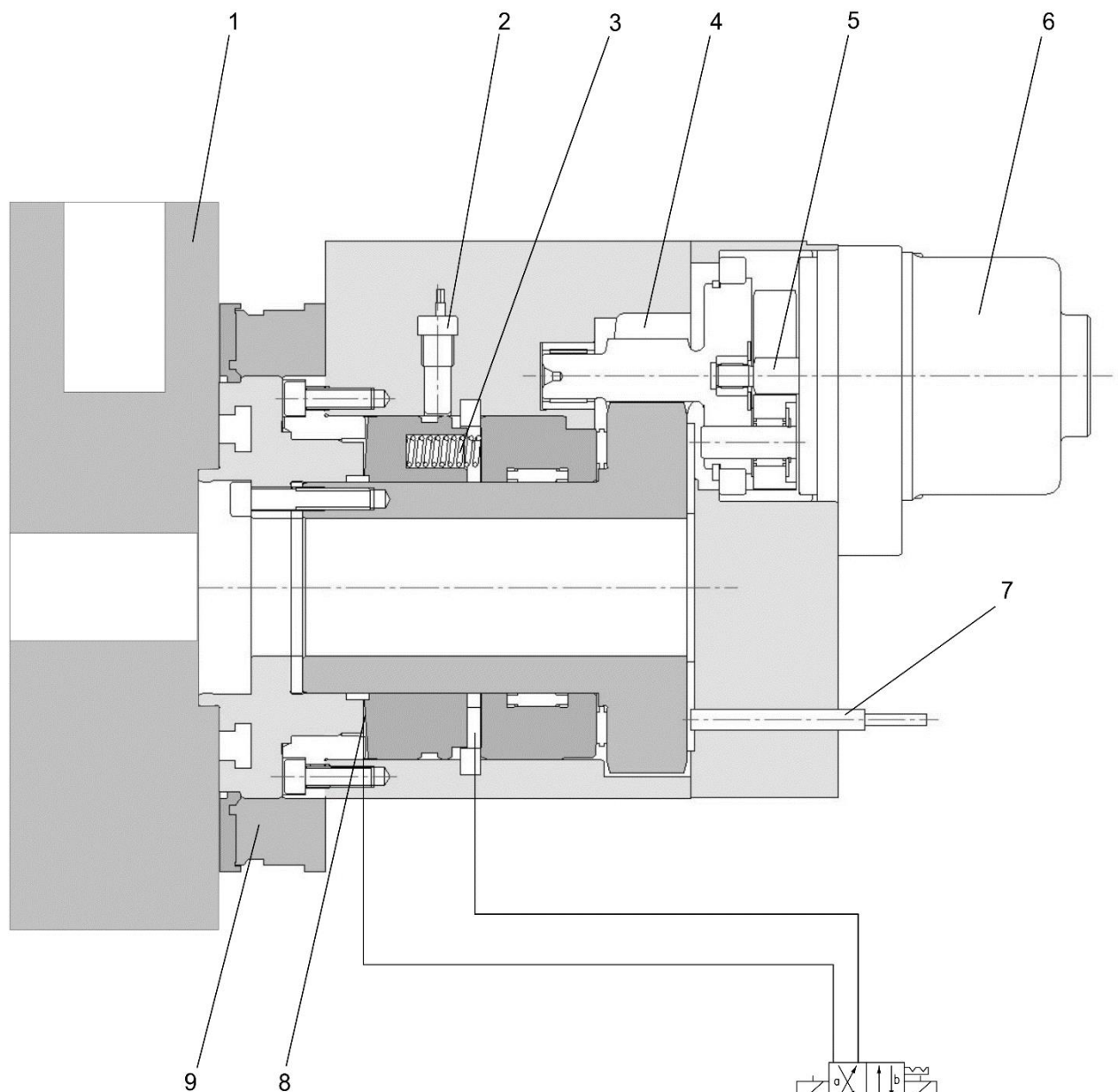
### Description

These turrets are suitable for use on turning machines for forward and reverse machining. They are equipped with all of the features and functions of modern high performance tool turrets. They are suitable for series manufacture due to their robust design and short switching times.

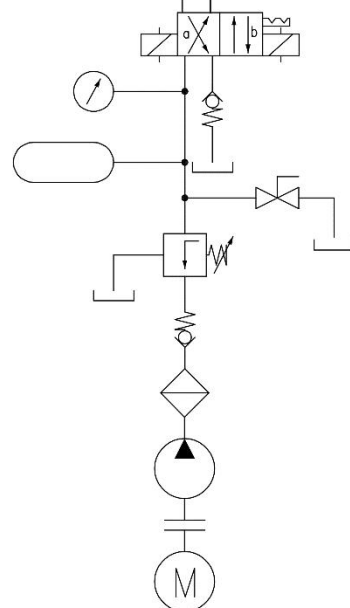
|                                 |                          |
|---------------------------------|--------------------------|
| Turret range without tool drive | 0.5.440.xxx              |
| with axial tool drive           | 0.5.433.xxx, 0.5.436.xxx |
| with radial tool drive          | 0.5.435.xxx              |

### Features

- Drive with controllable electric motor for very fast bidirectional swivel use of:
  - GPM drive unit EK 700 with motor and converter
  - GPM drive with rotary encoder activation and customary control
  - or customary servo motors
- Reduced wiring requirement
- High degree of stability due to high locking forces
- Hydraulic locking with special triple generating crown gear (pat.)
- Not affected by collisions due to:
  - ↔ [Low kinetic energy of the drive, and](#)
  - ↔ [Fastening snap-ring groove for the tool disk](#)
- Directly controllable with machine controller (not apply to GPM drive unit EK 700)
- Connection with centralised lubricating system to ensure extremely high service and usage life (only tool drive)
- Can be installed in any position
- Options:
  - Air purge connection for turrets with radial tool drive
  - Block-shaped housing or with flange fitting for especially high degree of rigidity
  - Central rotary feed-through for example for fluid-actuated tools and for a high pressure cooling lubricant device.
  - Installation of transfer elements in the tool disk
  - Attachment of sensors for cutting force monitoring
  - Y-axis
  - and more



1. Tool disk
2. Electrical locking
3. Spring
4. Spur gear
5. Planetary gearbox
6. Motor for indexing drive
7. Reference switch (optional)
8. Hirth-type gearing
9. cooling lubricant valve



## Technical Data

|                                                                                         |                     |
|-----------------------------------------------------------------------------------------|---------------------|
| <b>Series</b>                                                                           |                     |
| <b>Disk-type tool turret 0.5.440.xxx</b>                                                |                     |
| <b>Number of switching positions</b>                                                    |                     |
| Admissible tangential load (turret locked) <sup>1)</sup>                                | kNm                 |
| Admissible mass moment of inertia of tools <sup>1)2)</sup>                              | kgm <sup>2</sup>    |
| Standard load stage                                                                     |                     |
| with tool disk and holder                                                               | kgm <sup>2</sup>    |
| High load stage                                                                         |                     |
| Admissible out of balance (load moment ) due to tooling                                 | Nm                  |
| Gear ratio swivel drive <sup>3)</sup>                                                   | i                   |
| <b>Switching times<sup>4)</sup></b>                                                     | s                   |
| Rotate tool disk: <sup>5)</sup>                                                         |                     |
| • incl. acceleration and braking per partial step                                       | Standard load stage |
|                                                                                         | High load stage     |
|                                                                                         | s                   |
| • without acceleration and braking per additional partial step                          | s                   |
| Turret unlock/lock-hydraulic                                                            | s                   |
| Adm. switching frequency <sup>3)</sup> (median switching angle $\varphi_m = 90^\circ$ ) |                     |
| <b>Operating pressure</b>                                                               |                     |
| Hydraulic $\pm 10\%$                                                                    | bar                 |
| Cooling lubricant                                                                       |                     |
| • Standard                                                                              | bar                 |
| • Medium pressure value                                                                 | bar                 |
| • High-pressure cooling lubricant device                                                | bar                 |
| <b>Fluid absorption volume</b>                                                          |                     |
| Turret unlock/lock                                                                      | cm <sup>3</sup>     |
| <b>Mass</b>                                                                             |                     |
| Turret (incl. drive motor) <sup>6)</sup>                                                | kg                  |
| Tool disk and tooling (max)                                                             | kg                  |
| <b>Adm. ambient temperature</b>                                                         | °C                  |

1) Higher values on request

2) Switching times on request

3) further gear gradations on request

4) Conditions:

-Fluid supply sufficiently large

-Turret up to operating temperature

-Without controller-related non-productive time

-Switching times valid for high dynamic motor (e.g. 1FK7043)

5) The swivel times are determined with an average load. Further details on request.

6) At design standard housing

7) Ensure compliance with the required fineness for the tools used. For example drive tool with internal cooling lubricant supply.

| Size                                                                                                                 |      |    |     |      |    |     |      |    |     |      |    |      |      |    |         |      |    |
|----------------------------------------------------------------------------------------------------------------------|------|----|-----|------|----|-----|------|----|-----|------|----|------|------|----|---------|------|----|
| 12                                                                                                                   |      |    | 16  |      |    | 20  |      |    | 25  |      |    | 32   |      |    | 40      |      |    |
| 8                                                                                                                    | 12   | 16 | 8   | 12   | 16 | 8   | 12   | 16 | 8   | 12   | 16 | 8    | 12   | 16 | 8       | 12   | 16 |
| 0.8                                                                                                                  |      |    | 1.8 |      |    | 3.6 |      |    | 7.2 |      |    | 12.5 |      |    | 25      |      |    |
| 0.8                                                                                                                  |      |    | 1.8 |      |    | 3.2 |      |    | 8   |      |    | 25   |      |    | 70      |      |    |
| 1.2                                                                                                                  |      |    | 2.5 |      |    | 5.0 |      |    | 12  |      |    | 40   |      |    | 140     |      |    |
| 16                                                                                                                   |      |    | 32  |      |    | 63  |      |    | 125 |      |    | 200  |      |    | 320     |      |    |
| 45                                                                                                                   |      |    | 54  |      |    | 72  |      |    | 90  |      |    | 216  |      |    | 360     |      |    |
|                                                                                                                      |      |    |     |      |    |     |      |    |     |      |    |      |      |    |         |      |    |
|                                                                                                                      | 0.10 |    |     | 0.13 |    |     | 0.16 |    |     | 0.21 |    |      | 0.27 |    |         | 0.39 |    |
|                                                                                                                      | 0.11 |    |     | 0.15 |    |     | 0.19 |    |     | 0.25 |    |      | 0.31 |    |         | 0.45 |    |
|                                                                                                                      | 0.06 |    |     | 0.07 |    |     | 0.09 |    |     | 0.11 |    |      | 0.27 |    |         | 0.4  |    |
|                                                                                                                      | 0.11 |    |     | 0.12 |    |     | 0.13 |    |     | 0.2  |    |      | 0.5  |    |         | 0.8  |    |
| 25                                                                                                                   |      |    | 20  |      |    | 16  |      |    | 12  |      |    | 10   |      |    | 8       |      |    |
|                                                                                                                      |      |    |     |      |    |     |      |    |     |      |    |      |      |    |         |      |    |
| 50                                                                                                                   |      |    | 50  |      |    | 50  |      |    | 50  |      |    | 50   |      |    | 50      |      |    |
| 5-25(filtering ≤ 100µm) <sup>7)</sup><br>5-25(filtering ≤ 50µm) <sup>7)</sup><br>150(filtering ≤ 25µm) <sup>7)</sup> |      |    |     |      |    |     |      |    |     |      |    |      |      |    |         |      |    |
|                                                                                                                      |      |    |     |      |    |     |      |    |     |      |    |      |      |    |         |      |    |
| 15                                                                                                                   |      |    | 30  |      |    | 45  |      |    | 65  |      |    | 114  |      |    | 165     |      |    |
| 38                                                                                                                   |      |    | 50  |      |    | 70  |      |    | 110 |      |    | 220  |      |    | on      |      |    |
| 40                                                                                                                   |      |    | 80  |      |    | 160 |      |    | 250 |      |    | 400  |      |    | request |      |    |
| 10...40                                                                                                              |      |    |     |      |    |     |      |    |     |      |    |      |      |    |         |      |    |

