FIBROPLAN® NC-Rotary tables

Design: Standard and Vertical

FIBROPLAN® Standard

FIBROPLAN® Vertical
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The well-graded range of FIBROPLAN NC-Rotary Tables is characterized by the very extensive capabilities of the rotary table movement and angular positioning, both under full CNC-control. FIBROPLAN tables are used on machine tools of diverse type and description, with the control of their rotational axis provided either by an additional control axis of the machine's CNC, or by a separate CNC-unit for the rotary table itself. FIBROPLAN Rotary Tables are the result of progressive, non-compromising design concepts, aimed at utmost versatility and operational rigidity. These attributes, together with drive- and control elements of outstanding quality, enable the user to achieve --:

- accurate positioning steps of greatest flexibility, through angular displacements of unrestricted magnitude and operational sequence
- safe handling of large machining forces by the stationary table and thereby full utilization of the machine tool's cutting potential
- rotary milling operations with high demands on torque rating, even under conditions of fluctuating push-pull cutting conditions.

The FIBROPLAN manufacturing program offers a wide choice of types, sizes and performance specifications -- and therefore an ideal selection for each individual application. The following basic types are available --:

- FIBROPLAN Standard -- for uses with predominantly vertical table axis (i.e. horizontal table face)
- FIBROPLAN Vertical -- for uses with horizontal table axis, i.e. chiefly with vertical table face
- FIBROPLAN Compound -- for applications demanding multiple axis position such as machining of five workpiece faces in one clamping, also for machining tasks with complex three-dimensional geometries.
- FIBROPLAN executions with facilities for pallet clamping are also part of our manufacturing program -- as are special designs for complete integration with the carrier machine tool.

Unrestricted rotary positioning in freely selectable sequence and magnitude.

Positioning accuracies from plus/minus 3” (direct measuring system) to plus/minus 10” (indirect measuring system) -- for the ideal balance between demands and investment.

High precision in terms of radial and facial runout, due to selected, preloaded radial/axial combination bearings of the largest possible diameter.

Safe handling of forces imposed by heavy machining and of high torque ratings.

Optional hydraulic table clamping for even higher machining forces and their elimination as a result of careful design and exacting craftsmanship in assembly.

Reliability and long service life as a result of careful design and exacting craftsmanship in assembly.

Low maintenance demands because of extensively applied long-term lubrication.

Wide variety of batch-produced standard models -- with many variants selectable from a modular supplementary system.

Multiple-axis executions and special table combinations with linear carrier tables.

Executions with pallet clamping facilities and workpiece pallets.

Custom designs for special purposes.

Right of alterations reserved
The basic NC-Rotary Table FIBROPLAN consists of the major components table housing, table top, table bearing and drive gear. The main supplementary elements comprise the measuring system, the drive motor, and possibly hydraulic table clamping.

A wide range of optional supplements such as NC-controls and accessories make it possible to expand the installation into a completely NC-controlled axis for rotation and positioning.

The basic type FIBROPLAN Standard is intended chiefly for use with the table axis in the vertical position—which is with a horizontal table face. A compact, low-slung design ensures maximum utilization of the machine tool’s working space and utmost rigidity—which is further enhanced by special attention to table stability in the design of all relevant components.

Table sized 2 to 4 of the Standard series have a second mounting face perpendicular to the main one, thereby permitting alternative use with the table face in the vertical position.

FIBROPLAN Vertical—models are meant for use mainly with horizontal table axis—i.e. with the table face in the vertical position. Again the construction is highly compact, with the table axis kept as low as possible. The housing width matches that of the corresponding linear sub-table. Use with the table face in the horizontal position is provided for by the (optional) availability of Tee-slots as the back of the table housing, and in this attitude the permissible mass carried on the table is increased to that of the comparable “Standard” model.

The following descriptions equally apply to both the “Standard” and the “Vertical” models unless otherwise indicated.
A preloaded radial/axial combination bearing of highest precision is used to carry the rotary table. Throughout the range of table sizes, the bearing diameter was kept to the largest possible dimension. Together with the most rigid design of all concerned parts, this feature contributes to the exceptional stability of FIBROPLAN Rotary Tables.

Transmission from the drive motor to the rotary table takes place via a worm drive, either in direct power train, or by way of a secondary gear drive unit. The worm drive is distinguished by a worm wheel of the largest possible diameter. This leads to lower contact pressure and a wider meshing arc. Play between the worm and the worm wheel can be adjusted, thereby increasing the positioning accuracy on models with indirect displacement measuring. Moreover, the resulting freedom from backlash benefits rigidity in rotary milling, especially where fluctuating push-pull conditions are encountered. The overdimensioned, careful design layout of the worm drive as well as uncompromising selection of materials ensure lowest wear rates and long service life.

FIBROPLAN tables of size 5 and larger are normally fitted with a secondary gear drive unit. In cases where space considerations necessitate a remotely mounted motor, toothed belt drives are employed. Secondary gear drive units generally bring the advantage of reducing the drive motor rating.

FIBROPLAN tables can be supplied with pneumatic or hydraulic pressure lines through the central table bore—often required for the actuation of workpiece power clamping. These arrangements use a rotary union and are available on request.

Models with a clear bore through the table centre are obtainable also (bore diameter as per data sheet). On tables with direct displacement measuring the bore diameter is reduced in accordance with the particulars of the Inductosyn or encoder fitted.

Hydraulic table clamping is available as an optional feature. It offers powerful clamping of the rotary table to the housing and the safe handling of higher tangential machining forces. In the clamped state, the entire worm drive remains free from any transmitted stresses.

As measuring systems for the table top displacement relative to the zero datum position, different versions of incremental rotary resolvers are employed. These vary in respect of constructional type and resolution accuracy. Their final selection depends on the application parameters and on the characteristics of the existing NC-system of the carrier machine tool.

Principally there are two types of measuring systems for rotary tables. The Direct measuring System is defined by the direct coupling of the measuring elements to the rotary table; its accuracy depends solely on the resolution rating of the resolver. Other, extraneous fault sources such as errors of the transmission drive are excluded. Direct systems yield the highest degree of accuracy in rotary displacement measuring. Independent measuring systems have the resolver coupled to the worm shaft. This arrangement makes lesser demands on resolution accuracy but also introduces gearing errors and backlash into the ultimate result, which therefore is of a lower order. With the adjustable precision worm drives of FIBROPLAN tables it is nevertheless possible to achieve excellent results with indirect systems—often quite adequate for many applications. Specifications on positioning accuracies are given on the technical data sheets.

The measuring system of FIBROPLAN tables is calibrated to a fixed zero datum. The turntable can be driven to this reference point by way of a proximity switch which reduces the clockwise rotational motion to a slow approach. The defined response distance of the proximity switch can be seen under “technical data”. Anticlockwise approach of the zero datum position is available by special request.

AC or DC servo-motors are normally used for the table drive. However, other electric or hydraulic motors are possible and can be fitted on request. In most cases, the specific application data will determine make and type of the table drive motor. It is important that only motors without brakes fitted are used to avoid possible damage to the drive (worm and worm wheel) when unprogrammed stoppages occur.

A fully sealed motor shaft is required between the motor and the gearbox.
Displacement Measuring Systems – Arrangements of Resolver etc.

1. Direct Measuring System: resolver fitted directly to table top

2. Indirect Measuring System: resolver fitted to free end of worm shaft

3. Indirect Measuring System: resolver fitted to drive end side of worm shaft (toothed belt drive from motor)

4. Indirect Measuring System: resolver fitted to free end of motor shaft

Motor Arrangements with and without gearing (When ordering please quote the appropriate code in field 6)

1* FIBROPLAN Standard * depicts normal execution alternatives available on request

2* FIBROPLAN Vertical * depicts normal execution alternatives available on request

3* to be supplied prepared for fitting of customers drive motor

4* to be supplied with drive motor fitted
Composition of ordering code Number
The ordering code number is arranged in blocks. These give a definite description of table model, type, size, optional equipment and accessories.

1. Model:
- basic FIBROPLAN Table as per data sheet

   Key
   NC: Rotary Table FIBROPLAN
   Type: 1 = Standard, 2 = Vertical
   Size: write “06” for size 6, for instance ___________

2. Table top Dimensions:
   precede mm-dimension with “0” if less than 1000 mm (e.g. “0240”)

3. Table top Execution details:
   1 = round, without Tee-slots 2 = round, with Tee-slots
   3 = square, without Tee-slots 4 = square, with Tee-slots
   0 = Table top to customer’s drawings

4. Hydraulic Clamping of Table top:
   0 = without
   1 = with hydr. Table clamping system

5. Measuring System:
   0 = supplied prepared for installation of system by customer
   1 = supplied with measuring system fitted
   – for arrangement of resolvers, see code numbers given on page 8 – (insert in block 5)

6. Drive Motor: (only motors without brakes fitted)
   0 = supplied prepared for customer’s motor
   1 = supplied with motor installed
   Motor arrangement: refer to page 8 and insert requisite code number in block 6

7. Accessories/Supplementary Equipment: list separately, giving full description.

Example of completed Ordering Code Number: NC 1.06.0630.4.1.12.05

– We shall be pleased to process incoming orders NOT encoded in accordance with our ordering code system –
FIBROPLAN®
Special execution
## General Dimensions

<table>
<thead>
<tr>
<th>Specification</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>table top dimensions mm</td>
<td>240/280</td>
</tr>
<tr>
<td>centre height table top mm</td>
<td>180</td>
</tr>
<tr>
<td>height table top face above base mm</td>
<td>190</td>
</tr>
<tr>
<td>bearing dims. (I.D x O.D.) mm</td>
<td>120 x 210</td>
</tr>
</tbody>
</table>

### Capacities (maximum (values)

<table>
<thead>
<tr>
<th>Category</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>thrust against table top face:</td>
<td></td>
</tr>
<tr>
<td>a) table top face horizontal N</td>
<td>25,000</td>
</tr>
<tr>
<td>b) table top face vertical N</td>
<td>9,000</td>
</tr>
<tr>
<td>table top loading (workpieces + fixtures):</td>
<td></td>
</tr>
<tr>
<td>a) table top face horizontal kg</td>
<td>800</td>
</tr>
<tr>
<td>b) table top face vertical kg</td>
<td>250</td>
</tr>
<tr>
<td>tilting moments:</td>
<td></td>
</tr>
<tr>
<td>a) table top face horizontal Nm</td>
<td>3,200</td>
</tr>
<tr>
<td>b) table top face vertical (incl. moment of workpieces + fixtures) Nm</td>
<td>2,000</td>
</tr>
<tr>
<td>torque exerted in rotary milling Nm</td>
<td>850</td>
</tr>
<tr>
<td>tangential torque, exerted against table top locked hydraulically Nm</td>
<td>1,200</td>
</tr>
</tbody>
</table>

### Accuracies

<table>
<thead>
<tr>
<th>Category</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>positioning accuracy:</td>
<td>± 15</td>
</tr>
<tr>
<td>a) with Direct Measuring System&quot;</td>
<td>± 15</td>
</tr>
<tr>
<td>b) with Direct Measuring System&quot; (dependent on resolver type)</td>
<td>± 3</td>
</tr>
<tr>
<td>runout: central bore table top (TIR) mm</td>
<td>0,01</td>
</tr>
<tr>
<td>runout: table top face (TIR) mm</td>
<td>0,01</td>
</tr>
</tbody>
</table>

### Gear Ratios/ Table top Speeds

<table>
<thead>
<tr>
<th>Specification</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>total drive ratio motor table top</td>
<td>72/144</td>
</tr>
<tr>
<td>table top rotational speed (max.) min⁻¹</td>
<td>27,5</td>
</tr>
</tbody>
</table>

Program
FIBROPLAN® Standard
NC 1.02 Technical Data

1. Type designation

FIBROPLAN NC1.02

Size 02.