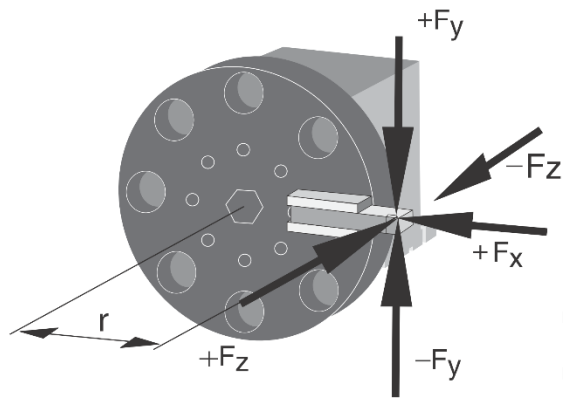
| Recommended motors<br>degree of protection to IP 67 | J                | Adm.<br>driving   | swiveling times for 30°-step<br>without acceleration and braking |      |      |      |      |
|-----------------------------------------------------|------------------|-------------------|------------------------------------------------------------------|------|------|------|------|
|                                                     | kgm <sup>2</sup> | min <sup>-1</sup> | s                                                                |      |      |      |      |
|                                                     |                  |                   | Size of turret                                                   |      |      |      |      |
|                                                     |                  |                   | 12                                                               | 16   | 20   | 25   | 32   |
| GPM with encoder <sup>1)</sup>                      | 0.0003           | 4500              | 0.05                                                             | 0.06 | 0.08 | 0.10 | 0.24 |
| Siemens 1FK7043 HD                                  | 0.0001           | 6000              | 0.04                                                             | 0.05 | 0.06 | 0.08 | 0.18 |
| Siemens 1FK7042                                     | 0.0003           | 4500              | 0.05                                                             | 0.06 | 0.08 | 0.10 | 0.24 |
| Fanuc $\alpha$ 2/5000 / $\beta$ 2/5000              | 0.0003           | 4500              | 0.05                                                             | 0.06 | 0.08 | 0.10 | 0.24 |
| Delta with Delta-control EK700                      | 0.0003           | 4000              | 0.06                                                             | 0.07 | 0.09 | 0.11 | 0.27 |

<sup>1)</sup> controlled via machine control system

## Admissible Loads

### Note

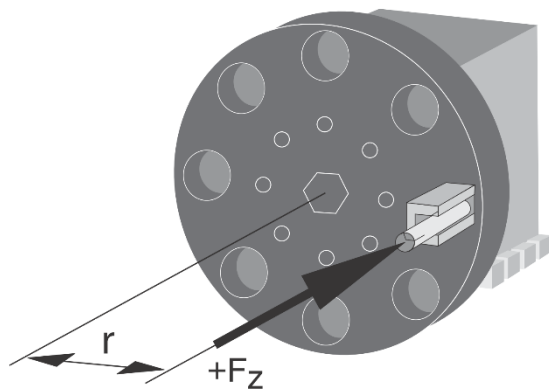
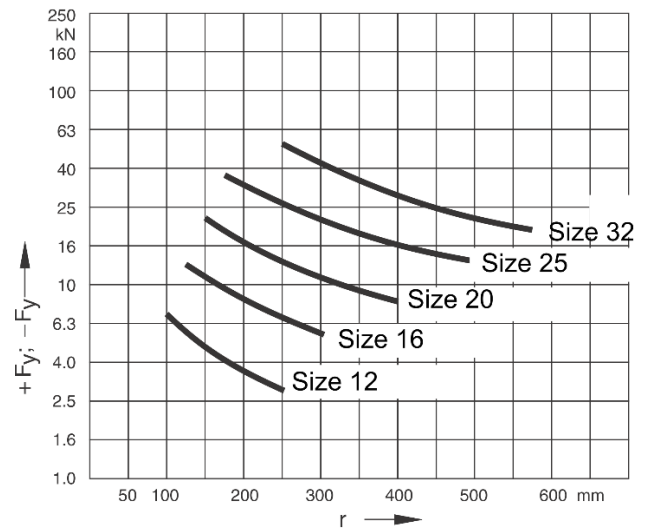
- The diagrams refer to static loads.
- In case of impact load (interrupted cutting), significantly lower values must be reckoned with.



$$F_z = F_x = 40\% F_y$$

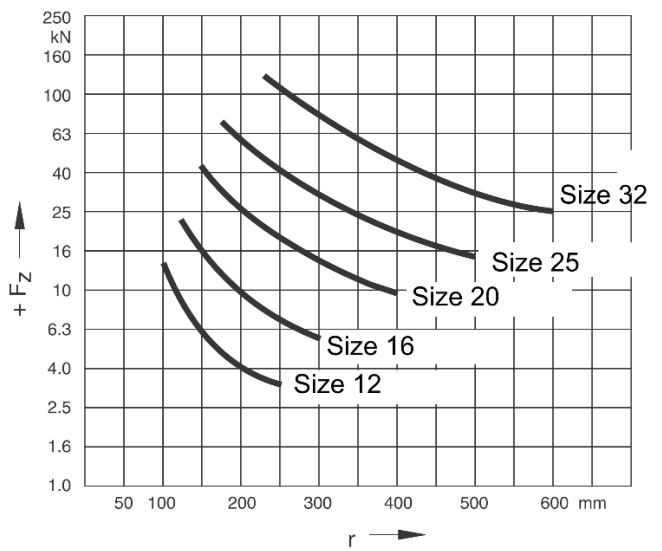
Combination force  $\pm F_y (+F_x, F_z)$

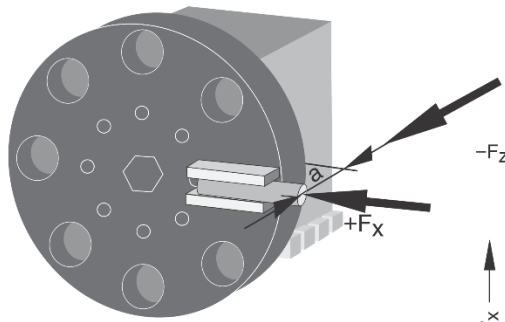
Type Turn-forward-and reverse machining



Advance force  $+F_z$

(drilling forward and backward)



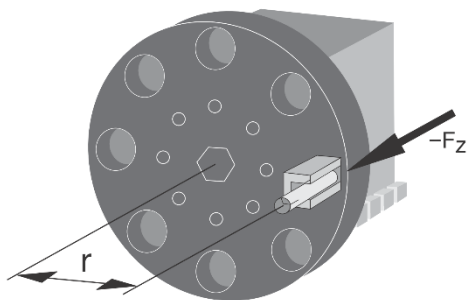
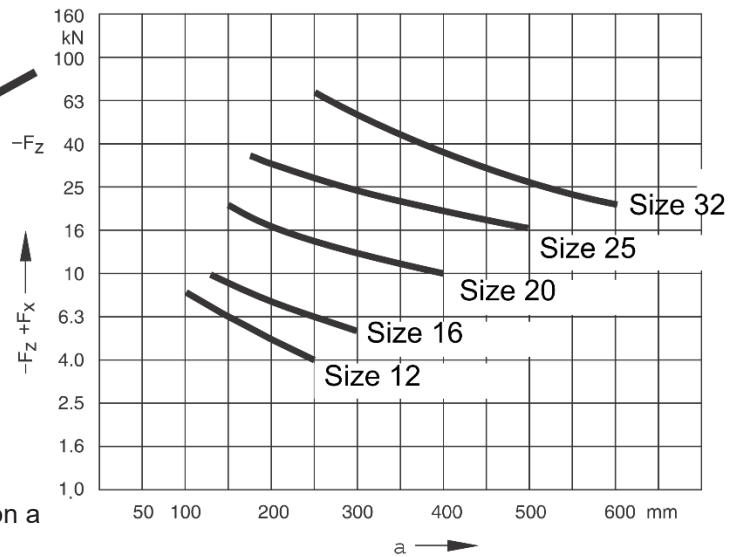


$$-F_z = F_x = 40\% F_y$$

Advance force  $-F_z$

(drilling forward and shunt load  $+F_x$ )

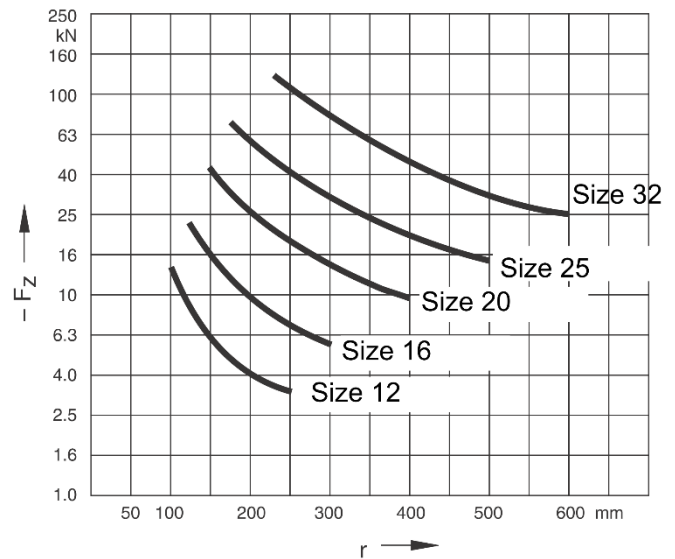
leading edge is the basis for dimension  $a$



Advance force  $-F_z$

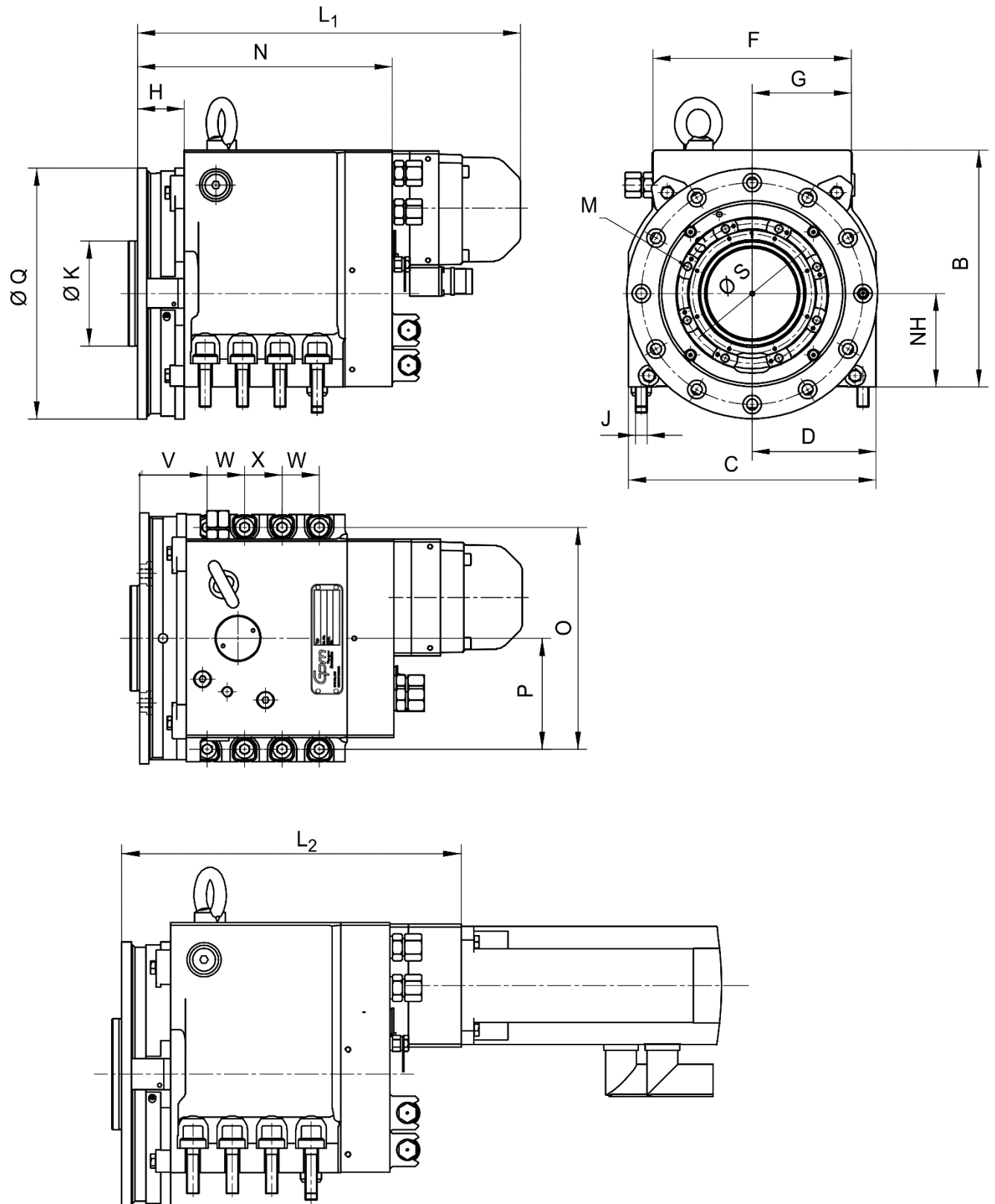
(drilling forward)

(Only with L- and block-shape)



## Dimension

### Foot shape (Standard)

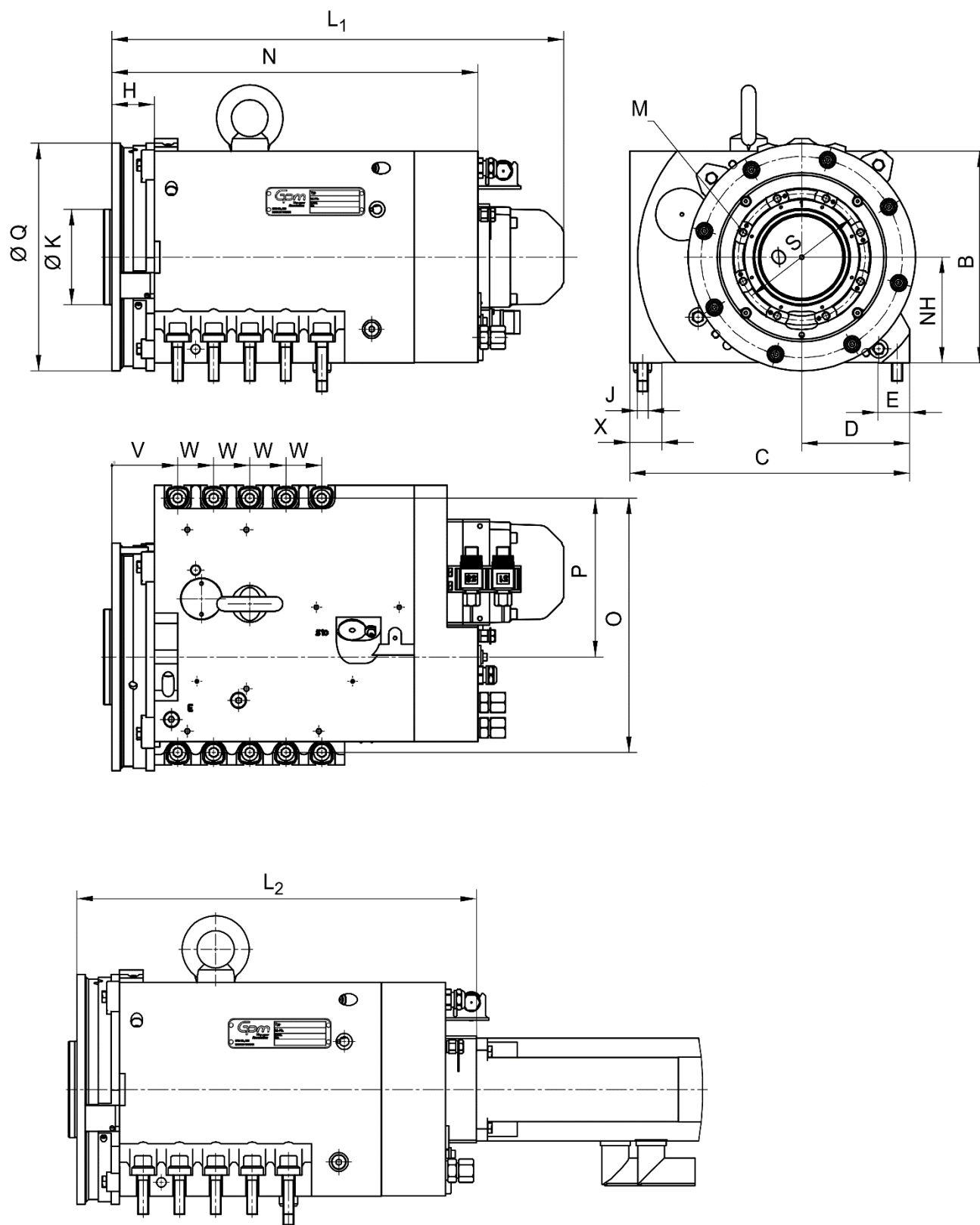


| Series                              |                | Size   |        |          |          |          |
|-------------------------------------|----------------|--------|--------|----------|----------|----------|
| Disk-type tool turret 0.5.440.xxx   |                | 12     | 16     | 20       | 25       | 32       |
| NH                                  |                | 63     | 80     | 100      | 125      | 160      |
| B                                   |                | 174    | 203    | 236      | 279      | 344      |
| C                                   |                | 185    | 212    | 250      | 316      | 396      |
| D                                   |                | 85     | 106    | 125      | 158      | 198      |
| F                                   |                | 145    | 170    | 200      | 250      | 316      |
| G                                   |                | 80     | 85     | 100      | 125      | 158      |
| H                                   |                | 31     | 40     | 41       | 52       | 62       |
| J                                   |                | M8     | M10    | M12      | M16      | M20      |
| ØK                                  |                | 70     | 90     | 100      | 120      | 150      |
| L                                   |                |        |        |          |          |          |
| GPM-Motor 1.8.150.573               | L <sub>1</sub> | 338    | 356    | 374      | 420      | 590      |
| Delta-Motor with control unit EK700 | L <sub>1</sub> | 394    | 412    | 430      | 476      | 646      |
| Siemens 1 FK7 43/42                 | L <sub>2</sub> | 258    | 276    | 294      | 340      | 510      |
| Fanuc $\alpha 2 / \beta 2$          | L <sub>2</sub> | 243    | 261    | 279      | 325      | 495      |
| M                                   |                | 8 x M8 | 8 X M8 | 11 x M10 | 11 X M12 | 15 X M12 |
| N                                   |                | 216    | 234    | 252      | 298      | 429      |
| O                                   |                | 165    | 190    | 220      | 280      | 352      |
| P                                   |                | 75     | 95     | 110      | 140      | 176      |
| ØQ                                  |                | 175    | 215    | 255      | 318      | 396      |
| ØS                                  |                | 90     | 120    | 145      | 182      | 220      |
| V                                   |                | 50     | 58     | 66       | 82       | 96       |
| W                                   |                | 30     | 32     | 30       | 44       | 48       |
| X                                   |                | —      | —      | 40       | 43       | 56       |

## Block shape (reinforced version / NH standard 1)

### Note

- with housing compatible with series 0.5.450.xxx

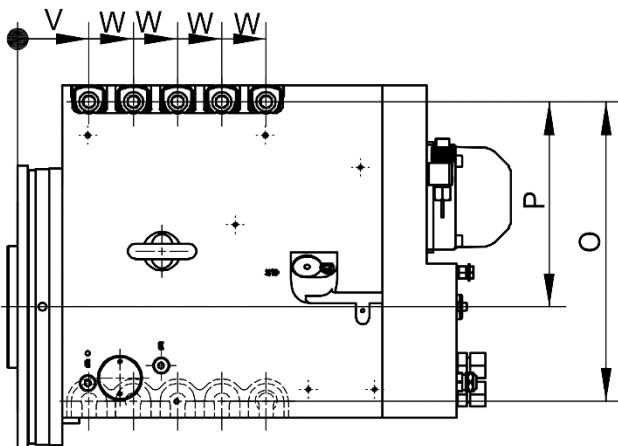
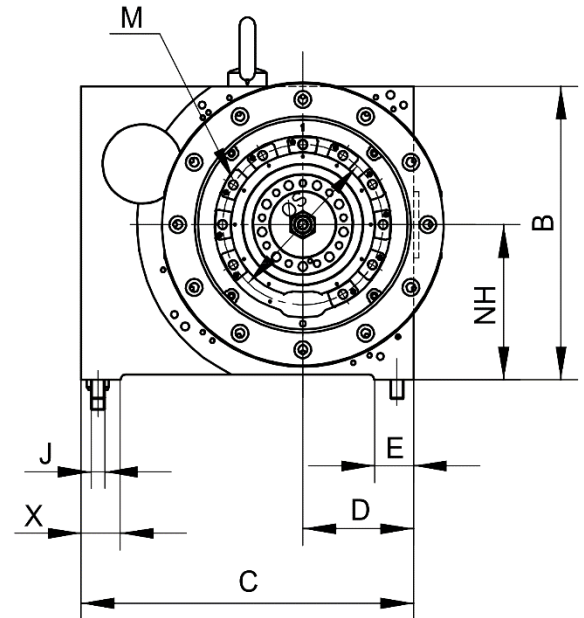
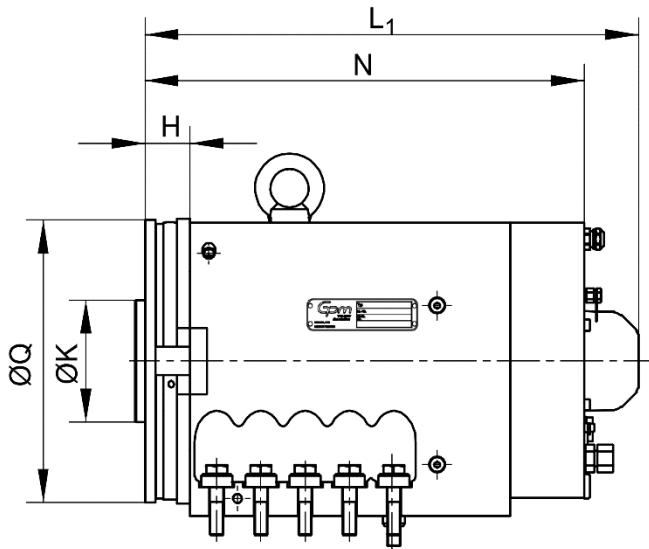


| Series                                                          |                | Size |        |          |          |          |
|-----------------------------------------------------------------|----------------|------|--------|----------|----------|----------|
| Disk-type tool turret 0.5.440.xxx – block shape<br>(Standard 1) |                | 12   | 16     | 20       | 25       | 32       |
| NH                                                              |                |      | 100    | 125      | 150      | 200      |
| B                                                               |                |      | 200    | 236      | 300      | 400      |
| C                                                               |                |      | 264    | 250      | 406      | 520      |
| D                                                               |                |      | 102    | 125      | 158      | 198      |
| E                                                               |                |      | 26     | 35       | 45       | 48       |
| H                                                               |                |      | 40     | 41       | 52       | 62       |
| J                                                               |                |      | M10    | M12      | M16      | M20      |
| ØK                                                              |                |      | 90     | 110      | 120      | 150      |
| L                                                               |                |      |        |          |          |          |
| GPM-Motor 1.8.150.573                                           | L <sub>1</sub> |      | 454    | 474      | 520      | 666      |
| Delta-Motor with control unit EK700                             | L <sub>1</sub> |      | 510    | 530      | 576      | 722      |
| Siemens 1 FK7 43/42                                             | L <sub>2</sub> |      | 347    | 394      | 440      | 586      |
| Fanuc $\alpha 2 / \beta 2$                                      | L <sub>2</sub> |      | 359    | 379      | 425      | 571      |
| M                                                               |                |      | 8 x M8 | 11 x M10 | 11 x M12 | 15 x M12 |
| N                                                               |                |      | 234    | 252      | 298      |          |
| O                                                               |                |      | 240    | 295      | 370      | 476      |
| P                                                               |                |      | 150    | 185      | 230      | 300      |
| ØQ                                                              |                |      | 160    | 255      | 318      | 396      |
| ØS                                                              |                |      | 120    | 145      | 182      | 220      |
| V                                                               |                |      | 62     | 65       | 78       | 96       |
| W                                                               |                |      | 34     | 40       | 42       | 52       |
| X                                                               |                |      | 34     | 35       | 45       | 48       |