2. Table top

dimension
- ∅ 240 mm
- ∅ 280 mm

execution
- round without T-slots
- square without T-slots
- square with T-slots

3. Locking, of rotary table spindle

without hydraulic table clamping
with hydraulic table clamping

4. Measuring system

see page 8

5. Drive motor arrangement

see page 8

6. Technical data

Optional centre bore – max. ∅ mm 65
Table top bearing ID × OD mm 120 × 210
Diameter of worm wheel mm 182

Ratio:
- Worm drive ratio i = 72
- Total drive ratio, with secondary drive
  (see page 6) i tot = 144

Table top speed (max.) n max. = 27,50 min–1

Hydraulic table clamping:
- system pressure rating bar 64
- consumption cm3 4
- pump delivery rating l/min max. 2

Any mounting attitude of FIBROPLAN

Weight of FIBROPLAN (table top ∅ 240, without drive motor) kg approx. 80

7. Accuracies

Positioning accuracies:
- a) with Indirect Measuring System
  in seconds of arc ± s ± 15° (± 10° on request)
  indicator reading at ∅ 240 mm ± 0,009 TIR
- b) with Direct Measuring System
  in seconds of arc ± s ± 3°
  indicator reading at ∅ 240 mm ± 0,0017

Runout: centre bore in the rotary table mm 0,01
Runout: table top face
  (relative to ∅ 240) mm 0,01
Parallelism: table top face to
  mounting face (relative to ∅ 240) mm 0,02
Squareness: table top face to
  mounting face (relative to ∅ 240) mm 0,02
Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)

excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table p min–1</th>
<th>10</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>27,50</td>
<td>27,50</td>
<td>27,50</td>
</tr>
<tr>
<td>Moment of inertia from transport load J kgm2</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Angular acceleration at table α s–2</td>
<td>14,40</td>
<td>10,50</td>
<td>7,85</td>
</tr>
<tr>
<td>Positioning time t s</td>
<td>0,25</td>
<td>0,25</td>
<td>0,30</td>
</tr>
<tr>
<td>Acceleration/deceleration time per tα, tv s</td>
<td>0,20</td>
<td>0,30</td>
<td>0,40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turning angle at table p min–1</th>
<th>10</th>
<th>90</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>27,50</td>
<td>27,50</td>
<td>27,50</td>
</tr>
<tr>
<td>Moment of inertia from transport load J kgm2</td>
<td>8</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Angular acceleration at table α s–2</td>
<td>14,40</td>
<td>10,50</td>
<td>7,85</td>
</tr>
<tr>
<td>Positioning time t s</td>
<td>0,55</td>
<td>0,65</td>
<td>0,75</td>
</tr>
<tr>
<td>Acceleration/deceleration time per tα, tv s</td>
<td>0,20</td>
<td>0,30</td>
<td>0,40</td>
</tr>
</tbody>
</table>

Ordering inform. with code no. NC1.02 Right of alterations reserved
10. Load data

Thrust against table top face:
- a) table top horizontal (load + machining forces) N 25 000
- b) table top vertical N 9 000

Radial thrust against table top N 25 000

Table top loads (workpieces + fixtures):
- a) table top horizontal kg 800
- b) table top vertical kg 250

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 20

 Tilting moments:
- a) table top horizontal Nm 3 200
- b) table top vertical - incl. moment exerted by workpieces + fixtures Nm 2 000

 Tangential moment against table top (with hydr. table clamping activated) Nm 1 200

Torque limit Nm 850
	ransferable by worm drive

Maximum permissible motor torque when but. = 72 Nm 40

Motor torque requirement for when but. = 144 Nm 8

positioning only when but. = 144 Nm 4

11. Installed dimensions

Drawings of DXF files available to order.

Reference slot (optional) indicate reqrd. location 1, 2, 3 with order

See page 8 for additional arrangements for motor and rotary resolver
### 1. Type designation

FIBROPLAN  NC1.

**Field 1** NC 1.03

**Field 2**

**Field 3**

### 2. Table top

<table>
<thead>
<tr>
<th>Dimension</th>
<th>mm</th>
<th>Field 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 340</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 400</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Field 3**

<table>
<thead>
<tr>
<th>Execution</th>
<th>Field 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>round without T-slots</td>
<td></td>
</tr>
<tr>
<td>square without T-slots</td>
<td></td>
</tr>
<tr>
<td>square with T-slots</td>
<td></td>
</tr>
</tbody>
</table>

### 3. Locking, of rotary table spindle

| without hydraulic table clamping |   |
| with hydraulic table clamping |   |

### 4. Measuring system

see page 8

### 5. Drive motor arrangement

see page 8

### 6. Technical Data

| Optional centre bore – max. | mm | 110 |
| Table top bearing ID × OD | mm | 200 × 300 |
| Diameter of worm wheel | mm | 275 |

**Ratio:**

- Worm drive ratio: \( i = 120 \)
- Total drive ratio, with secondary drive (see page 6): \( i_{tot} = 240 \)

**Table top speed (max.):** \( n_{max} = 12.5 \)

**Hydraulic table clamping:**

- System pressure rating: bar 64
- Consumption: cm³ 4
- Pump delivery rating: l/min max. 2

Any mounting attitude of FIBROPLAN

**Weight of FIBROPLAN** (table top Ø 340, without drive motor) kg approx. 170

### 7. Accuracies

**Positioning accuracies:**

- With Indirect Measuring System in seconds of arc \( \pm 15 \) (± 10 on request)
- Indicator reading at Ø 340 mm ± 0.012

- With Direct Measuring System in seconds of arc \( \pm 3 \)
- Indicator reading at Ø 340 mm ± 0.0025

**Runout: centre bore** in the rotary table mm 0.01

**Runout: table top face** (relative to Ø 340) mm 0.01

**Parallelism: table top face to mounting face** (relative to Ø 340) mm 0.02

**Squareness: table top face to mounting face** (relative to Ø 340) mm 0.02

Higher geometrical precision on request

### 8. Sequence of motions

The diagram shows the sequence of motions with the respective time values.

### 9. Switching times/moments of inertia (switching times rounded up/down) excluding clamping process and excluding reaction times

#### Turning angle at table

<table>
<thead>
<tr>
<th>( \rho )</th>
<th>p</th>
<th>min⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>12.50</td>
<td>12.50</td>
</tr>
<tr>
<td>30</td>
<td>12.50</td>
<td>12.50</td>
</tr>
<tr>
<td>45</td>
<td>12.50</td>
<td>12.50</td>
</tr>
</tbody>
</table>

**Moments of inertia from transport load** \( \alpha \) kg²

<table>
<thead>
<tr>
<th>J</th>
<th>45</th>
<th>55</th>
<th>70</th>
<th>90</th>
<th>45</th>
<th>55</th>
<th>70</th>
<th>90</th>
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<tbody>
<tr>
<td>10</td>
<td>12.50</td>
<td>12.50</td>
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<td></td>
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<tr>
<td>30</td>
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<td>45</td>
<td>12.50</td>
<td>12.50</td>
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</tbody>
</table>

**Angular acceleration at table** \( \alpha \) s⁻²

<table>
<thead>
<tr>
<th>( \alpha )</th>
<th>6.55</th>
<th>5.25</th>
<th>4.20</th>
<th>3.15</th>
<th>6.55</th>
<th>5.25</th>
<th>4.20</th>
<th>3.15</th>
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<tbody>
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</table>

**Positioning time** \( t \) s

<table>
<thead>
<tr>
<th>( t )</th>
<th>0.35</th>
<th>0.35</th>
<th>0.40</th>
<th>0.50</th>
<th>0.60</th>
<th>0.65</th>
<th>0.70</th>
<th>0.85</th>
<th>0.85</th>
<th>0.90</th>
<th>1.05</th>
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<tbody>
<tr>
<td>10</td>
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<td>45</td>
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</tr>
</tbody>
</table>

**Acceleration/deceleration time per** \( t_{a}, t_{v} \) s

<table>
<thead>
<tr>
<th>( t_{a}, t_{v} )</th>
<th>0.20</th>
<th>0.25</th>
<th>0.30</th>
<th>0.45</th>
<th>0.20</th>
<th>0.25</th>
<th>0.30</th>
<th>0.45</th>
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<tbody>
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</table>

#### Turning angle at table

<table>
<thead>
<tr>
<th>( \rho )</th>
<th>p</th>
<th>min⁻¹</th>
</tr>
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<tbody>
<tr>
<td>60</td>
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<td>12.50</td>
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<tr>
<td>90</td>
<td>12.50</td>
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</tr>
<tr>
<td>180</td>
<td>12.50</td>
<td>12.50</td>
</tr>
</tbody>
</table>

**Moments of inertia from transport load** \( \alpha \) kg²

<table>
<thead>
<tr>
<th>J</th>
<th>45</th>
<th>55</th>
<th>70</th>
<th>90</th>
<th>45</th>
<th>55</th>
<th>70</th>
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</tbody>
</table>

**Angular acceleration at table** \( \alpha \) s⁻²

<table>
<thead>
<tr>
<th>( \alpha )</th>
<th>6.55</th>
<th>5.25</th>
<th>4.20</th>
<th>3.15</th>
<th>6.55</th>
<th>5.25</th>
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<tr>
<td>90</td>
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<td>12.50</td>
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<tr>
<td>180</td>
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<td>12.50</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Positioning time** \( t \) s

<table>
<thead>
<tr>
<th>( t )</th>
<th>1.00</th>
<th>1.05</th>
<th>1.10</th>
<th>1.25</th>
<th>1.40</th>
<th>1.45</th>
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<th>2.60</th>
<th>2.65</th>
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<tbody>
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<tr>
<td>90</td>
<td>12.50</td>
<td>12.50</td>
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</tr>
<tr>
<td>180</td>
<td>12.50</td>
<td>12.50</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Acceleration/deceleration time per** \( t_{a}, t_{v} \) s

<table>
<thead>
<tr>
<th>( t_{a}, t_{v} )</th>
<th>0.20</th>
<th>0.25</th>
<th>0.30</th>
<th>0.45</th>
<th>0.20</th>
<th>0.25</th>
<th>0.30</th>
<th>0.45</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>12.50</td>
<td>12.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>12.50</td>
<td>12.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>180</td>
<td>12.50</td>
<td>12.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Right of alterations reserved**
10. Load data

Thrust against table top face:
- a) table top horizontal (load + machining forces) N 35 000
- b) table top vertical N 9 000

Radial thrust against table top N 40 000

Table top loads (workpieces + fixtures):
- a) table top horizontal kg 1 000
- b) table top vertical kg 300

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 90

Tilting moments:
- a) table top horizontal Nm 5 000
- b) table top vertical
  - incl. moment exerted by workpieces + fixtures Nm 2 000

Tangential moment against table top Nm 2 000
  - (with hydr. table clamping activated)

Torque limit during rotary milling Nm 1 900
  - transferable by worm drive

Maximum permissible motor torque
- when i tot. = 120 Nm 58
- when i tot. = 240 Nm 29

Motor torque requirement for
- when i tot. = 120 Nm 14
- positioning only when i tot. = 240 Nm 7

11. Installed dimensions

Drawings of DXF files available to order.
1. Type designation

FIBROPLAN NC1.