## Block shape (reinforced version / NH standard 2)

### Hint

- with housing compatible with series 0.5.450.xxx

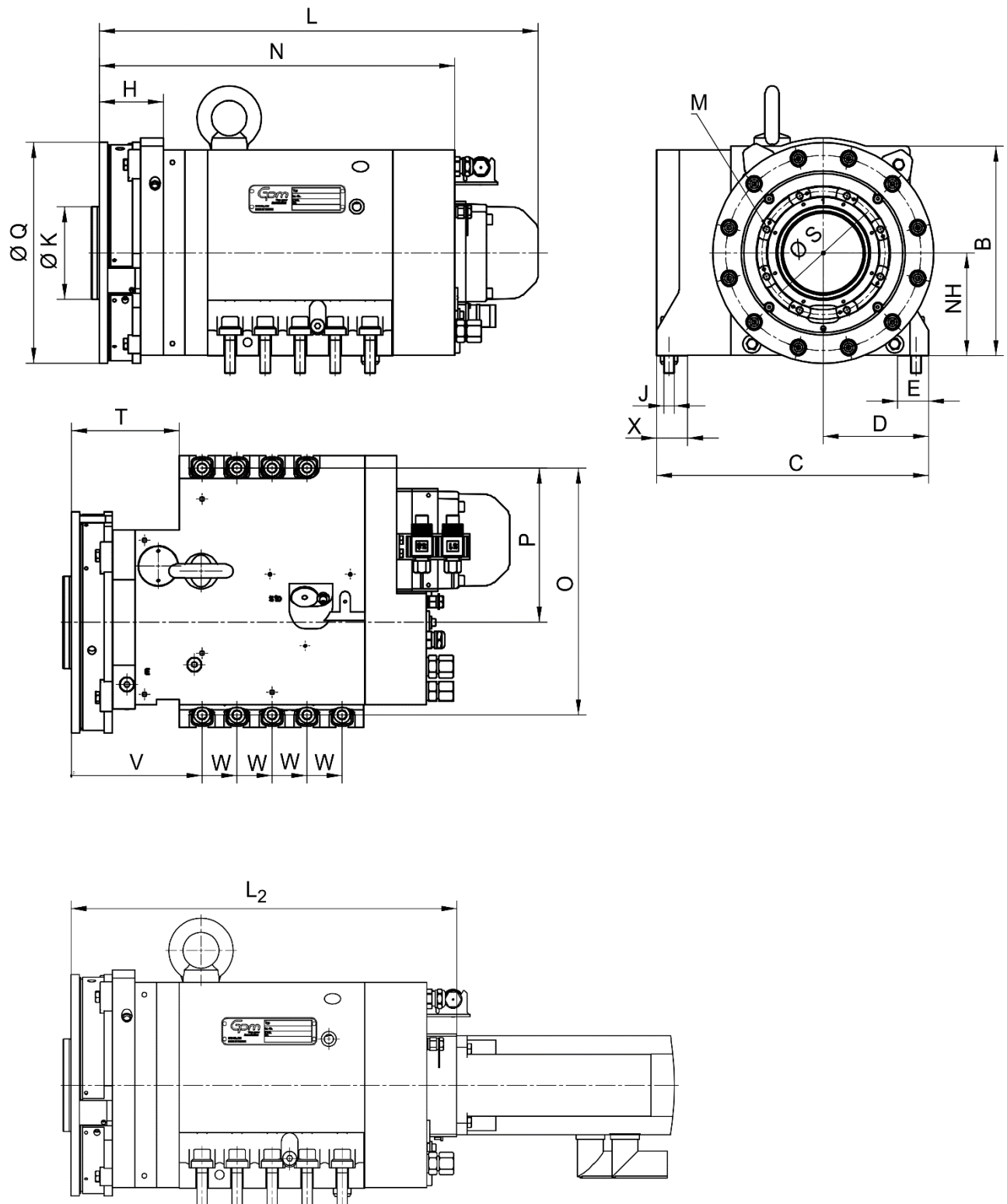


| Series                                                          |                | Size   |        |          |          |
|-----------------------------------------------------------------|----------------|--------|--------|----------|----------|
| Disk-type tool turret 0.5.440.xxx – block shape<br>(Standard 2) |                | 12     | 16     | 20       | 25       |
| NH                                                              |                | 90     | 115    | 140      | 150      |
| B                                                               |                | 170    | 219    | 265      | 300      |
| C                                                               |                | 198    | 244    | 300      | 406      |
| D                                                               |                | 68     | 82     | 100      | 158      |
| E                                                               |                | 20     | 26     | 35       | 45       |
| H                                                               |                | 32     | 40     | 41       | 52       |
| J                                                               |                | M8     | M10    | M12      | M16      |
| ØK                                                              |                | 70     | 90     | 110      | 120      |
| L                                                               |                |        |        |          |          |
| GPM-Motor 1.8.150.573                                           | L <sub>1</sub> | 438    | 454    | 474      | 520      |
| Delta-Motor with control unit EK700                             | L <sub>1</sub> | 494    | 510    | 530      | 576      |
| Siemens 1 FK7 43/42                                             | L <sub>2</sub> | 358    | 347    | 394      | 440      |
| Fanuc $\alpha 2 / \beta 2$                                      | L <sub>2</sub> | 343    | 359    | 379      | 425      |
| M                                                               |                | 8 x M8 | 8 x M8 | 11 x M10 | 11 x M12 |
| N                                                               |                | 216    | 234    | 252      | 298      |
| O                                                               |                | 178    | 220    | 270      | 370      |
| P                                                               |                | 120    | 150    | 185      | 230      |
| ØQ                                                              |                | 175    | 160    | 255      | 318      |
| ØS                                                              |                | 90     | 120    | 145      | 182      |
| V                                                               |                | 50     | 62     | 65       | 78       |
| W                                                               |                | 28     | 34     | 40       | 42       |
| X                                                               |                | 20     | 34     | 35       | 45       |

## L shape (NH standard 1)

### Note

- with housing compatible with series 0.5.450.xxx

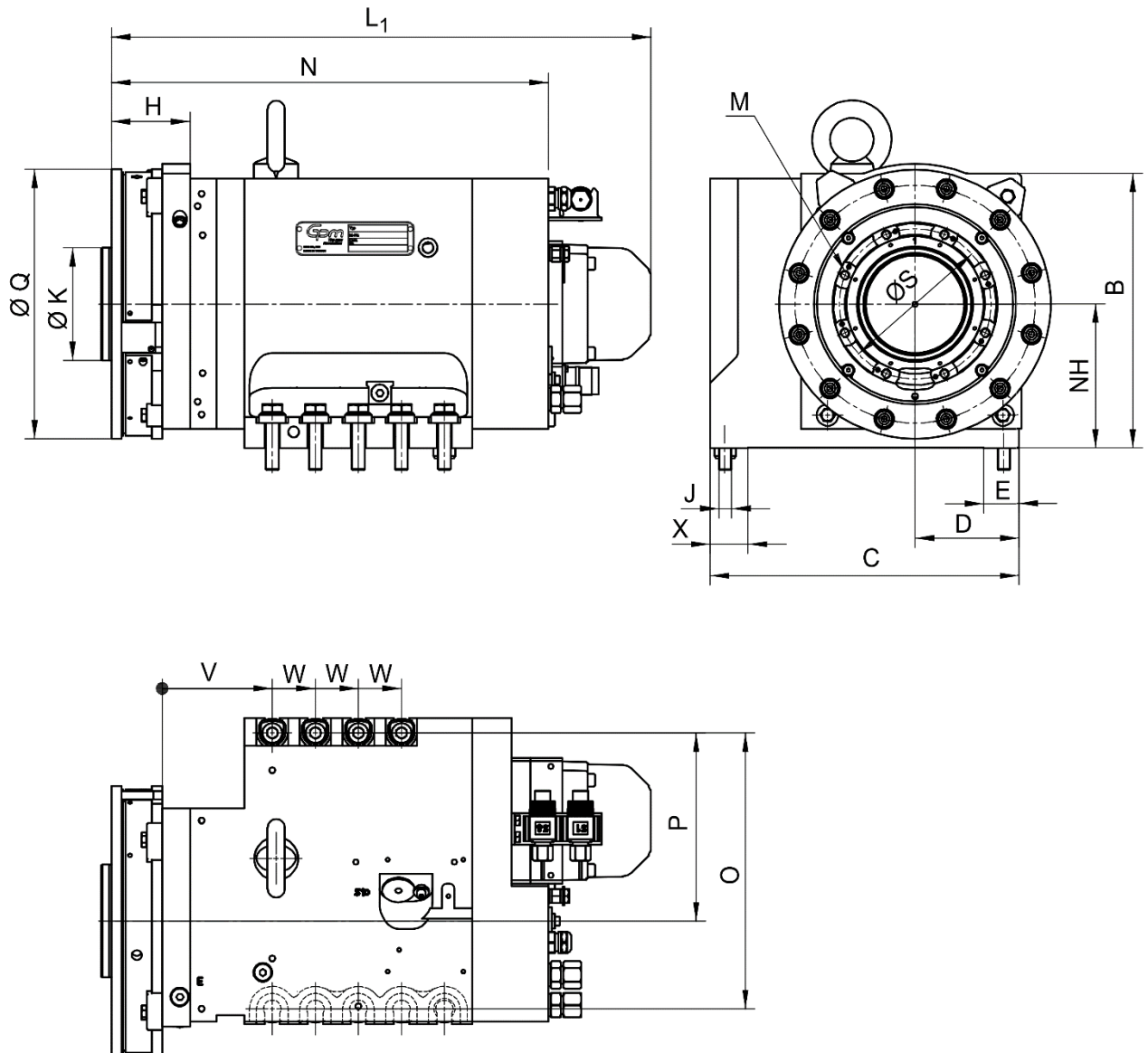


| Series                                                     |                | Size |        |          |          |          |
|------------------------------------------------------------|----------------|------|--------|----------|----------|----------|
| Disk-type tool turret 0.5.440.xxx – L-Form<br>(Standard 1) |                | 12   | 16     | 20       | 25       | 32       |
| NH                                                         |                |      | 100    | 125      | 150      | 200      |
| B                                                          |                |      | 200    | 236      | 300      | 400      |
| C                                                          |                |      | 264    | 250      | 406      | 520      |
| D                                                          |                |      | 102    | 125      | 158      | 198      |
| E                                                          |                |      | 26     | 35       | 45       | 48       |
| H                                                          |                |      | 40     | 41       | 52       | 62       |
| J                                                          |                |      | M10    | M12      | M16      | M20      |
| K                                                          |                |      | 90     | 110      | 120      | 150      |
| L                                                          |                |      |        |          |          |          |
| GPM-Motor 1.8.150.573                                      | L <sub>1</sub> |      | 454    | 474      | 520      | 666      |
| Delta-Motor with control unit EK700                        | L <sub>1</sub> |      | 375    | 395      | 441      | 587      |
| Siemens 1 FK7 43/42                                        | L <sub>2</sub> |      | 374    | 394      | 440      | 586      |
| Fanuc $\alpha 2 / \beta 2$                                 | L <sub>2</sub> |      | 359    | 379      | 425      | 571      |
| M                                                          |                |      | 8 x M8 | 11 x M10 | 11 x M12 | 15 x M12 |
| N                                                          |                |      | 234    | 252      | 298      | 429      |
| O                                                          |                |      | 240    | 295      | 370      | 476      |
| P                                                          |                |      | 150    | 185      | 230      | 300      |
| ØQ                                                         |                |      | 160    | 255      | 318      | 396      |
| ØS                                                         |                |      | 120    | 145      | 182      | 220      |
| T                                                          |                |      | 90     | 120      | 150      | 200      |
| V                                                          |                |      | 62     | 144      | 176      | 234      |
| W                                                          |                |      | 34     | 40       | 42       | 52       |
| X                                                          |                |      | 34     | 35       | 45       | 48       |

## L shape (NH standard 2)

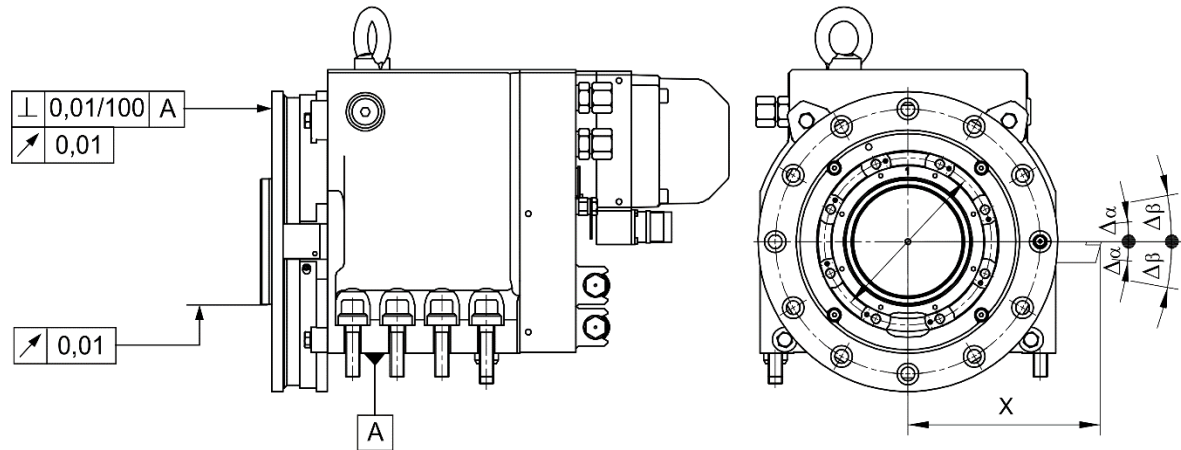
### Note

- with housing compatible with series 0.5.450.xxx



| Series                                                     |                | Size   |        |          |          |
|------------------------------------------------------------|----------------|--------|--------|----------|----------|
| Disk-type tool turret 0.5.440.xxx – L-Form<br>(Standard 2) |                | 12     | 16     | 20       | 25       |
| NH                                                         |                | 90     | 115    | 140      | 180      |
| B                                                          |                | 170    | 219    | 265      | 330      |
| C                                                          |                | 198    | 244    | 300      | 373      |
| D                                                          |                | 68     | 82     | 100      | 125      |
| E                                                          |                | 20     | 26     | 35       | 45       |
| H                                                          |                | 32     | 40     | 41       | 52       |
| J                                                          |                | M8     | M10    | M12      | M16      |
| K                                                          |                | 70     | 90     | 110      | 120      |
| L                                                          |                |        |        |          |          |
| GPM-Motor 1.8.150.573                                      | L <sub>1</sub> | 438    | 454    | 474      | 520      |
| Delta-Motor with control unit EK700                        | L <sub>1</sub> | 494    | 375    | 395      | 441      |
| Siemens 1 FK7 43/42                                        | L <sub>2</sub> | 358    | 347    | 394      | 440      |
| Fanuc $\alpha 2 / \beta 2$                                 | L <sub>2</sub> | 343    | 359    | 379      | 425      |
| M                                                          |                | 8 x M8 | 8 x M8 | 11 x M10 | 11 x M12 |
| N                                                          |                | 216    | 234    | 252      | 298      |
| O                                                          |                | 178    | 220    | 270      | 337      |
| P                                                          |                | 120    | 150    | 185      | 230      |
| ØQ                                                         |                | 120    | 150    | 255      | 318      |
| ØS                                                         |                | 175    | 160    | 145      | 182      |
| T                                                          |                | 90     | 120    | 120      | 150      |
| V                                                          |                | 50     | 62     | 144      | 176      |
| W                                                          |                | 28     | 34     | 40       | 42       |
| X                                                          |                | 20     | 34     | 35       | 45       |

## Precision



### Repeating accuracy

(Multiple move to a switching position from the same direction)

$$\Delta\alpha = \pm 1.6'' \equiv \pm 0.8 \times \frac{X[mm]}{100[mm]} [\mu m]$$

### Indexing precision

(Multiple move to a switching position from the same direction)

$$\Delta\beta = \pm 4'' \equiv \pm 2 \times \frac{X[mm]}{100[mm]} [\mu m]$$

## Fluid Rotary Feed-Through

All turrets are deliverable with central fluid rotary feed-through:

- „uncontrolled“ version      - fluid supply in **all** switch positions  
e.g. for sealing air, for gripper actuation, and similar actions
- „controlled“ version        - fluid supply in **all** switch positions  
e.g. for KSS, for automatic tool changes, and similar actions

A maximum of three supply lines are routed through the center of the turret.

Operation pressure  $P_{adm} = 100\text{bar}$  (standard).

## Series 0.5.433.xxx / 0.5.436.xxx

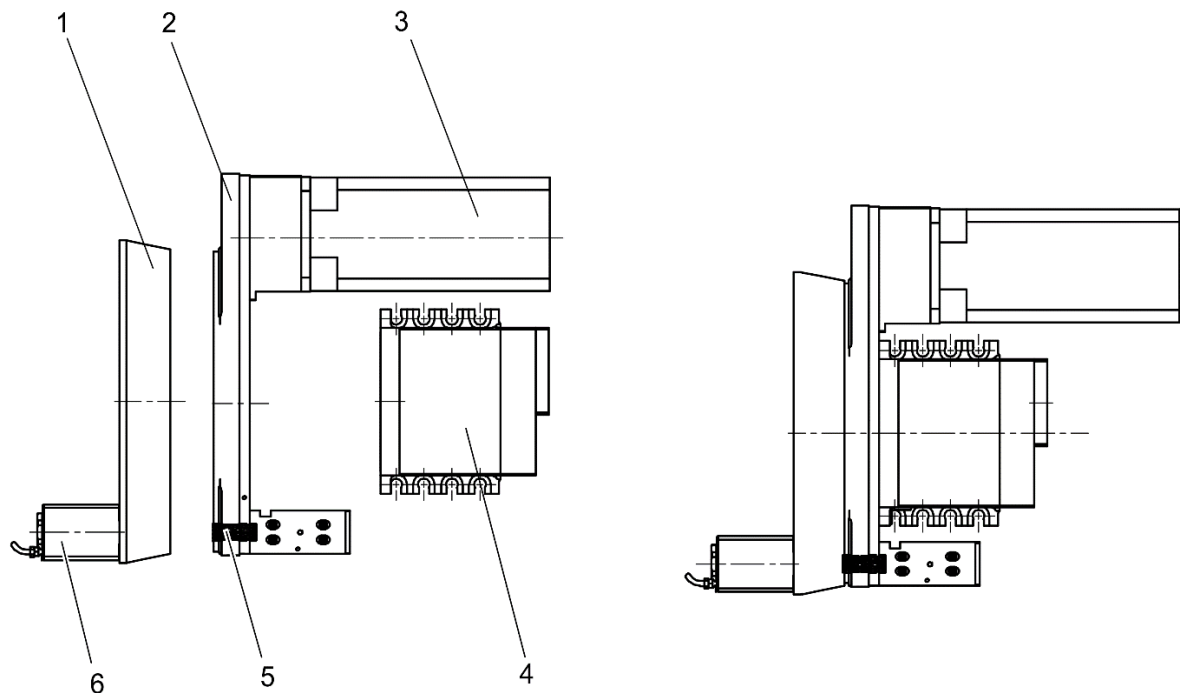
with Axial Tool Drive (only available with foot-shape housing)

### Description

These turrets are of modular construction and consist of a basic turret (4) of the 0.5.440.xxx series and a decentralised tool drive (2) mounted instead of the cooling lubricant ring. The tool drive has been designed for individually switchable driven tools.

The tool drive motor (3) drives the sliding coupling (5) via the spur gear incorporated in the gearbox casing. The tool in the working position is switched on by means of the sliding coupling.

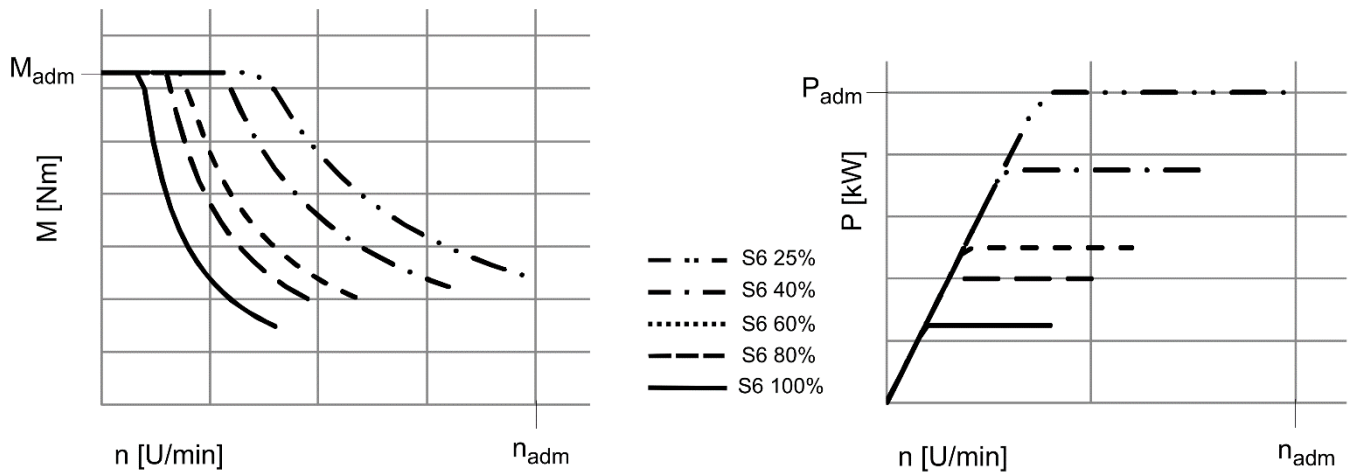
| Coupling process with                           | Turret series      | Suitable driven tools  |                      |
|-------------------------------------------------|--------------------|------------------------|----------------------|
|                                                 |                    | Spindle-locking system | GPM-driven tools typ |
| Searching                                       | <b>0.5.433.xxx</b> | nein                   | 0.5.921.xxx          |
| without searching<br>(with spindle positioning) | <b>0.5.436.xxx</b> | ja                     | 0.5.941.xxx          |



- 1 Tool disk
- 2 Tool drive
- 3 Tool drive motor
- 4 Base turret
- 5 Sliding coupling
- 6 Driven tool

## Admissible duty cycle (DC) Tool drive

### Performance Diagram



### Admissible duty cycle of the tool drive short-time operation (reference values)

The actual efficiency (DC) also depends on where the turret is installed and on the operating conditions!

| Admissible duty cycle [DC] (10 min) |                                      | 100% | 80% | 60% | 40% | 25%  |
|-------------------------------------|--------------------------------------|------|-----|-----|-----|------|
| Admissible drive rating             | $\left[ \frac{P_c}{P_{zul}} \right]$ | 25%  | 40% | 50% | 75% | 100% |
| and                                 |                                      |      |     |     |     |      |
| admissible relative rpm             | $\left[ \frac{n_c}{n_{zul}} \right]$ | 40%  | 50% | 60% | 80% | 100% |

$P_c$  = Required cutting performance [kW]

$n_c$  = Required cutting rpm [ $\text{min}^{-1}$ ]

$P_{adm}$  = Admissible drive rating [kW]

$n_{adm}$  = Admissible rpm [ $\text{min}^{-1}$ ]

### Example calculation

Witch speed  $n_c$  and witch power  $P_c$  with 40% DC are supported on a tool drive, size 20

According to the table on pages 26 / 27 / 30 and 33, the following values are valid for disk-type tool turrets, size20:  $P_{adm} = 8 \text{ kW}$ ,  $n_{adm} = 4000 \text{ min}^{-1}$

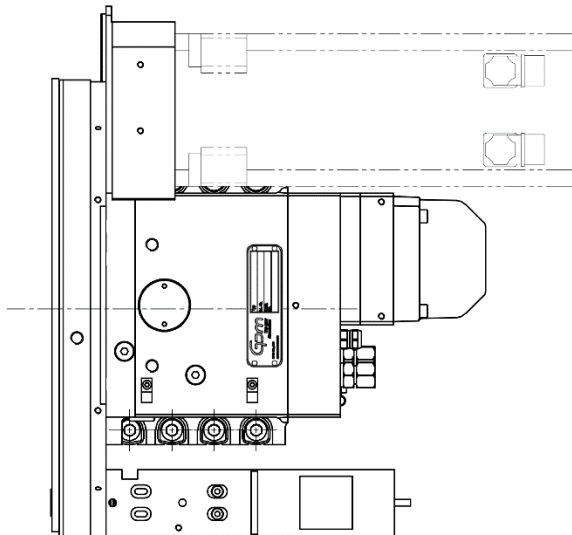
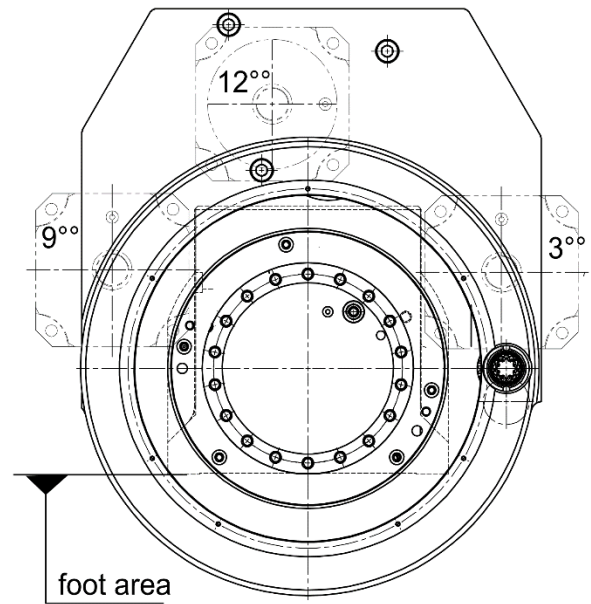
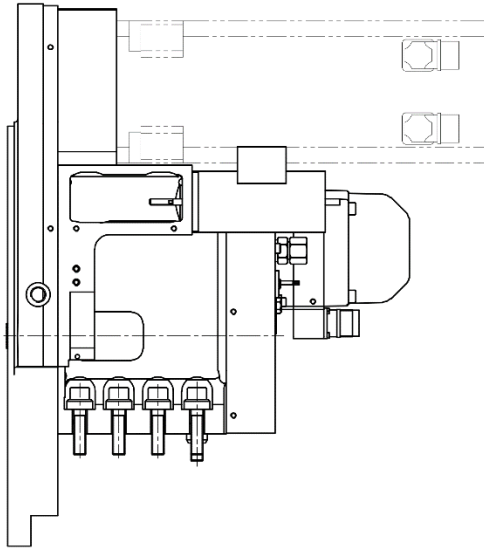
Values are valid for 40% DC (10min) according to the table on this page:

$$\frac{n_c}{n_{adm}} = 75\% \text{ und } \frac{P_c}{P_{adm}} = 75\%$$

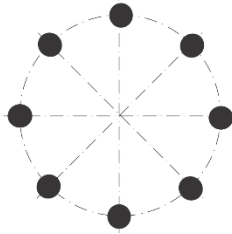
In the example the tool drive can be operated with  $P_c = 6 \text{ kW}$  and  $n_c = 3200 \text{ min}^{-1}$  for 4 minutes and then it must rest for 6 minutes.