NC1.04

2. Table top

Optional centre bore – max. \( \varnothing \) mm 140

Table top bearing ID x OD mm 260 x 385

Diameter of worm wheel mm 347

Ratio:

Worm drive ratio \( i = 120 \)

Total drive ratio, with secondary drive \( i_{\text{tot}} = 240 \)

Table top speed (max.) \( n_{\text{max}} = 10 \)

Hydraulic table clamping:

- System pressure rating bar 64
- Consumption cm\(^3\) 6
- Pump delivery rating l/min max. 3

Weight of FIBROPLAN (table top \( \varnothing 420 \), without drive motor) kg approx. 270

3. Locking, of rotary table spindle

- Without hydraulic table clamping
- With hydraulic table clamping

4. Measuring system

see page 8

5. Drive motor arrangement

see page 8

6. Technical Data

Optional centre bore – max. \( \varnothing \) mm 140

Table top bearing ID x OD mm 260 x 385

Diameter of worm wheel mm 347

Ratio:

- Worm drive ratio \( i = 120 \)
- Total drive ratio, with secondary drive \( i_{\text{tot}} = 240 \)

Table top speed (max.) \( n_{\text{max}} = 10 \)

Hydraulic table clamping:

- System pressure rating bar 64
- Consumption cm\(^3\) 6
- Pump delivery rating l/min max. 3

Any mounting attitude of FIBROPLAN

Weight of FIBROPLAN (table top \( \varnothing 420 \), without drive motor) kg approx. 270

7. Accuracies

Positioning accuracies:

a) with indirect Measuring System

- Indicator reading at \( \varnothing 420 \) mm \( \pm 0,010 \)

b) with direct Measuring System

- Indicator reading at \( \varnothing 420 \) mm \( \pm 0,003 \)

Runout: centre bore

- In the rotary table mm 0,01

Runout: table top face

- (Relative to \( \varnothing 420 \)) mm 0,01

Parallelism: table top face to mounting face

- (Relative to \( \varnothing 420 \)) mm 0,02

Squareness: table top face to mounting face

- (Relative to \( \varnothing 420 \)) mm 0,02

Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)

excluding clamping process and excluding reaction times

Turning angle at table \( \varphi \) in \( ^\circ \) 10, 30, 45

r.p.m. at table \( n \) min\(^{-1} \) 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00

Moment of inertia from transport load J kgm\(^2\) 75, 95, 125, 190, 75, 95, 125, 190, 75, 95, 125, 190

Angular acceleration at table \( \alpha \) s\(^{-2}\) 5,25, 4,20, 3,15, 2,10, 5,25, 4,20, 3,15, 2,10, 5,25, 4,20, 3,15, 2,10

Positioning time t s 0,40, 0,40, 0,50, 0,60, 0,70, 0,75, 0,85, 1,00, 1,05, 1,10, 1,25

Acceleration/deceleration time per \( t_s, t_v \) s 0,20, 0,25, 0,35, 0,50, 0,20, 0,25, 0,35, 0,50, 0,20, 0,25, 0,35, 0,50

Turning angle at table \( \varphi \) in \( ^\circ \) 60, 90, 180

r.p.m. at table \( n \) min\(^{-1} \) 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00, 10,00

Moment of inertia from transport load J kgm\(^2\) 75, 95, 125, 190, 75, 95, 125, 190, 75, 95, 125, 190

Angular acceleration at table \( \alpha \) s\(^{-2}\) 5,25, 4,20, 3,15, 2,10, 5,25, 4,20, 3,15, 2,10, 5,25, 4,20, 3,15, 2,10

Positioning time t s 1,20, 1,25, 1,35, 1,50, 1,70, 1,75, 1,85, 2,00, 3,20, 3,25, 3,35, 3,50

Acceleration/deceleration time per \( t_s, t_v \) s 0,20, 0,25, 0,35, 0,50, 0,20, 0,25, 0,35, 0,50, 0,20, 0,25, 0,35, 0,50
10. Load data

Thrust against table top face:
  a) table top horizontal (load + machining forces) N 40 000
  b) table top vertical N 10 000

Radial thrust against table top N 50 000

Table top loads (workpieces + fixtures):
  a) table top horizontal kg 1200
  b) table top vertical – kg 400

Mass moment of inertia of load (workpieces + fixtures), s. 9. kglm² 190

Tilting moments:
  a) table top horizontal Nm 8 000
  b) table top vertical – incl. moment exerted by workpieces + fixtures Nm 3 200

Tangential moment against table top Nm 4 000 (with hydr. table clamping activated)

Torque limit during rotary milling Nm 3 500 transferable by worm drive

Maximum permissible motor torque when i tot. = 120 Nm 96
  when i tot. = 240 Nm 48

Motor torque requirement for when i tot. = 120 Nm 16
  positioning only when i tot. = 240 Nm 8

11. Installed dimensions

Drawings of DXF files available to order.

G¼ Connection for air purge (both sides)

G½ Bleeding

PG 7 Cable entry for prox. switch cable

G¼ Connection for hydraulic locking (both sides)

Mounting clamp

PG 9 Cable entry for rotary resolver (with direct measuring system)

Drive motor insulation class IP 64 (splashproof execution on request)

This dimension dependent on motor type

Reference slot (optional) indicate reqrd. location 1, 2, 3 with order
1. Type designation

FIBROPLAN NC1.

NC1.05

Field 1

2. Table top

dimension ∅/L520 mm 0520

∅/L630 mm 0630

execution ○ round without T-slots

□ square without T-slots

Field 2

3. Locking, of rotary table spindle

without hydraulic table clamping

with hydraulic table clamping

Field 3

4. Measuring system

see page 8

Field 4

5. Drive motor arrangement

see page 8

Field 5

6. Technical Data

Optional centre bore – max. ∅ mm 140

Table top bearing ID × OD mm 325 × 450

Diameter of worm wheel mm 417

Ratio:

Worm drive ratio \( i = 120 \)

Basic version with gearwheel train \( i_{tot} = 240 \)

Table top speed (max.) \( n_{max} = 10 \)

Hydraulic table clamping:

system pressure rating bar 64

consumption cm³/8

pump delivery rating l/min max. 4

Field 6

7. Accuracies

Positioning accuracies:

a) with indirect Measuring System

in seconds of arc \( \pm 10 \)

indicator reading at ∅ 520 mm \( \pm 0.013 \)

b) with Direct Measuring System

in seconds of arc \( \pm 3 \)

indicator reading at ∅ 520 mm \( \pm 0.004 \)

Runout: centre bore

in the rotary table mm 0.01

Runout: table top face

(relative to ∅ 520) mm 0.012

Parallelism: table top face to mounting face

(relative to ∅ 520) mm 0.025

Higher geometrical precision on request

Field 7

8. Sequence of motions

Field 8

9. Switching times/moments of inertia (switching times rounded up/down)

excluding clamping process and excluding reaction times

Field 9

Ordering inform. with code no.

NC1.05

Right of alterations reserved

Field 10
Technical Data

10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 55000

Radial thrust against table top N 65000

Table top loads (workpieces + fixtures):
- table top horizontal kg 2500

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 285

Tilting moments: table top horizontal Nm 16000

Tangential moment against table top Nm 6000
(with hydr. table clamping activated)

Torque limit during rotary milling Nm 4200
transferable by worm drive

Maximum permissible motor torque when i tot. = 240 Nm 50

Motor torque requirement for positioning only when i tot. = 240 Nm 7

11. Installed dimensions

Drawings of DXF files available to order.

G 1⁄8 Connection for air purge 0.5 bar (both sides)

G 1⁄4 Connection for hydraulic locking (both sides)

PG 9 Cable entry for rotary resolver (with direct measuring system)

PG 7 Cable entry for prox. switch cable

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

See page 8 for additional arrangements for motor and rotary resolver

Reference slot (optional) indicate reqrd. location 1, 2 with order

Right of alterations reserved
NC 1.06  Technical Data

1. Type designation

FIBROPLAN NC1.  \[ NC1.06 \]

2. Table top

<table>
<thead>
<tr>
<th>Dimension</th>
<th>( \varnothing 630 )</th>
<th>( \varnothing 800 )</th>
<th>Field 2</th>
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<tbody>
<tr>
<td>Execution</td>
<td>round without T-slots</td>
<td>round with T-slots</td>
<td>square without T-slots</td>
</tr>
</tbody>
</table>

3. Locking, of rotary table spindle

- without hydraulic table clamping
- with hydraulic table clamping

4. Measuring system

see page 8

5. Drive motor arrangement

see page 8

6. Technical Data

- Optional centre bore – max. \( \varnothing \) mm 190
- Table top bearing ID \( \times \text{OD} \) mm 395 \( \times \) 525
- Diameter of worm wheel mm 486
- Ratio: Worm drive ratio \( i \) = 144
- Basic version with gearwheel train \( i_{\text{tot}} \) = 288
- Table top speed (max.) mm 8
- Hydraulic table clamping:
  - System pressure rating bar 64
  - Consumption cm\(^3\) 10
  - Pump delivery rating l/min max. 5
- Any mounting attitude of FIBROPLAN

Weight of FIBROPLAN (table top \( \varnothing 630 \), without drive motor) kg approx. 550

7. Accuracies

Positioning accuracies:
- a) with indirect Measuring System in seconds of arc \( \pm 0,015 \)
- b) with Direct Measuring System in seconds of arc \( \pm 0,005 \)

Runout: centre bore in the rotary table mm 0,01

Runout: table top face (relative to \( \varnothing 630 \)) mm 0,015

Parallelism: table top face to mounting face (relative to \( \varnothing 630 \)) mm 0,03

Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)

- Excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>( p )</th>
<th>( \varnothing )</th>
<th>Field 1</th>
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<th>30</th>
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<td>r.p.m. at table</td>
<td>min(^{-1})</td>
<td>8,00</td>
<td>8,00</td>
<td>8,00</td>
<td>8,00</td>
<td>8,00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>J</td>
<td>kgm(^2)</td>
<td>190</td>
<td>260</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>( \alpha )</td>
<td>s(^{-2})</td>
<td>2.80</td>
<td>2.10</td>
<td>1.40</td>
<td>0.70</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t</td>
<td>s</td>
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<td>0.60</td>
<td>0.70</td>
<td>1.00</td>
</tr>
<tr>
<td>Acceleration/deceleration time per t(_a), t(_v)</td>
<td>s</td>
<td>0.30</td>
<td>0.40</td>
<td>0.60</td>
<td>1.20</td>
<td>0.30</td>
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<td>min(^{-1})</td>
<td>8,00</td>
<td>8,00</td>
<td>8,00</td>
<td>8,00</td>
<td>8,00</td>
</tr>
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<td>Moment of inertia from transport load</td>
<td>J</td>
<td>kgm(^2)</td>
<td>190</td>
<td>260</td>
<td>400</td>
<td>800</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>( \alpha )</td>
<td>s(^{-2})</td>
<td>2.80</td>
<td>2.10</td>
<td>1.40</td>
<td>0.70</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t</td>
<td>s</td>
<td>1.35</td>
<td>1.65</td>
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<tr>
<td>Acceleration/deceleration time per t(_a), t(_v)</td>
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<td>0.30</td>
<td>0.40</td>
<td>0.60</td>
<td>1.20</td>
<td>0.30</td>
</tr>
</tbody>
</table>
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 75 000
- Radial thrust against table top N 80 000

Table top loads (workpieces + fixtures):
- table top horizontal kg 3 500

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 800

Tilting moments: table top horizontal Nm 20 000

Torque limit during rotary milling Nm 7 000

Transferable by worm drive

Maximum permissible motor torque when i tot. = 288 Nm 74

Motor torque requirement for positioning only when i tot. = 288 Nm 9.5

11. Installed dimensions

Drawings of DXF files available to order.