## Motor Arrangement

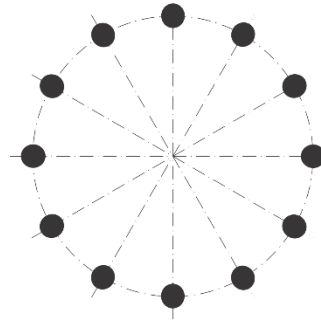
Motor arrangement possible at  
3 o'clock, 9 o'clock oder 12 o'clock positions



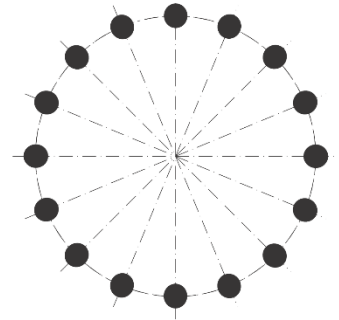
## Tool Arrangement



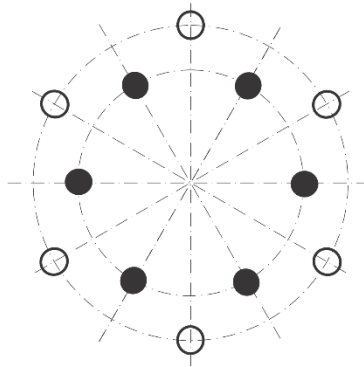
8 Pos. - 1 graduated circle



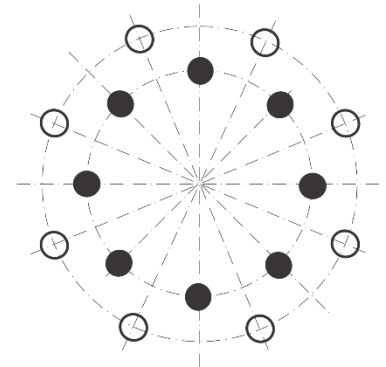
12 Pos. - 1 graduated circle



16 Pos. - 1 graduated circle



12 Pos. - 2 graduated circles



16 Pos. - 2 graduated circles

- Position with tool drive
- Position w/o tool drive

## Configurations

Configurations on **grey** background are preferably deliverable!

Further configurations – e.g. the version "left" – on request.

| Turret<br>Size | Working position |            | Motor-<br>Position | Coupling profile                                                      | Tool-holder<br>receptacle Ø<br>DIN 69880 | 8 fold   | 12 fold  |
|----------------|------------------|------------|--------------------|-----------------------------------------------------------------------|------------------------------------------|----------|----------|
|                | x                | y          |                    |                                                                       |                                          |          |          |
| 12             | <b>+98.54</b>    | <b>-17</b> | <b>9°</b>          | <b>DIN 5480</b>                                                       | <b>20</b>                                |          | <b>x</b> |
|                | +100             | 0          | 9°                 | <b>W10 x 0.8</b>                                                      | 20                                       |          | x        |
|                | -100             | 0          | 3°                 | <b>M<sub>zul</sub> = 12.5Nm</b>                                       | 20                                       |          | x        |
|                | <b>+98.54</b>    | <b>-17</b> | <b>9°</b>          | <b>DIN 5482</b><br><b>B15 x 12</b><br><b>M<sub>zul</sub> = 12.5Nm</b> | <b>30</b>                                | <b>x</b> |          |
| 16             | <b>+117.4</b>    | <b>-25</b> | <b>12°</b>         | <b>DIN 5482</b><br><b>B15 x 12</b><br><b>M<sub>zul</sub> = 20Nm</b>   | <b>30</b>                                |          | <b>x</b> |
|                | +120             | 0          | 12°                |                                                                       | 30                                       | x        | x        |
|                | <b>+120</b>      | <b>0</b>   | <b>9°</b>          |                                                                       | <b>30</b>                                | <b>x</b> | <b>x</b> |
|                | <b>-120</b>      | <b>0</b>   | <b>12°</b>         |                                                                       | <b>30</b>                                | <b>x</b> | <b>x</b> |
|                | +150             | 0          | 9°                 |                                                                       | 30                                       |          | x        |
|                | <b>+150</b>      | <b>0</b>   | <b>12°</b>         |                                                                       | <b>30</b>                                |          | <b>x</b> |
| 20             | <b>+155</b>      | <b>0</b>   | <b>9°</b>          | <b>DIN 5482</b><br><b>B17 x 14</b><br><b>M<sub>zul</sub> = 32Nm</b>   | <b>40</b>                                | <b>x</b> | <b>x</b> |
|                | +155             | 0          | 12°                |                                                                       | 40                                       | x        | x        |
|                | <b>-155</b>      | <b>0</b>   | <b>12°</b>         |                                                                       | <b>40</b>                                | <b>x</b> | <b>x</b> |
|                | <b>-150</b>      | <b>0</b>   | <b>12°</b>         |                                                                       | <b>40</b>                                | <b>x</b> |          |
|                | <b>+170</b>      | <b>0</b>   | <b>9°</b>          |                                                                       | <b>40</b>                                |          | <b>x</b> |
|                | <b>+185</b>      | <b>0</b>   | <b>9°</b>          |                                                                       | <b>40</b>                                |          | <b>x</b> |
| 25             | <b>-180</b>      | <b>0</b>   | <b>12°</b>         | <b>DIN 5482</b><br><b>B20 x 17</b><br><b>M<sub>zul</sub> = 63Nm</b>   | <b>50</b>                                | <b>x</b> |          |
|                | +235             | -70        | 9°                 |                                                                       | 50                                       |          | x        |
|                | <b>+200</b>      | <b>0</b>   | <b>9°</b>          |                                                                       | <b>50</b>                                |          | <b>x</b> |
|                | <b>+200</b>      | <b>-20</b> | <b>12°</b>         |                                                                       | <b>50</b>                                |          | <b>x</b> |
|                | <b>+210</b>      | <b>0</b>   | <b>12°</b>         |                                                                       | <b>50</b>                                |          | <b>x</b> |
| 32             |                  |            |                    | <b>DIN 5482</b>                                                       |                                          |          |          |
|                |                  |            |                    |                                                                       |                                          |          |          |
|                |                  |            |                    |                                                                       |                                          |          |          |
|                |                  |            |                    |                                                                       |                                          |          |          |
|                |                  |            |                    |                                                                       |                                          |          |          |

## Performance Data for the Tool Coupling

The gearbox is designed for the performance data indicated below for the coupling.

The actually available performance data depend on:

- the drive motor used
- the rpm on the tool coupling
- the duty cycle
- the cutting performance

The values given in the following examples of cutting capacity can be taken as reliable estimates:

| Series                                                        |           |                     |
|---------------------------------------------------------------|-----------|---------------------|
| Disk-type tool 0.5.433.xxx                                    |           |                     |
| Gearbox performance data                                      |           |                     |
| • Adm. drive rating <sup>1)</sup>                             | $P_{adm}$ | kW                  |
| • Adm. torque <sup>2)</sup>                                   | $M_{adm}$ | Nm                  |
| • Adm. rpm <sup>3)</sup>                                      | $n_{adm}$ | rpm                 |
| Recommended drive <sup>4)</sup> degree of protection to IP 67 |           |                     |
| Siemens servo motor<br>Typ 1 FT 6                             |           |                     |
| Gear ratio <sup>5)</sup> motor rpm / tool coupling            |           | $i = n_{mot} / n_2$ |
| Fanuc – servo motor                                           |           |                     |
| Fanuc – Spindle motor<br>Typ Alpha                            |           |                     |
| Gear ratio motor rpm / tool coupling                          |           | $i = n_{mot} / n_2$ |

1) The values apply for short-time operation.

2) Torque limitation on the motor converter required.

The torque values apply to smooth machining (such as drilling, thread cutting).

In case of machining processes subject to shock (e.g. milling),

the  $P_c$  cutting performance must be reduced by 50 % or more without reducing the required speed  $n_c$ .

3) Higher values on request

4) Spindle motor

5) Further motors on request

| Size |      |      |      |      |     |     |      |      |
|------|------|------|------|------|-----|-----|------|------|
| 10   | 12   | 16   | 20   | 25   |     |     | 32   | 40   |
|      |      |      |      | D30  | D40 | D50 |      |      |
| 4    | 5    | 6    | 8    | 10   | 10  | 10  | 12.5 | 15   |
| 8    | 12.5 | 20   | 32   | 32   | 63  | 63  | 130  | 160  |
| 6000 | 6000 | 5000 | 4000 | 4000 |     |     | 3200 | 2500 |

| ..044..AK..  | ..062..AK.. | ..064..AK..  | ..082..AK.. | ..086..AH.. | ..108..AF.. | ..108..AF.. |
|--------------|-------------|--------------|-------------|-------------|-------------|-------------|
| 1.0          | 1.5 1.0     | 1.5 1.0      | 1.32 1.0    | 1.63 1.0    | 1.24 1.0    | 1.3 1.0     |
| on request   | 8/4000 is   | 12/4000 is   | 22/4000 is  | 40/4000 is  | on request  | on request  |
| $\alpha$ 0.5 | $\alpha$ 1  | $\alpha$ 1.5 | $\alpha$ 2  | $\alpha$ 3  | $\alpha$ 8  | $\alpha$ 8  |
| 1.0          | 1.0         | 1.0          | 1.0         | 2.0         | 1.53        | 1.53        |

## Configuration

### 0.5.433.xxx – with reinforced tool drive

Configuration on **grey** background are preferably deliverable!

Further configurations – e.g. the version "left" – on request.

| Turret Size | Working position<br>x / y | Motor-position | Coupling profile<br>Coupling process<br>with search run                 | Tool holder<br>receptacle ø<br>DIN 69880 | Possible tool<br>arrangement |
|-------------|---------------------------|----------------|-------------------------------------------------------------------------|------------------------------------------|------------------------------|
| 12          | +100 / 0                  | 9°             | <b>DIN 5480</b><br><b>W10 x 0.8</b><br><b>M<sub>zul</sub> = 12.5 Nm</b> | 20                                       | 12 - 2                       |
|             | <b>+120 / 0</b>           | <b>9°</b>      |                                                                         | <b>20</b>                                | <b>12 - 1</b>                |
| 16          | +120 / 0                  | 9°             | <b>DIN 5482</b><br><b>B15 x 12</b><br><b>M<sub>zul</sub> = 32 Nm</b>    | 30                                       | 12 - 2                       |
|             | +135 / 0                  | 12°            |                                                                         | 30                                       | 12 - 2                       |
|             | <b>+150 / 0</b>           | <b>9°</b>      |                                                                         | <b>30</b>                                | <b>12 - 1</b>                |
| 20          | +155 / 0                  | 9°             | <b>DIN 5482</b><br><b>B17 x 14</b><br><b>M<sub>zul</sub> = 63 Nm</b>    | 40                                       | 12 - 2                       |
|             | <b>+170 / 0</b>           | <b>9°</b>      |                                                                         | <b>40</b>                                | <b>12 - 2</b>                |
|             | <b>+185 / 0</b>           | <b>9°</b>      |                                                                         | <b>40</b>                                | <b>12 - 1</b>                |
|             | +195 / 0                  | 12°            |                                                                         | 40                                       | 12 - 1                       |
| 25          | +198 / -70                | 9°             |                                                                         | 50                                       | 12 - 2                       |
|             | <b>+210 / 0</b>           | <b>9°</b>      |                                                                         | <b>50</b>                                | <b>12 - 1</b>                |
| 32          |                           |                |                                                                         |                                          |                              |
|             |                           |                |                                                                         |                                          |                              |
|             |                           |                |                                                                         |                                          |                              |
|             |                           |                |                                                                         |                                          |                              |