G1⁄8 Connection for air purge 0.5 bar (both sides)
G1⁄4 Connection for hydraulic locking (both sides)
PG 9 Cable entry for rotary resolver (with direct measuring system)
PG 7 Cable entry for prox. switch cable

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

This dimension dependent on motor type

See page 8 for additional arrangements for motor and rotary resolver
Reference slot (optional) indicate reqrd. location (1,2) with order

Right of alterations reserved
NC 1.07 Technical Data

1. Type designation
   FIBROPLAN NC1.
   Case 1
   NC1.07.
   Size 07.

2. Table top
   dimension \( \phi \times L \)
   mm 800 × 500
   mm 1000 × 600
   execution \( \square \) round without T-slots
   \( \square \) square without T-slots
   \( \boxplus \) square with T-slots

3. Locking, of rotary table spindle
   without hydraulic table clamping
   with hydraulic table clamping

4. Measuring system
   see page 8

5. Drive motor arrangement
   see page 8

6. Technical Data
   Optional centre bore – max.
   \( \phi \) mm 250
   Table top bearing ID \( \times \) OD mm 460 × 600
   Diameter of worm wheel mm 562
   Ratio:
   Worm drive ratio \( i = 180 \)
   Basic version with gearwheel train \( i_{br} = 360 \)
   Table top speed (max.) \( n_{\text{max}} = 6 \)
   Hydraulic table clamping:
   system pressure rating bar 64
   consumption \( \text{cm}^3/\text{min} \)
   pump delivery rating \( \text{max.} = 6 \)
   Weight of FIBROPLAN
   (table top \( \phi 800 \), without drive motor) kg approx. 920

7. Accuracies
   Positioning accuracies:
   a) with indirect Measuring System
      in seconds of arc \( \pm 10 \)
      indicator reading at \( \phi 800 \) mm \( \pm 0.020 \)
   b) with Direct Measuring System
      in seconds of arc \( \pm 3 \)
      indicator reading at \( \phi 800 \) mm \( \pm 0.008 \)
   Runout: centre bore
     in the rotary table mm 0.01
   Runout: table top face
     (relative to \( \phi 800 \)) mm 0.015
   Parallelism: table top face to mounting face
     (relative to \( \phi 800 \)) mm 0.03
   Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
   excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p °</th>
<th>0</th>
<th>10</th>
<th>30</th>
<th>45</th>
<th>90</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>6,00</td>
<td>6,00</td>
<td>6,00</td>
<td>6,00</td>
<td>6,00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>J kgm²</td>
<td>220</td>
<td>310</td>
<td>500</td>
<td>1000</td>
<td>220</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>( \alpha ) s⁻²</td>
<td>2.10</td>
<td>1.60</td>
<td>1.05</td>
<td>0.55</td>
<td>2.10</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t s</td>
<td>0.60</td>
<td>0.70</td>
<td>0.85</td>
<td>1.15</td>
<td>1.15</td>
</tr>
<tr>
<td>Acceleration/deceleration time per ( t_{a}, t_{v} ) s</td>
<td>0.30</td>
<td>0.40</td>
<td>0.60</td>
<td>1.20</td>
<td>0.30</td>
<td>0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p °</th>
<th>0</th>
<th>10</th>
<th>30</th>
<th>45</th>
<th>90</th>
<th>180</th>
</tr>
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<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>6,00</td>
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<td>1000</td>
<td>220</td>
<td>310</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>( \alpha ) s⁻²</td>
<td>2.10</td>
<td>1.60</td>
<td>1.05</td>
<td>0.55</td>
<td>2.10</td>
<td>1.60</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t s</td>
<td>2.00</td>
<td>2.10</td>
<td>2.30</td>
<td>2.85</td>
<td>2.80</td>
<td>2.90</td>
</tr>
<tr>
<td>Acceleration/deceleration time per ( t_{a}, t_{v} ) s</td>
<td>0.30</td>
<td>0.40</td>
<td>0.60</td>
<td>1.20</td>
<td>0.30</td>
<td>0.40</td>
<td>0.60</td>
</tr>
</tbody>
</table>
Technical Data
NC 1.07

10. Load data
Thrust against table top face:
- table top horizontal (load + machining forces) N 100 000
- Radial thrust against table top N 115 000
Table top loads (workpieces + fixtures):
- table top horizontal kg 6 000
Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 1 000
Tilting moments: table top horizontal Nm 26 000
Tangential moment against table top (with hydr. table clamping activated) Nm 14 000
Torque limit during rotary milling Nm 7 000
Maximum permissible motor torque when but. = 360 Nm 55
Motor torque requirement for positioning only when But. = 360 Nm 10

11. Installed dimensions
Drawings of DXF files available to order.

- G¼ Connection for air purge 0,5 bar (both sides)
- G½ Connection for hydraulic locking (both sides)
- PG 9 Cable entry for rotary resolver (with direct measuring system)
- PG 7 Cable entry for prox. switch cable
- PG 9 Cable entry for rotary resolver (with indirect measuring system)

Drive motor with fully sealed shaft, insulation class IP 64 (splashproof execution on request)
This dimension dependent on motor type

See page 8 for additional arrangements for motor and rotary resolver
Reference slot (optional) indicate reqd. location 1, 2 with order

Right of alterations reserved
1. Type designation
FIBROPLAN NC1. NC1.08

2. Table top
- Dimension: Ø 1000 mm
  Ø 1250 mm
- Execution: Round without T-slots
  Round with T-slots

3. Locking
- Without hydraulic table clamping
- With hydraulic table clamping

4. Measuring system
see page 8

5. Drive motor arrangement
see page 8

6. Technical Data
- Optional centre bore – max. Ø mm 420
- Table top bearing ID × OD mm 650 × 870
- Diameter of worm wheel mm 805

7. Accuracies
- Positioning accuracies:
  a) With indirect Measuring System
     ± s ± 10
     Indicator reading at Ø 1000 mm ± 0.024
  b) With Direct Measuring System
     ± s ± 3
     Indicator reading at Ø 1000 mm ± 0.007
- Runout: Centre bore
  in the rotary table mm 0.01
- Runout: Table top face
  (relative to Ø 1000) mm 0.02

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
- Excluding clamping process and excluding reaction times
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 180,000

Radial thrust against table top N 250,000

Table top loads (workpieces + fixtures):
- table top horizontal kg 10,000

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm$^2$ 3,600

Tilting moments: table top horizontal Nm 60,000

Tangential moment against table top
(with hydr. table clamping activated) Nm 25,000

Torque limit during rotary milling Nm 14,000

Maximum permissible motor torque when i tot. = 480 Nm 90

Motor torque requirement for positioning only when i tot. = 480 Nm 15

11. Installed dimensions

Drawings of DXF files available to order.

G1⁄8 Connection for air purge 0.5 bar (both sides)

G1⁄4 Connection for hydraulic locking (both sides)

PG 9 Cable entry for rotary resolver (with direct measuring system)

PG 7 Cable entry for prox. switch cable

PG 9 Cable entry for rotary resolver (with indirect measuring system)

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

See page 8 for additional arrangements for motor and rotary resolver

Reference slot (optional) indicate reqrd. location with order

Right of alterations reserved
## 7. Accuracies

Positioning accuracies:

a) with Indirect Measuring System
   - in seconds of arc: \( \pm 10 \) indicator reading at \( \varnothing \) 1250 mm

b) with Direct Measuring System
   - in seconds of arc: \( \pm 3 \) indicator reading at \( \varnothing \) 1250 mm

Runout: centre bore
   - in the rotary table: mm 0.01

Runout: table top face
   - (relative to \( \varnothing \) 1250): mm 0.02

Parallelism: table top face to mounting face
   - (relative to \( \varnothing \) 1250): mm 0.04

Higher geometrical precision on request

## 8. Sequence of motions

### 9. Switching times/moments of inertia (switching times rounded up/down)

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>( J ) kgm(^2)</th>
<th>( \alpha ) s(^{-2})</th>
<th>( \varphi ) ( \text{radian} )</th>
<th>( t_s ) s</th>
<th>( t_{tv} ) s</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.20</td>
<td>1500</td>
<td>0.90</td>
<td>1.50</td>
<td>0.50</td>
<td>0.70</td>
</tr>
<tr>
<td>4.20</td>
<td>2250</td>
<td>0.90</td>
<td>1.90</td>
<td>0.50</td>
<td>0.70</td>
</tr>
<tr>
<td>4.20</td>
<td>3500</td>
<td>0.90</td>
<td>2.30</td>
<td>0.50</td>
<td>0.70</td>
</tr>
<tr>
<td>4.20</td>
<td>5000</td>
<td>0.90</td>
<td>2.80</td>
<td>0.50</td>
<td>0.70</td>
</tr>
<tr>
<td>4.20</td>
<td>7500</td>
<td>0.90</td>
<td>3.90</td>
<td>0.50</td>
<td>0.70</td>
</tr>
</tbody>
</table>

### 10. Technical Data

#### 6. Optional centre bore – max.

<table>
<thead>
<tr>
<th>Optional centre bore</th>
<th>( \varnothing ) mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm 520</td>
<td></td>
</tr>
</tbody>
</table>

#### 7. Table top dimension

<table>
<thead>
<tr>
<th>Table top bearing ID ( \times ) OD</th>
<th>mm 850 ( \times ) 1095</th>
</tr>
</thead>
</table>

#### 8. Drive motor arrangement

Weight of FIBROPLAN

| (table top \( \varnothing \) 1250, without drive motor) kg approx. | 2500 |

### 11. Technical Data

<table>
<thead>
<tr>
<th>Ratio: Worm drive ratio</th>
<th>( i = ) 320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic version with gearwheel train</td>
<td>( i_{\text{bas}} = ) 480</td>
</tr>
</tbody>
</table>

#### 12. Technical Data

<table>
<thead>
<tr>
<th>Table top speed (max.)</th>
<th>( \varphi ) ( \text{radian} )</th>
<th>( n ) r.p.m.</th>
<th>( \eta ) kgm ( \text{radian} )</th>
<th>( T_s ) s</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.20</td>
<td>1500</td>
<td>0.90</td>
<td>1.50</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>2250</td>
<td>0.90</td>
<td>1.90</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>3500</td>
<td>0.90</td>
<td>2.30</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>5000</td>
<td>0.90</td>
<td>2.80</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>7500</td>
<td>0.90</td>
<td>3.90</td>
<td>0.50</td>
</tr>
</tbody>
</table>

#### 13. Technical Data

<table>
<thead>
<tr>
<th>Diameter of worm wheel</th>
<th>mm 1020</th>
</tr>
</thead>
</table>

#### 14. Technical Data

<table>
<thead>
<tr>
<th>Ratio: Worm drive ratio</th>
<th>( i = ) 320</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic version with gearwheel train</td>
<td>( i_{\text{bas}} = ) 480</td>
</tr>
</tbody>
</table>

#### 15. Technical Data

<table>
<thead>
<tr>
<th>Table top speed (max.)</th>
<th>( \varphi ) ( \text{radian} )</th>
<th>( n ) r.p.m.</th>
<th>( \eta ) kgm ( \text{radian} )</th>
<th>( T_s ) s</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.20</td>
<td>1500</td>
<td>0.90</td>
<td>1.50</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>2250</td>
<td>0.90</td>
<td>1.90</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>3500</td>
<td>0.90</td>
<td>2.30</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>5000</td>
<td>0.90</td>
<td>2.80</td>
<td>0.50</td>
</tr>
<tr>
<td>4.20</td>
<td>7500</td>
<td>0.90</td>
<td>3.90</td>
<td>0.50</td>
</tr>
</tbody>
</table>
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 240 000
- Radial thrust against table top N 300 000

Table top loads (workpieces + fixtures):
- table top horizontal kg 12 000

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 7 500

Tilting moments: table top horizontal Nm 80 000

Tangential moment against table top
- (with hydr. table clamping activated) Nm 32 000

Torque limit during rotary milling Nm 17 000

Transferable by worm drive

Maximum permissible motor torque when but. = 480 Nm 110

Motor torque requirement for positioning only when but. = 480 Nm 20

---

11. Installed dimensions

Drawings of DXF files available to order.

---

G1/8 Connection for air purge 0.5 bar (both sides)

G1/4 Connection for hydraulic locking

PG 9 Cable entry for rotary resolver (with direct measuring system)

PG 7 Cable entry for prox. switch cable

PG 9 Cable entry for rotary resolver (with indirect measuring system)

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

Reference slot (optional) indicate reqrd. location 1,2 with order

See page 8 for additional arrangements for motor and rotary resolver

Right of alterations reserved
NC 1.10 Technical Data

1. Type designation
   FIBROPLAN NC1.
   Size 10.

2. Table top
   dimension ⌀ 240 mm 1600
   execution ⌀ round without T-slots ⌀ square without T-slots ⌀ square with T-slots

3. Locking, of rotary table spindle
   without hydraulic table clamping
   with hydraulic table clamping

4. Measuring system
   see page 8

5. Drive motor arrangement
   see page 8

6. Technical Data
   Optional centre bore – max. ⌀ mm 630
   Table top bearing ID × OD mm 1030 × 1300
   Diameter of worm wheel mm 1215
   Ratio:
   Worm drive ratio
   Basic version with gearwheel train
   Table top speed (max.) n_max. = 3,1
   Hydraulic table clamping:
   system pressure rating bar 64
   consumption cm³ min⁻¹ max. 25
   pump delivery rating l/min max. 12
   Any mounting attitude of FIBROPLAN
   Weight of FIBROPLAN
   (table top ⌀ 1600, without drive motor) kg approx. 4000

7. Accuracies
   Positioning accuracies:
   a) with indirect Measuring System
      in seconds of arc  ½ s ± 10 indicator reading at ⌀ 1600 mm ± 0,039
   b) with Direct Measuring System
      in seconds of arc  ½ s ± 3 indicator reading at ⌀ 1600 mm ± 0,012
   Runout: centre bore
      in the rotary table mm 0,01
   Runout: table top face
      (relative to ⌀ 1600) mm 0,025
   Parallelism: table top face to mounting face
      (relative to ⌀ 1600) mm 0,05
   Runout:
   a) ⌀ 1600
   b) ⌀ 1600
   c) ⌀ 1600
   d) ⌀ 1600
   e) ⌀ 1600
   f) ⌀ 1600
   g) ⌀ 1600
   h) ⌀ 1600
   i) ⌀ 1600
   j) ⌀ 1600
   k) ⌀ 1600
   l) ⌀ 1600
   m) ⌀ 1600
   n) ⌀ 1600
   o) ⌀ 1600
   p) ⌀ 1600
   q) ⌀ 1600
   r) ⌀ 1600
   s) ⌀ 1600
   t) ⌀ 1600
   u) ⌀ 1600
   v) ⌀ 1600
   w) ⌀ 1600
   x) ⌀ 1600
   y) ⌀ 1600
   z) ⌀ 1600

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
   excluding clamping process and excluding reaction times

   Turning angle at table
   r.p.m. at table
   Moment of inertia from transport load J kgm²
   Angular acceleration at table α s⁻²
   Positioning time t s
   Acceleration/deceleration time per tₚ, tᵥ s

   Turning angle at table
   r.p.m. at table
   Moment of inertia from transport load J kgm²
   Angular acceleration at table α s⁻²
   Positioning time t s
   Acceleration/deceleration time per tₚ, tᵥ s

Ordering inform. with code no.

Right of alterations reserved
Technical Data NC 1.10

10. Load data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust against table top face:</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal (load + machining forces)</td>
<td>N 350,000</td>
</tr>
<tr>
<td>Radial thrust against table top</td>
<td>N 400,000</td>
</tr>
<tr>
<td>Table top loads (workpieces + fixtures):</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>kg 20,000</td>
</tr>
<tr>
<td>Mass moment of inertia of load (workpieces + fixtures), s. 9.</td>
<td>kgm² 12,000</td>
</tr>
<tr>
<td>Tilting moments: table top horizontal</td>
<td>Nm 150,000</td>
</tr>
<tr>
<td>- with hydr. table clamping activated</td>
<td>Nm 40,000</td>
</tr>
<tr>
<td>Torque limit during rotary milling</td>
<td>Nm 24,000</td>
</tr>
<tr>
<td>Maximum permissible motor torque when ( \text{mot.} = 480 )</td>
<td>Nm 145</td>
</tr>
<tr>
<td>Motor torque requirement for positioning only when ( \text{mot.} = 480 )</td>
<td>Nm 27</td>
</tr>
</tbody>
</table>

11. Installed dimensions

Drawings of DXF files available to order.

- G1/4 Connection for air purge 0.5 bar (both sides)
- G1/4 Connection for hydraulic locking (both sides)
- PG 7 Cable entry for prox. switch cable (both sides)
- PG 9 Cable entry for rotary resolver with indirect measuring system (both sides)
- PG 9 Cable entry for rotary resolver with indirect measuring system (both sides)

Mounting holes in flange to match customer requirements

Drive motor with fully sealed shaft, Insulation class IP 64 (splashproof execution on request)

This dimension dependent on motor type

See page 8 for additional arrangements for motor and rotary resolver

Reference slot (optional) indicate reqrd. location 1,2 with order

Right of alterations reserved
Program FIBROPLAN® Vertical

### Model Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>Vertical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification on Page</td>
<td>32/33 34/35 36/37 38/39 40/41 42/43 44/45 46/47 48/49</td>
</tr>
</tbody>
</table>

### Comparable size in Standard-range:

| Specifications see page | NC 1.02 NC 1.03 NC 1.04 |

### General Dimensions

- **table top dims. (⌀ or □) mm**
  - 160
  - 340/400
  - 420/500
  - 520/630
  - 630/800
  - 800/1000
  - 1000/1250
  - 1250/1500
  - 1600

- **centre height table top mm**
  - 130
  - 245
  - 280
  - 360
  - 360/440
  - 440/550
  - 550/670
  - 670/800
  - 900

- **bearing dims. (I.D. x O.D.) mm**
  - 80 × 150
  - 200 × 300
  - 260 × 385
  - 325 × 450
  - 460 × 600
  - 580 × 750
  - 650 × 870
  - 850 × 1095
  - 1030 × 1300

### Capacities (maximum values)

- **thrust against table top face N**
  - 5000
  - 30000
  - 35000
  - 45000
  - 75000
  - 100000
  - 120000
  - 160000
  - 200000

- **table top loading (workpieces + fixtures) kg**
  - 150
  - 600
  - 800
  - 1200
  - 2000
  - 3000
  - 6000
  - 8000
  - 12000

- **tilting moments Nm**
  - 1500
  - 6300
  - 10000
  - 16000
  - 26000
  - 32000
  - 48000
  - 60000
  - 110000

- **torque exerted in rotary milling Nm**
  - 300
  - 1900
  - 3500
  - 4200
  - 7000
  - 7000
  - 14000
  - 17000
  - 24000

- **tangential torque, exerted against table top clamped hydraulically Nm**
  - 700
  - 2000
  - 4000
  - 6000
  - 8000
  - 14000
  - 25000
  - 32000
  - 40000

### Accuracies

- **positioning accuracy**
  - a) with Indirect Measuring System™
    - ± 20
    - ± 15
    - ± 10
    - ± 10
    - ± 10
    - ± 10
    - ± 10
    - ± 10

  - b) with Direct Measuring System™ (dependent on resolver type)
    - ± 3
    - ± 3
    - ± 3
    - ± 3
    - ± 3
    - ± 3
    - ± 3
    - ± 3

- **runout: central bore table top (TIR) mm**
  - 0,01
  - 0,01
  - 0,01
  - 0,01
  - 0,01
  - 0,01
  - 0,01
  - 0,01

- **runout: table top face (TIR) mm**
  - 0,01
  - 0,01
  - 0,01
  - 0,012
  - 0,012
  - 0,015
  - 0,015
  - 0,02
  - 0,02
  - 0,025

### Gear Ratios/ Table top Speeds

- **total drive ratio motor/ table top i total**
  - 144
  - 120/240
  - 120/240
  - 240
  - 288
  - 360
  - 480
  - 480
  - 480

- **table top rotational speed (max.) min⁻¹**
  - 27.5
  - 12.5
  - 10
  - 10
  - 8
  - 6
  - 6
  - 4.2
  - 3.1

Right of alterations reserved
1. Type designation

FIBROPLAN NC2.  
NC2.01

Size  01.