## 0.5.436.xxx - reinforced tool drive

| <b>Turret<br/>Size</b> | <b>Working<br/>position<br/>x / y</b> | <b>Motor-position</b> | <b>Coupling profile<br/>Coupling process<br/>with search run</b> | <b>Tool holder<br/>receptacle ø<br/>DIN 69880</b> | <b>Possible tool<br/>arrangement</b> |
|------------------------|---------------------------------------|-----------------------|------------------------------------------------------------------|---------------------------------------------------|--------------------------------------|
| <b>12</b>              | +100 / 0                              | 9°                    | <b>DIN 5480<br/>W10 x 0.8<br/>M<sub>zul</sub> = 12.5 Nm</b>      | 20                                                | 12 - 2                               |
|                        | <b>+120 / 0</b>                       | <b>9°</b>             | <b>DIN 5480<br/>W16 x 0.8<br/>M<sub>zul</sub> = 20 Nm</b>        | <b>20</b>                                         | <b>12 - 1</b>                        |
|                        | <b>+135 / 0</b>                       | <b>9°</b>             |                                                                  | <b>30</b>                                         | <b>12 - 1</b>                        |
| <b>16</b>              | +120 / 0                              | 9°                    | <b>DIN 5480<br/>W16 x 0.8<br/>M<sub>zul</sub> = 32 Nm</b>        | 30                                                | 12 - 2                               |
|                        | +135 / 0                              | 12°                   |                                                                  | 30                                                | 12 - 2                               |
|                        | <b>+150 / 0</b>                       | <b>9°</b>             |                                                                  | <b>30</b>                                         | <b>12 - 1</b>                        |
| <b>20</b>              | +155 / 0                              | 9°                    | <b>DIN 5480<br/>W20 x 0.8<br/>M<sub>zul</sub> = 63 Nm</b>        | 40                                                | 12 - 2                               |
|                        | <b>+170 / 0</b>                       | <b>9°</b>             |                                                                  | <b>40</b>                                         | <b>12 - 2</b>                        |
|                        | <b>+185 / 0</b>                       | <b>9°</b>             |                                                                  | <b>40</b>                                         | <b>12 - 1</b>                        |
|                        | +195 / 0                              | 12°                   |                                                                  | 40                                                | 12 - 1                               |
| <b>25</b>              | +198 / -70                            | 9°                    | <b>DIN 5480<br/>W24 x 1.25<br/>M<sub>zul</sub> = 100 Nm</b>      | 50                                                | 12 - 2                               |
|                        | <b>+210 / 0</b>                       | <b>9°</b>             |                                                                  | <b>50</b>                                         | <b>12 - 1</b>                        |
| <b>32</b>              |                                       |                       |                                                                  |                                                   |                                      |
|                        |                                       |                       |                                                                  |                                                   |                                      |
|                        |                                       |                       |                                                                  |                                                   |                                      |
|                        |                                       |                       |                                                                  |                                                   |                                      |

## Performance Data for the Tool Coupling with reinforced tool drive

The gearbox is designed for the performance data indicated below for the tool coupling.

The actually available performance data depend on:

- the drive motor used
- the rpm on the tool coupling
- the duty cycle
- the cutting performance

The values given in the following examples of cutting efficiency can be taken as **reliable estimates**:

| Series                                                       | Size               |              |            |                    |     |                    |              |                    |              |                    |              |
|--------------------------------------------------------------|--------------------|--------------|------------|--------------------|-----|--------------------|--------------|--------------------|--------------|--------------------|--------------|
| Disk-type tool turret<br>0.5.433.xxx / 436.xxx               | 12                 |              | 16         | 20                 |     | 25                 |              | 32                 |              | 40                 |              |
| Gearbox performance data                                     |                    |              |            |                    |     |                    |              |                    |              |                    |              |
| Adm. drive rating <sup>1)</sup> P <sub>adm</sub> kW          | 6                  |              | 8          | 10                 |     | 12.5               |              | 15                 |              | 16                 |              |
| Adm. torque <sup>2)</sup> M <sub>adm</sub> Nm                | 20                 |              | 32         | 63                 |     | 100                |              | 160                |              | 160                |              |
| Adm. rpm <sup>1)3)</sup> n <sub>adm</sub> min <sup>-1</sup>  | 6000               |              | 5000       | 4000               |     | 4000               |              | 3200               |              | 3200               |              |
| Gear ratio <sup>4)</sup> i = n <sub>1</sub> / n <sub>2</sub> | ~1.5 <sup>4)</sup> | 1.0          | 1.0        | ~1.5 <sup>4)</sup> | 1.0 | ~1.5 <sup>4)</sup> | 1.0          | ~1.5 <sup>4)</sup> | 1.0          | ~1.5 <sup>4)</sup> | 1.0          |
| Recommended drive motors degree of protection to IP 67       |                    |              |            |                    |     |                    |              |                    |              |                    |              |
| Siemens servo motor<br>Typ 1 FT 6..                          | ..062<br>6AK       | ..064<br>6AK | ..084-8AK  | ..086-8AK          |     | ..102<br>8AH       | ..105<br>8AF | 1PH7<br>107        | ..108<br>8AF | 1PH7<br>107        | ..108<br>8AF |
| Fanuc servo motor                                            | 8/4000 is          |              | 12/4000 is | 22/4000 is         |     | 40/4000 is         |              | on request         |              | on request         |              |
| Fanuc-Spindle motor<br>Typ Alpha                             |                    |              | α 2        | α 3                | α 6 | α 8                | α 8          | α 8                |              |                    |              |
|                                                              |                    | α 1.5        |            |                    |     |                    |              |                    |              |                    |              |

- 1) The values are reference values for short-term operation. Higher rpm generate more heat and noise.
- 2) Torque limitation on the motor converter required! The torque values apply to smooth machining (such as drilling, thread cutting). In the case of machining with severe shock loads (e.g. face milling and similar operation) it is necessary to reduce the motor drive torque by 50% or more
- 3) Higher rpm on request
- 4) Option. i = 1.5 only on turret series 0.5.433.xxx

## Series 0.5.435.xxx

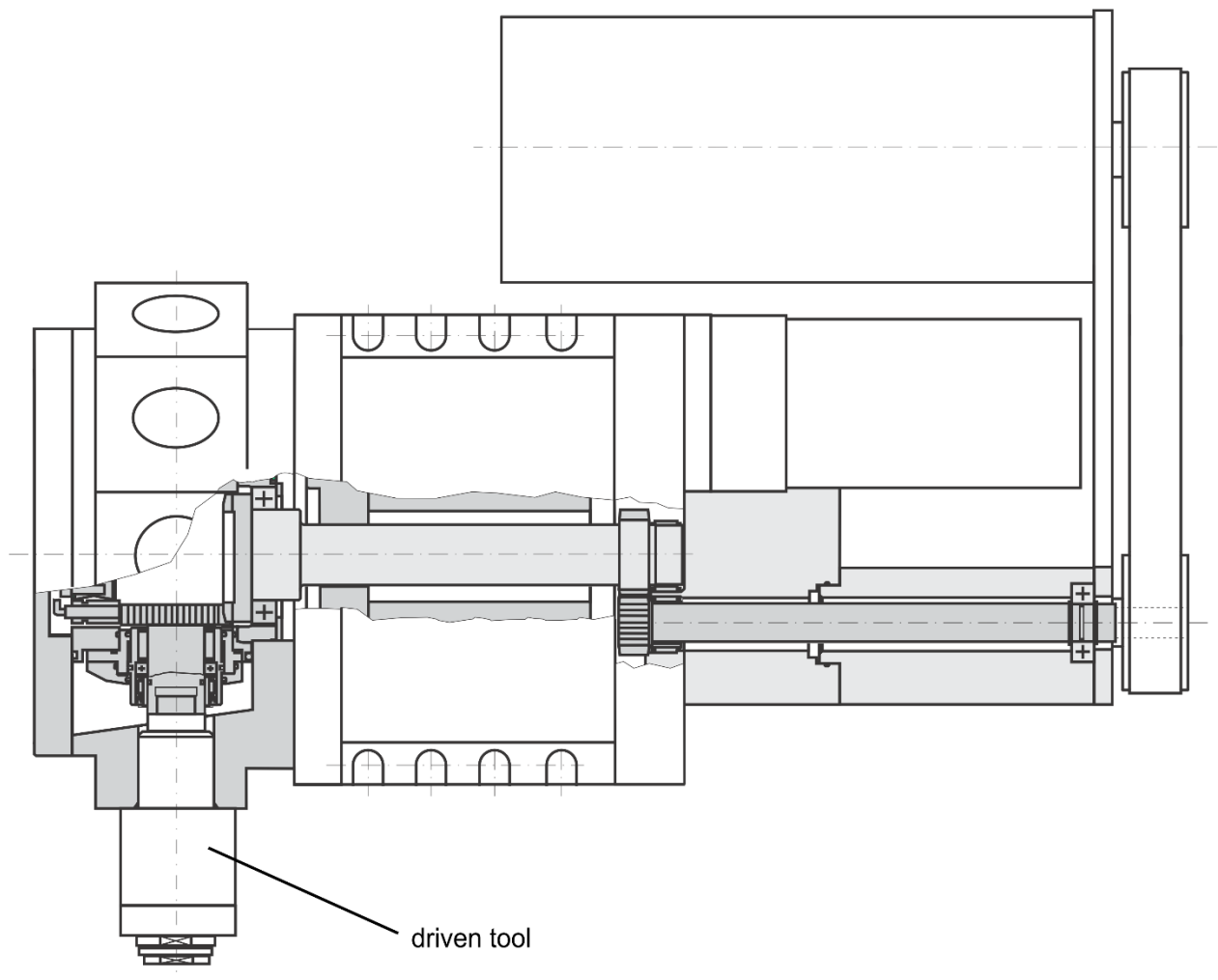
with radial tool drive (only available with foot-shape housing)

### Description

These turret series 0.5.440.xxx and

- Basic turret series 0.5.440.xxx and
- Tool drive **central** for individually switchable radial driven tools for **forward** and **reverse** machining.

This requires driven tools with spindle locking system – GPM driven tools series 0.5.941.xxx-



The tool drive motor drives – either directly or via a belt drive – the drive shaft, which is located centrally within the turret in a hollow shaft. The tool in the working position is connected inside the gear head via an angular gear and a fluid – switched coupling.

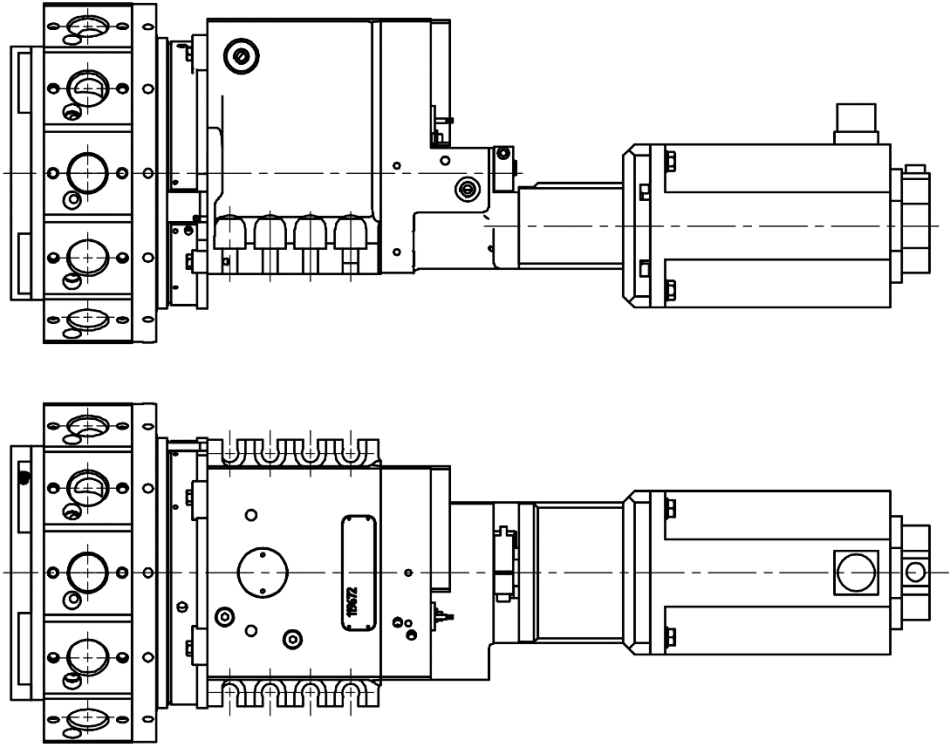
Coupling and decoupling of the driven tool located in the working position is executed after each positioning of the tool drive motor "C not tooth on tooth situation, shortest switching time!

In these turret systems, the tool disk is an integrated part of the turret.