2. Table top

dimension  Φ 160 mm 80 × 150 Field 2

execution  round without T-slots Field 3

3. Locking, of rotary table spindle

without hydraulic table clamping Field 4

with hydraulic table clamping

4. Measuring system

see page 8

5. Drive motor arrangement

see page 8

6. Technical Data

Optional centre bore – max. Φ mm 25
Table top bearing ID × OD mm 80 × 150
Diameter of worm wheel mm 130
Ratio:
Worm drive ratio  i = 72
Basic version with gearwheel train  i_b = 144
Table top speed (max.)  n_max. = 27,5
Hydraulic table clamping:

system pressure rating bar 64
consumption cm³ min⁻¹ 2
pump delivery rating l/min max. 2
Any mounting attitude of FIBROPLAN
Weight of FIBROPLAN

(table top Φ 160, without drive motor) kg approx. 45

7. Accuracies

Positioning accuracies:

a) with indirect Measuring System
   in seconds of arc s ± 20 (± 15 on request)
   indicator reading at Φ 160 mm ± 0,008
b) with Direct Measuring System
   in seconds of arc s ± 3
   indicator reading at Φ 160 mm ± 0,0012
Runout: centre bore
   in the rotary table mm 0,01
Runout: table top face
   (relative to Φ 160) mm 0,01
Squareness: table top face to
   mounting face
   (relative to Φ 160) mm 0,02
Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)

excluding clamping process and excluding reaction times

Turning angle at table in °

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p</th>
<th>10</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>27,50</td>
<td>27,50</td>
<td>27,50</td>
</tr>
<tr>
<td>Angular acceleration</td>
<td>J kgm²</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>at table</td>
<td>α</td>
<td>14,40</td>
<td>10,50</td>
<td>7,85</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t</td>
<td>0,25</td>
<td>0,25</td>
<td>0,30</td>
</tr>
<tr>
<td>Acceleration/deceleration time per</td>
<td>t_a, t_v</td>
<td>0,20</td>
<td>0,30</td>
<td>0,40</td>
</tr>
</tbody>
</table>

Turning angle at table in °

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p</th>
<th>60</th>
<th>90</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>27,50</td>
<td>27,50</td>
<td>27,50</td>
</tr>
<tr>
<td>Angular acceleration</td>
<td>J kgm²</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>at table</td>
<td>α</td>
<td>14,40</td>
<td>10,50</td>
<td>7,85</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t</td>
<td>0,55</td>
<td>0,65</td>
<td>0,75</td>
</tr>
<tr>
<td>Acceleration/deceleration time per</td>
<td>t_a, t_v</td>
<td>0,20</td>
<td>0,30</td>
<td>0,40</td>
</tr>
</tbody>
</table>

Ordering inform. with code no.  
NC2.01  
Right of alterations reserved
10. Load data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust against table top face:</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal (load + machining forces)</td>
<td>N 5000</td>
</tr>
<tr>
<td>Radial thrust against table top</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>N 12000</td>
</tr>
<tr>
<td>Table top loads (workpieces + fixtures):</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>kg 150</td>
</tr>
<tr>
<td>Mass moment of inertia of load (workpieces + fixtures), s. 9.</td>
<td>kgm² 10</td>
</tr>
<tr>
<td>Tilting moments:</td>
<td></td>
</tr>
<tr>
<td>- incl. moment exerted by workpieces + fixtures</td>
<td>Nm 1500</td>
</tr>
<tr>
<td>Tangential moment against table top</td>
<td></td>
</tr>
<tr>
<td>- (with hydr. table clamping activated)</td>
<td>Nm 700</td>
</tr>
<tr>
<td>Torque limit during rotary milling</td>
<td></td>
</tr>
<tr>
<td>- transferable by worm drive</td>
<td>Nm 300</td>
</tr>
<tr>
<td>Maximum permissible motor torque</td>
<td></td>
</tr>
<tr>
<td>- when but. = 144</td>
<td>Nm 9</td>
</tr>
<tr>
<td>Motor torque requirement for positioning only</td>
<td></td>
</tr>
<tr>
<td>- when but. = 144</td>
<td>Nm 2</td>
</tr>
</tbody>
</table>

11. Installed dimensions

Drawings of DXF files available to order.

Right of alterations reserved
NC 2.03 Technical Data

1. Type designation
   FIBROPLAN NC2.
   NC 2.03
   Size 03.

2. Table top
   - dimension
     - round without T-slots mm 340
     - round with T-slots mm 400
   - execution
     - round without T-slots
     - square without T-slots
     - square with T-slots

3. Locking, of rotary table spindle
   - without hydraulic table clamping
   - with hydraulic table clamping

4. Measuring system
   - see page 8

5. Drive motor arrangement
   - see page 8

6. Technical Data
   - Optional centre bore – max. mm 110
   - Table top bearing ID × OD mm 200 × 300
   - Diameter of worm wheel mm 275
   - Ratio:
     - Worm drive ratio i = 120
     - Total drive ratio, with secondary drive (see page 6) i tot = 240
   - Table top speed (max.) n max. = 12.5
   - Hydraulic table clamping:
     - system pressure rating bar 64
     - consumption cm³ 8
     - pump delivery rating l/min max. 4
   - Any mounting attitude of FIBROPLAN
   - Weight of FIBROPLAN (table top ∅ 340, without drive motor) kg approx. 230

7. Accuracies
   - Positioning accuracies:
     a) with indirect Measuring System
        - in seconds of arc ± 15 (± 10 on request)
        - indicator reading at ∅ 340 mm ± 0.012
     b) with Direct Measuring System
        - in seconds of arc ± 3
        - indicator reading at ∅ 340 mm ± 0.0025
   - Runout: centre bore
     - in the rotary table mm 0.01
   - Runout: table top face
     - (relative to ∅ 340) mm 0.01
   - Squareness: table top face to
     - mounting face
     - (relative to ∅ 340) mm 0.02
   - Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
   excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p °</th>
<th>10</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>12.50</td>
<td>12.50</td>
<td>12.50</td>
</tr>
<tr>
<td>Moment of inertia from</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transport load J kgm²</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Angular acceleration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at table α s⁻²</td>
<td>6.55</td>
<td>6.55</td>
<td>6.55</td>
<td>6.55</td>
</tr>
<tr>
<td>Positioning time t s</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
<td>0.35</td>
</tr>
<tr>
<td>Acceleration/deceleration time per tₚ, tᵥ s</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
</tr>
<tr>
<td>Turning angle at table</td>
<td>p °</td>
<td>60</td>
<td>90</td>
<td>180</td>
</tr>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>12.50</td>
<td>12.50</td>
<td>12.50</td>
</tr>
<tr>
<td>Moment of inertia from</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>transport load J kgm²</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Angular acceleration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at table α s⁻²</td>
<td>6.55</td>
<td>6.55</td>
<td>6.55</td>
<td>6.55</td>
</tr>
<tr>
<td>Positioning time t s</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Acceleration/deceleration time per tₚ, tᵥ s</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
</tr>
</tbody>
</table>

Ordering inform. with code no. NC 2.03 . . . . . . . . . Right of alterations reserved
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 30 000
- Radial thrust against table top N 40 000

Table top loads (workpieces + fixtures):
- table top horizontal kg 600

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 90

Tilting moments:
- incl. moment exerted by workpieces + fixtures Nm 6 300

Tangential moment against table top (with hydr. table clamping activated) Nm 2 000

Torque limit during rotary milling Nm 1 900

Transferable by worm drive

Maximum permissible motor torque when inst. = 120 Nm 58
- when inst. = 240 Nm 29

Motor torque requirement for when inst. = 120 Nm 14
- positioning only when inst. = 240 Nm 7

11. Installed dimensions

Drawings of DXF files available to order.

Drive motor insulation class IP 64 (splashproof execution on request)

PG 8 Cable entry for rotary resolver with direct measuring system (both sides)

G 1/4 Connection for air purge 0.5 bar (both sides)

PG 7 Cable entry for prox. switch cable (both sides)

G 1/4 Connection for hydraulic locking (both sides)

See page 8 for additional arrangements for motor and rotary resolver

Reference slot (optional) indicate reqrd. location with order

Right of alterations reserved
NC 2.04 Technical Data

1. Type designation

FIBROPLAN NC2.

NC 2.04

Size 04.

2. Table top

<table>
<thead>
<tr>
<th>Dimension</th>
<th>mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Theta$ 420</td>
<td>220</td>
</tr>
<tr>
<td>$\Theta$ 500</td>
<td>300</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Execution</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Round without T-slots</td>
<td>2</td>
</tr>
<tr>
<td>Round with T-slots</td>
<td>3</td>
</tr>
<tr>
<td>Square without T-slots</td>
<td>4</td>
</tr>
<tr>
<td>Square with T-slots</td>
<td>5</td>
</tr>
</tbody>
</table>

3. Locking, of rotary table spindle

| Without hydraulic table clamping | 0 |
| With hydraulic table clamping | 1 |

4. Measuring system

see page 8

5. Drive motor arrangement

see page 8

6. Technical Data

Optional centre bore – max. $\Theta$ mm 140
Table top bearing ID x OD mm 260 x 385
Diameter of worm wheel mm 347

Ratio:
- Worm drive ratio $i = 120$
- Total drive ratio, with secondary drive (see page 6) $I_{tot} = 240$

Table top speed (max.) $n_{max} = 10$

Hydraulic table clamping:
- System pressure rating bar 64
- Consumption cm$^3$ 12
- Pump delivery rating l/min max. 6

Any mounting attitude of FIBROPLAN

Weight of FIBROPLAN (table top $\Theta$ 420, without drive motor) kg approx. 370

7. Accuracies

Positioning accuracies:
- a) with indirect Measuring System
  - In seconds of arc $\pm$ s 10
  - Indicator reading at $\Theta$ 420 mm $\pm$ 0.01
- b) with Direct Measuring System
  - In seconds of arc $\pm$ s 3
  - Indicator reading at $\Theta$ 420 mm $\pm$ 0.003

Runout: Centre bore in the rotary table mm 0.01
Runout: Table top face (relative to $\Theta$ 420) mm 0.01

Squareness: Table top face to mounting face (relative to $\Theta$ 420) mm 0.02

Higher geometrical precision on request

8. Sequence of motions

<table>
<thead>
<tr>
<th>$n_{max}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$T_s$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>$t_a, t_v$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20</td>
</tr>
</tbody>
</table>

9. Switching times/moments of inertia (switching times rounded up/down)

excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p $^\circ$</th>
<th>10</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min$^{-1}$</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>kgm$^2$</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>$\alpha$ s$^{-2}$</td>
<td>5.25</td>
<td>4.20</td>
<td>3.15</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t s</td>
<td>0.40</td>
<td>0.40</td>
<td>0.50</td>
</tr>
<tr>
<td>Acceleration/deceleration time per</td>
<td>$t_a, t_v$ s</td>
<td>0.20</td>
<td>0.25</td>
<td>0.35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p $^\circ$</th>
<th>60</th>
<th>90</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min$^{-1}$</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>kgm$^2$</td>
<td>75</td>
<td>95</td>
<td>125</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>$\alpha$ s$^{-2}$</td>
<td>5.25</td>
<td>4.20</td>
<td>3.15</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t s</td>
<td>1.20</td>
<td>1.25</td>
<td>1.35</td>
</tr>
<tr>
<td>Acceleration/deceleration time per</td>
<td>$t_a, t_v$ s</td>
<td>0.20</td>
<td>0.25</td>
<td>0.35</td>
</tr>
</tbody>
</table>

Ordering inform. with code no. NC 2.04 Right of alterations reserved
10. Load data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust against table top face:</td>
<td>N 35 000</td>
</tr>
<tr>
<td>Radial thrust against table top</td>
<td>N 50 000</td>
</tr>
<tr>
<td>Table top loads (workpieces + fixtures):</td>
<td>kg 800</td>
</tr>
<tr>
<td>Mass moment of inertia of load (workpieces + fixtures), s. 9.</td>
<td>kgm² 190</td>
</tr>
<tr>
<td>Tilting moments:</td>
<td>Nm 10 000</td>
</tr>
<tr>
<td>Tangential moment against table top (with hydr. table clamping activated)</td>
<td>Nm 4 000</td>
</tr>
<tr>
<td>Torque limit during rotary milling</td>
<td>Nm 3 500</td>
</tr>
<tr>
<td>Maximum permissible motor torque when Iₜot. = 120</td>
<td>Nm 96</td>
</tr>
<tr>
<td>when Iₜot. = 240</td>
<td>Nm 48</td>
</tr>
<tr>
<td>Motor torque requirement for positioning only</td>
<td>Nm 16</td>
</tr>
<tr>
<td>when Iₜot. = 240</td>
<td>Nm 8</td>
</tr>
</tbody>
</table>

11. Installed dimensions

Drawings of DXF files available to order.

- Drive motor insulation class IP 64 (splashproof execution on request)
- PG 9 Cable entry for rotary resolver with direct measuring system (both sides)
- PG 7 Cable entry for prox. switch cable (both sides)
- G ¼ Connection for air purge 0.5 bar (both sides)
- G ¼ Connection for hydraulic locking (both sides)

See page 8 for additional arrangements for motor and rotary resolver. Reference slot (optional) indicate reqrd. location with order.
NC 2.05 Technical Data

1. Type designation

FIBROPLAN NC2.

NC 2.05

Size 05.

2. Table top

<table>
<thead>
<tr>
<th>Dimension</th>
<th>mm</th>
<th>520</th>
</tr>
</thead>
<tbody>
<tr>
<td>Execution</td>
<td></td>
<td>630</td>
</tr>
<tr>
<td>Width</td>
<td></td>
<td>0520</td>
</tr>
<tr>
<td>ID × OD</td>
<td></td>
<td>325 × 450</td>
</tr>
</tbody>
</table>

3. Locking, of rotary table spindle

- Without hydraulic table clamping
- With hydraulic table clamping

4. Measuring system

See page 8

5. Drive motor arrangement

See page 8

6. Technical Data

- Optional centre bore – max. ∅ mm 190
- Table top bearing ID × OD mm 325 × 450
- Diameter of worm wheel mm 417
- Ratio:
  - Worm drive ratio i = 120
  - Basic version with gearwheel train i = 240
- Table top speed (max.) n max. = 10
- Hydraulic table clamping:
  - System pressure rating bar 64
  - Consumption cm³/min 16
  - Pump delivery rating l/min max. 8
- Any mounting attitude of FIBROPLAN

Weight of FIBROPLAN (table top ∅ 520, without drive motor) kg approx. 500

7. Accuracies

- Positioning accuracies:
  a) With indirect Measuring System
     - ± s = 10
     - Indicator reading at ∅ 520 mm ± 0.013
  b) With Direct Measuring System
     - ± s = 3
     - Indicator reading at ∅ 520 mm ± 0.004
- Runout: Centre bore
  - In the rotary table mm 0.01
- Runout: Table top face
  - (relative to ∅ 520) mm 0.012
- Squareness: Table top face to mounting face
  - (relative to ∅ 520) mm 0.025
- Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)

Excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p °</th>
<th>0</th>
<th>10</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>J kgm²</td>
<td>110</td>
<td>140</td>
<td>190</td>
<td>285</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>α s⁻²</td>
<td>3.50</td>
<td>2.80</td>
<td>2.10</td>
<td>1.40</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t s</td>
<td>0.45</td>
<td>0.50</td>
<td>0.60</td>
<td>0.70</td>
</tr>
<tr>
<td>Acceleration/deceleration time per</td>
<td>t₁, t₂ s</td>
<td>0.30</td>
<td>0.40</td>
<td>0.50</td>
<td>0.75</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p °</th>
<th>0</th>
<th>60</th>
<th>90</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>J kgm²</td>
<td>110</td>
<td>140</td>
<td>190</td>
<td>285</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>α s⁻²</td>
<td>3.50</td>
<td>2.80</td>
<td>2.10</td>
<td>1.40</td>
</tr>
<tr>
<td>Positioning time</td>
<td>t s</td>
<td>1.30</td>
<td>1.40</td>
<td>1.50</td>
<td>1.75</td>
</tr>
<tr>
<td>Acceleration/deceleration time per</td>
<td>t₁, t₂ s</td>
<td>0.30</td>
<td>0.40</td>
<td>0.50</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Ordering information with code no. NC 2.05.

Right of alterations reserved.
10. Load data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust against table top face:</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal (load + machining forces)</td>
<td>N 45 000</td>
</tr>
<tr>
<td>Radial thrust against table top</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>N 65 000</td>
</tr>
<tr>
<td>Table top loads (workpieces + fixtures):</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>kg 1 200</td>
</tr>
<tr>
<td>Mass moment of inertia of load (workpieces + fixtures), s. 9.</td>
<td>kgm² 285</td>
</tr>
<tr>
<td>Tilting moments:</td>
<td></td>
</tr>
<tr>
<td>- incl. moment exerted by workpieces + fixtures</td>
<td>Nm 16 000</td>
</tr>
<tr>
<td>Tangential moment against table top</td>
<td></td>
</tr>
<tr>
<td>(with hydraulic table clamping activated)</td>
<td>Nm 6 000</td>
</tr>
<tr>
<td>Torque limit during rotary milling</td>
<td></td>
</tr>
<tr>
<td>- transferable by worm drive</td>
<td>Nm 4 200</td>
</tr>
<tr>
<td>Maximum permissible motor torque when i tot. = 240</td>
<td>Nm 50</td>
</tr>
<tr>
<td>Motor torque requirement for positioning only when i tot. = 240</td>
<td>Nm 7</td>
</tr>
</tbody>
</table>

11. Installed dimensions

Drawings of DXF files available to order.

![Diagram showing installation dimensions](image_url)

- Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request).
- PG 7 Cable entry for prox. switch cable (both sides).
- PG 9 Cable entry for rotary resolver with direct measuring system (both sides).
- G¼ Connection for hydraulic locking (both sides).
- G¼ Connection for air purge 0,5 bar (both sides).

See page 8 for additional arrangements for motor and rotary resolver. Reference slot (optional) indicate req'd location with order.
NC 2.06  Technical Data

1. Type designation
   FIBROPLAN  - NC2.  
   Size  06.  

2. Table top
   dimension  \( \varnothing \times L \)  
   \( \varnothing \)  630 mm 630  
   800 mm 800  
   execution  \( \varnothing \)  round without T-slots 1  
   \( \varnothing \)  square without T-slots 3  
   \( \varnothing \)  round with T-slots 2  
   \( \varnothing \)  square with T-slots 4  

3. Locking, of rotary table spindle
   without hydraulic table clamping 0  
   with hydraulic table clamping 1  

4. Measuring system
   see page 8  

5. Drive motor arrangement
   see page 8  

6. Technical Data
   Optional centre bore – max.  \( \varnothing \)  mm 250  
   Table top bearing ID \( \times \) OD mm 460 \( \times \) 600  
   Diameter of worm wheel mm 486  
   Ratio:
   
   - Worm drive ratio  \( i = 144 \)  
   - Basic version with gearwheel train \( i_{\text{tot}} = 288 \)  
   Table top speed (max.) \( n_{\text{max}} = 8 \)  
   Hydraulic table clamping:
   
   - system pressure rating bar 64  
   - consumption cm\(^3\) 20  
   - pump delivery rating l/min max. 10  
   Any mounting attitude of FIBROPLAN  
   Weight of FIBROPLAN
   (table top \( \varnothing \) 630, without drive motor) kg approx. 700  

7. Accuracies
   Positioning accuracies:
   a) with indirect Measuring System
      \( \pm s \)  10  
      indicator reading at \( \varnothing \) 630 mm 0.015  
   b) with Direct Measuring System
      \( \pm s \)  3  
      indicator reading at \( \varnothing \) 630 mm 0.005  
   Runout: centre bore
      in the rotary table mm 0.01  
   Runout: table top face
      (relative to \( \varnothing \) 630) mm 0.015  
   Squareness: table top face to
      mounting face
      (relative to \( \varnothing \) 630) mm 0.03  
   Higher geometrical precision on request  

8. Sequence of motions
   \( r_{\text{max}} \)
   \( n \)
   \( t \)
   \( T_s = 2t_a \)
   \( T_a = 2t_a \)
   \( t_v = t_a \)

9. Switching times/moments of inertia (switching times rounded up/down)
   excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>( p )</th>
<th>10</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n_{\text{r.p.m. at table}} )</td>
<td>( \text{min}^{-1} )</td>
<td>8.00</td>
<td>8.00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>J ( \text{kgm}^2 )</td>
<td>190</td>
<td>260</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>( \alpha ) ( \text{s}^{-2} )</td>
<td>2.80</td>
<td>2.10</td>
</tr>
<tr>
<td>Positioning time</td>
<td>( t )</td>
<td>s</td>
<td>0.30</td>
</tr>
<tr>
<td>Acceleration/deceleration time per ( t_a, t_v )</td>
<td>s</td>
<td>0.30</td>
<td>0.40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>( p )</th>
<th>90</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n_{\text{r.p.m. at table}} )</td>
<td>( \text{min}^{-1} )</td>
<td>8.00</td>
<td>8.00</td>
</tr>
<tr>
<td>Moment of inertia from transport load</td>
<td>J ( \text{kgm}^2 )</td>
<td>190</td>
<td>260</td>
</tr>
<tr>
<td>Angular acceleration at table</td>
<td>( \alpha ) ( \text{s}^{-2} )</td>
<td>2.80</td>
<td>2.10</td>
</tr>
<tr>
<td>Positioning time</td>
<td>( t )</td>
<td>s</td>
<td>1.35</td>
</tr>
<tr>
<td>Acceleration/deceleration time per ( t_a, t_v )</td>
<td>s</td>
<td>0.30</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Ordering inform. with code no.  

Right of alterations reserved
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 75,000
- Radial thrust against table top N 115,000

Table top loads (workpieces + fixtures):
- table top horizontal kg 2,000

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 800

Tilting moments:
- incl. moment exerted by workpieces + fixtures Nm 26,000
- tangential moment against table top (with hydr. table clamping activated) Nm 8,000
- Torque limit during rotary milling Nm 7,000

Maximum permissible motor torque when i tot. = 288 Nm 74

Motor torque requirement for positioning only when i tot. = 288 Nm 9.5

11. Installed dimensions

Drawings of DXF files available to order.