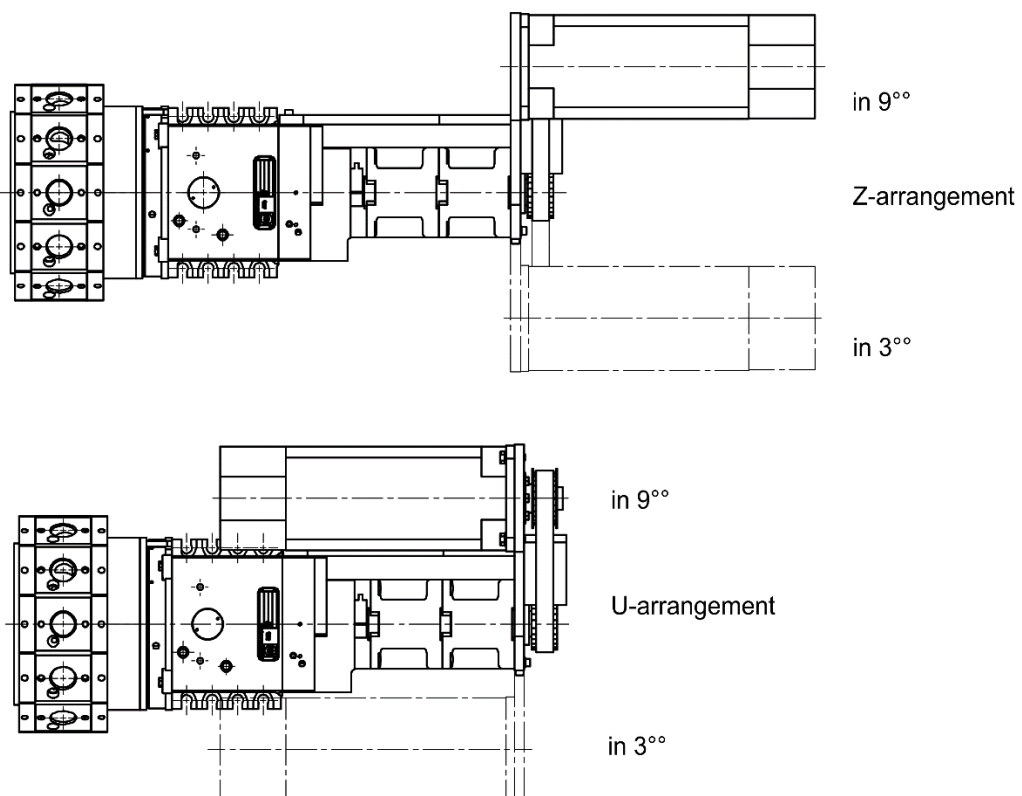
## Motor Arrangement

The tool drive motor can be installed directly on the turret or with a belt drive, depending on the application specifications.

Motor – arrangement – direct-



Motor – arrangement with deflection



## Performance Data for the Tool Coupling

The gearbox is designed for the performance data indicated below for the tool coupling.

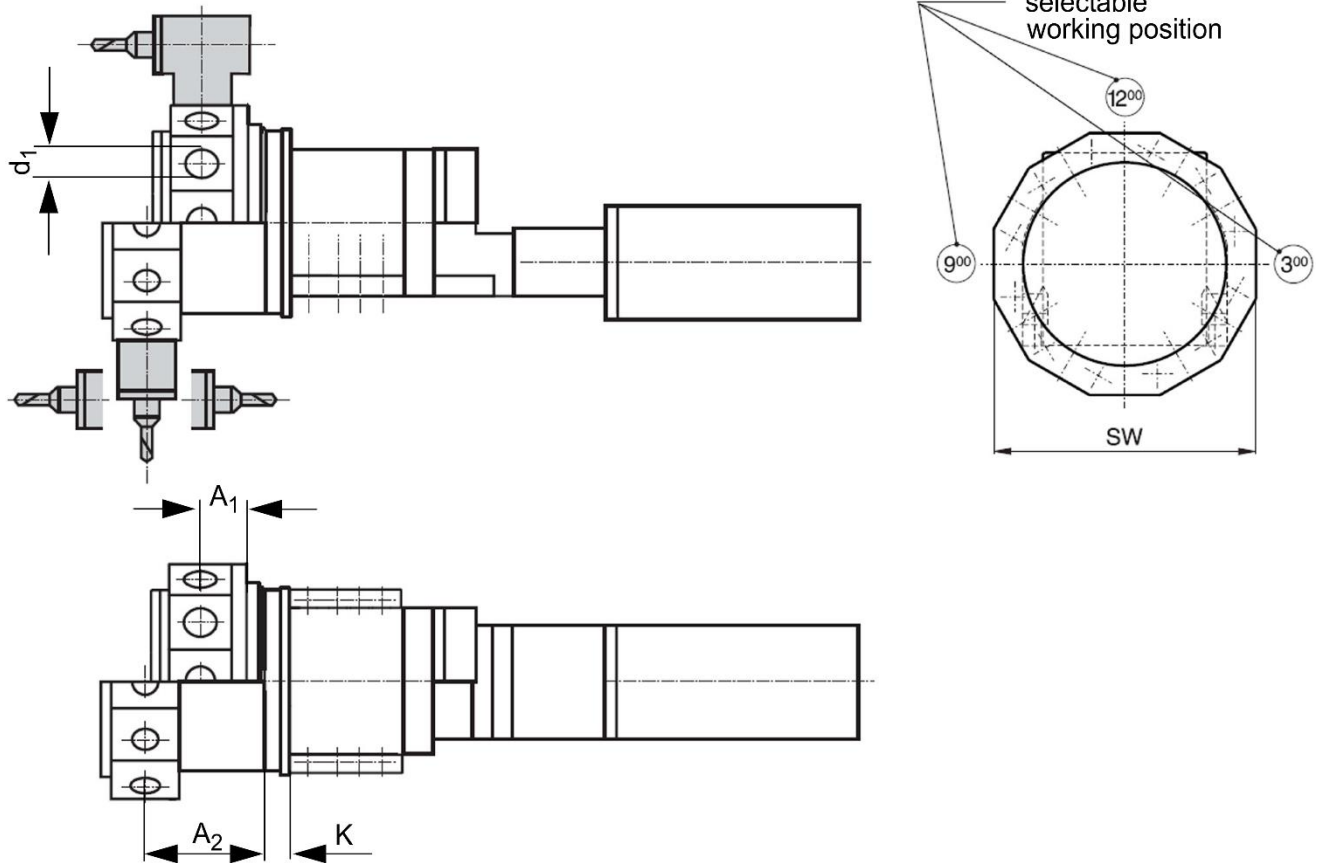
The actually available performance data depend on the drive motor used (see below).

| Series                                                        | Size        |             |             |             |            |
|---------------------------------------------------------------|-------------|-------------|-------------|-------------|------------|
| <b>Disk-type tool turret</b><br><b>0.5.435.xxx</b>            | 12          | 16          | 20          | 25          | 32         |
| Gearbox performance data                                      |             |             |             |             |            |
| Adm. drive rating <sup>1)</sup> P <sub>adm</sub> kW           | 6           | 8           | 10          | 12.5        | 15         |
| Adm. torque <sup>2)</sup> M <sub>adml</sub> Nm                | 20          | 32          | 63          | 100         | 160        |
| Adm. rpm <sup>1)3)</sup> n <sub>adm</sub> min <sup>-1</sup>   | 6000        | 5000        | 4000        | 4000        | 3200       |
| Gear ratio i = n <sub>1</sub> / n <sub>2</sub>                | 1.0         | 1.0         | 1.0         | 1.0         | 1.0        |
| <b>Recommended drive motors</b> degree of protection to IP 67 |             |             |             |             |            |
| Siemens servo motor                                           |             |             |             |             |            |
| Typ 1 FT 6..                                                  | ..064 - 1AK | ..084 - 1AK | ..086 - 1AH | ..105 - 1AF | ..108 - A  |
| Fanuc servo motor                                             | 8/4000 is   | 12/4000 is  | 22/4000 is  | 40/4000 is  | on request |
| Typ 1 FT 6..                                                  | α 1.5       | α 2         | α 3         | α 6         | α 8        |

- 1) The values are reference values for short-term operation. Higher rpm generate more heat and noise, especially when the belt drive is used!
- 2) Torque limitation at motor converter required! The torque values apply to smooth-machining (such as thread drilling).  
In the case of machining with severe shock loads  
(e.g. face milling and similar operation) it is necessary to reduce the motor drive torque by 50% or more
- 3) Higher rpm on request

**Note: See page 20 for how to define the duty cycle (DC).**

## Dimensions



| Series                                                    |                            | Size     |          |          |           |
|-----------------------------------------------------------|----------------------------|----------|----------|----------|-----------|
| Disk-type tool turret<br>0.5.435.xxx                      |                            | 12       | 16       | 20       | 25        |
| Coupling profile DIN 5480                                 |                            | 14 x 0.8 | 16 x 0.8 | 20 x 0.8 | 24 x 1.25 |
| Distance                                                  | A <sub>1</sub> (standrad)  | 48       | 55       | 80       | 100       |
|                                                           | A <sub>2</sub>             | 80       | 96       | 159      | 198       |
|                                                           | K                          | 32       | 40       | 41       | 52        |
| Tool holder receptacle system<br>cylinder shaft DIN 69880 |                            |          |          |          |           |
|                                                           | d <sub>1</sub>             | 25       | 30       | 40       | 50        |
|                                                           | SW <sub>1</sub> -standard  | 220      | 270      | 320      | 380       |
|                                                           | SW <sub>2</sub> (optional) | 240      | -        | 360      | 410       |
|                                                           | SW <sub>3</sub> (optional) | 300      | 340      | 380      | -         |
| Tool system Coromant Capto (optional)                     |                            |          |          |          |           |
|                                                           | NG                         | C3       | C4       | C5       | C5        |
|                                                           | SW                         | 280      | 340      | 380      | 420       |

## Type Key

0.5.440. 2 20

### Series

0.5.440

Disk-type tool turret  
without tool drive

0.5.433

Disk-type tool turret  
with axial tool drive  
coupling process with search run

0.5.435

Disk-type tool turret  
with radial tool drive  
coupling process with spindle  
positioning

0.5.436

Disk-type tool turret  
with axial tool drive  
coupling process with  
spindle positioning

**Design** Series 440, 435

**2** Disk-type tool turret  
hydraulic

**Design** Series 433, 436

**1** Disk-type tool turret  
actuated magnetically

**2** Disk-type tool turret  
actuated hydraulically

Size

12

16

**20**

25

32

40

## Order Details

|                                                                                   |                                                                                                        |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|  | Service<br>GPM CO., LTD<br>No. 368, Sec. 4, Huan Zhong Rd., Nan tun<br>District, Taichung City, Taiwan |
|  | +886-4-23805836                                                                                        |
|  | +886-4-23805832                                                                                        |
|  | www.GPMcnc.com                                                                                         |
|  | info@gpmcnc.com                                                                                        |

Company: \_\_\_\_\_

Street: \_\_\_\_\_

Postal Code: \_\_\_\_\_  
City

Name: \_\_\_\_\_

Phone: \_\_\_\_\_

Fax: \_\_\_\_\_

E-Mail: \_\_\_\_\_

| GPM Disk-type tool turret 0.5.440.xxx / 0.5.433. / 436.xxx / 0.5.435.xxx                                                            |                                                                                                                                                                                  |               |
|-------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Ordering details                                                                                                                    | Possible configurations                                                                                                                                                          | You selection |
| <b>Basis turret</b><br><br>Size<br>Number of switching positions<br>Turret drive motor<br>Referenzschalter<br>Installation position | 12 / 16 / 20 / 25 / 32 / 40<br><br>8 / 12 / 16<br><br>Siemens / Fanuc / ...<br><br>yes / no                                                                                      |               |
| <b>Axial tool drive</b><br><br>Working position X / Y<br>Motor position<br>Motor used<br>Gear ratio<br>Coupling profile             | s. page 23<br><br>3° / 9° / 12°<br><br>s. page 24 / 25<br><br>1.0 / 1.5                                                                                                          |               |
| <b>Radial tool drive</b><br><br>Working position<br>Tool disk A / F<br>- neck length A<br>Tool system<br>Motor arrangement          | 3° / 9° / 12°<br><br>SW <sub>1</sub> / SW <sub>2</sub> / SW <sub>3</sub> /<br><br>A <sub>1</sub> / A <sub>2</sub><br><br>DIN 69880 / Sandvik / Capto<br><br>U / Z – right / left |               |
| Motor used<br>Gear ratio                                                                                                            | s. page 32<br><br>1.0 / 1.5                                                                                                                                                      |               |
| <b>Special requirements:</b>                     |                                                                                                                                                                                  |               |