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

See page 8 for additional arrangements for motor and rotary resolver

Reference slot (optional) indicate reqrd. location with order
NC 2.07  Technical Data

1. Type designation
   FIBROPLAN  NC2.
   NC2.07
   Size 07.

2. Table top
   dimension
   \[ \varnothing \times \varnothing \begin{array}{c} 800 \text{ mm} \ 1000 \text{ mm} \\ \end{array} \]
   execution
   \[ \begin{array}{c} \varnothing \text{ round without T-slots} \\ \varnothing \text{ square without T-slots} \\ \varnothing \text{ square with T-slots} \\ \end{array} \]

3. Locking, of rotary table spindle
   without hydraulic table clamping
   with hydraulic table clamping

4. Measuring system
   see page 8

5. Drive motor arrangement
   see page 8

6. Technical Data
   Optional centre bore – max. \[ \varnothing \text{ mm} 350 \]
   Table top bearing ID \[ \times \text{ OD mm} 580 \times 750 \]
   Diameter of worm wheel \[ \text{mm} 562 \]
   Ratio:
   Worm drive ratio \( i = 180 \)
   Basic version with gearwheel train \( \text{tot} = 360 \)
   Table top speed (max.) \( n_{\text{max}} = 6 \)
   Hydraulic table clamping:
   system pressure rating \( \text{bar} 64 \)
   consumption \( \text{cm}^3 \text{ min}^{-1} 25 \)
   pump delivery rating \( \text{l/min max.} 12 \)
   Any mounting attitude of FIBROPLAN
   Weight of FIBROPLAN
   (table top \( \varnothing 800, \) without drive motor) \( \text{kg} \approx 1250 \)

7. Accuracies
   Positioning accuracies:
   a) with indirect Measuring System
      in seconds of arc \( \pm 10 \)
      indicator reading at \( \varnothing 800 \text{ mm} \pm 0.02 \)
   b) with Direct Measuring System
      in seconds of arc \( \pm 3 \)
      indicator reading at \( \varnothing 800 \text{ mm} \pm 0.006 \)
   Runout: centre bore
      in the rotary table \( \text{mm} 0.01 \)
   Runout: table top face
      (relative to \( \varnothing 800) \text{ mm} 0.015 \)
   Squareness: table top face to
      mounting face
      (relative to \( \varnothing 800) \text{ mm} 0.03 \)
   Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
   excluding clamping process and excluding reaction times
   Turning angle at table \( \varnothing \text{ r.p.m. at table} \)
   p \[ \text{min}^{-1} \begin{array}{c} 10 \ 30 \ 45 \\ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \end{array} \]
   Moment of inertia from transport load \( J \text{ kgm}^2 \)
   \[ \begin{array}{c} 220 \ 310 \ 500 \ 1000 \ 220 \ 310 \ 500 \ 1000 \ 220 \ 310 \ 500 \ 1000 \end{array} \]
   Angular acceleration at table \( \alpha \text{ s}^{-2} \)
   \[ \begin{array}{cccccccc} 2.10 & 1.60 & 1.05 & 0.55 & 2.10 & 1.60 & 1.05 & 0.55 \\ 2.10 & 1.60 & 1.05 & 0.55 & 2.10 & 1.60 & 1.05 & 0.55 \end{array} \]
   Positioning time \( T \text{ s} \)
   \[ \begin{array}{cccccccc} 0.60 & 0.70 & 0.85 & 1.15 & 1.15 & 1.25 & 1.45 & 2.00 \\ 1.15 & 1.25 & 1.45 & 2.00 & 1.35 & 1.65 & 1.85 & 2.45 \end{array} \]
   Acceleration/deceleration time per \( t_s, t_v \text{ s} \)
   \[ \begin{array}{cccccccc} 0.30 & 0.40 & 0.60 & 1.20 & 0.30 & 0.40 & 0.60 & 1.20 \\ 0.30 & 0.40 & 0.60 & 1.20 & 0.30 & 0.40 & 0.60 & 1.20 \end{array} \]

   Turning angle at table \( \varnothing \text{ r.p.m. at table} \)
   p \[ \text{min}^{-1} \begin{array}{c} 10 \ 30 \ 45 \ 60 \ 90 \ 180 \\ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \ 6.00 \end{array} \]
   Moment of inertia from transport load \( J \text{ kgm}^2 \)
   \[ \begin{array}{c} 220 \ 310 \ 500 \ 1000 \ 220 \ 310 \ 500 \ 1000 \ 220 \ 310 \ 500 \ 1000 \end{array} \]
   Angular acceleration at table \( \alpha \text{ s}^{-2} \)
   \[ \begin{array}{cccccccc} 2.10 & 1.60 & 1.05 & 0.55 & 2.10 & 1.60 & 1.05 & 0.55 \\ 2.10 & 1.60 & 1.05 & 0.55 & 2.10 & 1.60 & 1.05 & 0.55 \end{array} \]
   Positioning time \( T \text{ s} \)
   \[ \begin{array}{cccccccc} 2.00 & 2.10 & 2.30 & 2.85 & 2.80 & 2.90 & 3.10 & 3.70 \\ 5.30 & 5.40 & 5.60 & 6.20 \end{array} \]
   Acceleration/deceleration time per \( t_s, t_v \text{ s} \)
   \[ \begin{array}{cccccccc} 0.30 & 0.40 & 0.60 & 1.20 & 0.30 & 0.40 & 0.60 & 1.20 \\ 0.30 & 0.40 & 0.60 & 1.20 & 0.30 & 0.40 & 0.60 & 1.20 \end{array} \]
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 100 000
- Radial thrust against table top N 140 000

Table top loads (workpieces + fixtures):
- table top horizontal kg 3 000

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 1 000

Tilting moments:
- incl. moment exerted by workpieces + fixtures Nm 32 000
- tangential moment against table top (with hyd. table clamping activated) Nm 14 000
- Torque limit during rotary milling Nm 7 000

Maximum permissible motor torque when but. = 360 Nm 55

Motor torque requirement for positioning only when but. = 360 Nm 10

11. Installed dimensions

Drawings of DXF files available to order.

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

See page 8 for additional arrangements for motor and rotary resolver Reference slot (optional) indicate reqrd. location with order
### 1. Type designation

**FIBROPLAN - NC2.**

**Size** 08.

### 2. Table top

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Execution</th>
<th>Field 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø 1 000 mm</td>
<td>Round without T-slots</td>
<td>2</td>
</tr>
<tr>
<td>Ø 1 250 mm</td>
<td>Round with T-slots</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Square without T-slots</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Square with T-slots</td>
<td>4</td>
</tr>
</tbody>
</table>

### 3. Locking, of rotary table spindle

- **Without hydraulic table clamping**
- **With hydraulic table clamping**

### 4. Measuring system

See page 8

### 5. Drive motor arrangement

See page 8

### 6. Technical Data

<table>
<thead>
<tr>
<th>Optional centre bore – max.</th>
<th>mm 460</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table top bearing ID x OD</td>
<td>mm 650 x 870</td>
</tr>
<tr>
<td>Diameter of worm wheel</td>
<td>mm 805</td>
</tr>
<tr>
<td>Ratio:</td>
<td></td>
</tr>
<tr>
<td>Worm drive ratio</td>
<td>i = 240</td>
</tr>
<tr>
<td>Basic version with gearwheel train</td>
<td>i tot = 480</td>
</tr>
<tr>
<td>Table top speed (max.)</td>
<td>( n_{\text{max}} = 6 )</td>
</tr>
<tr>
<td>Hydraulic table clamping:</td>
<td></td>
</tr>
<tr>
<td>System pressure rating</td>
<td>bar 64</td>
</tr>
<tr>
<td>Consumption</td>
<td>cm³ 30</td>
</tr>
<tr>
<td>Pump delivery rating</td>
<td>l/min max. 14</td>
</tr>
<tr>
<td>Any mounting attitude of FIBROPLAN</td>
<td></td>
</tr>
<tr>
<td>Weight of FIBROPLAN (table top Ø 1 000, without drive motor)</td>
<td>kg approx. 2 300</td>
</tr>
</tbody>
</table>

### 7. Accuracies

#### Positioning accuracies:

- **With indirect Measuring System**
  - in seconds of arc: \( \pm 10 \) indicator reading at Ø 1 000 mm
  - in seconds of arc: \( \pm 0.024 \)

- **With Direct Measuring System**
  - in seconds of arc: \( \pm 3 \) indicator reading at Ø 1 000 mm
  - in seconds of arc: \( \pm 0.007 \)

#### Runout:

- Centre bore in the rotary table mm 0.01
- Table top face (relative to Ø 1 000) mm 0.02

#### Squareness:

- Table top face to mounting face (relative to Ø 1 000) mm 0.04

**Higher geometrical precision on request**

### 8. Sequence of motions

#### Positioning time

- \( t_s \) s
- \( T_1 \) s
- \( T_2 = 2 t_s \) s
- \( T_3 \) s

#### Angular acceleration

- \( \alpha \) s⁻²
- \( \beta \) s⁻²

#### Angular velocity

- \( \omega \) rad/s

### 9. Switching times/moments of inertia (switching times rounded up/down)

<table>
<thead>
<tr>
<th>Turning angle at table</th>
<th>p°</th>
<th>30</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moment of inertia from</td>
<td>J kgm²</td>
<td>750</td>
<td>1 100</td>
</tr>
<tr>
<td>Transport load</td>
<td></td>
<td>750</td>
<td>1 100</td>
</tr>
</tbody>
</table>

### Ordering information with code no.

NC 2.08
10. Load data

Thrust against table top face:
  - table top horizontal (load + machining forces) N 120'000
  - Radial thrust against table top N 250'000

Table top loads (workpieces + fixtures):
  - table top horizontal kg 6'000

Mass moment of inertia of load (workpieces + fixtures), s. 9. km² 3'600

Tilting moments:
  - incl. moment exerted by workpieces + fixtures Nm 48'000
  - Tangential moment against table top
    (with hydr. table clamping activated) Nm 25'000
  - Torque limit during rotary milling Nm 14'000

Maximum permissible motor torque when i tot. = 480 Nm 90

Motor torque requirement for
  positioning only when i tot. = 480 Nm 15

11. Installed dimensions

Drawings of DXF files available to order.

See page 8 for additional arrangements for motor and rotary resolver.
Reference slot (optional) indicate reqrd. location with order.

Right of alterations reserved
NC 2.09 Technical Data

1. Type designation
   FIBROPLAN - NC2.
   NC 2.09

   Size 09.

2. Table top
   dimension Ø 1250 Ø 1500
   mm 1250 mm 1500
   execution round without T-slots
   square without T-slots square with T-slots

3. Locking, of rotary table spindle
   without hydraulic table clamping
   with hydraulic table clamping

4. Measuring system
   see page 8

5. Drive motor arrangement
   see page 8

6. Technical Data
   Optional centre bore – max. Ø mm 600
   Table top bearing ID × OD mm 850 × 1095
   Diameter of worm wheel mm 1020
   Ratio:
   Worm drive ratio i = 320
   Basic version with gearwheel train i = 480
   Table top speed (max.) n max. = 4.2
   Hydraulic table clamping:
   system pressure rating bar 64
   consumption cm³ 40
   pump delivery rating l/min max. 20
   Any mounting attitude of FIBROPLAN
   Weight of FIBROPLAN
   (table top Ø 1250, without drive motor) kg approx. 4000

7. Accuracies
   Positioning accuracies:
   a) with indirect Measuring System
      in seconds of arc ± s ± 10
      indicator reading at Ø 1250 mm ± 0.03
   b) with Direct Measuring System
      in seconds of arc ± s ± 3
      indicator reading at Ø 1250 mm ± 0.009
   Runout: centre bore
      in the rotary table mm 0.01
   Runout: table top face
      (relative to Ø 1250) mm 0.02
   Squareness: table top face to
      mounting face
      (relative to Ø 1250) mm 0.04
   Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
   excluding clamping process and excluding reaction times
   Turning angle at table p °
   r.p.m. at table 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20
   Moment of inertia from transport load J kgm²
   Angular acceleration at table α s⁻²
   Positioning time t s
   Acceleration/deceleration time per t₀, tₐ s

   Turning angle at table p °
   r.p.m. at table 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20 4.20
   Moment of inertia from transport load J kgm²
   Angular acceleration at table α s⁻²
   Positioning time t s
   Acceleration/deceleration time per t₀, tₐ s

Ordering inform. with code no. NC 2.09 Right of alterations reserved
10. Load data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrust against table top face:</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal (load + machining forces)</td>
<td>N 160 000</td>
</tr>
<tr>
<td>Radial thrust against table top</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>N 300 000</td>
</tr>
<tr>
<td>Table top loads (workpieces + fixtures):</td>
<td></td>
</tr>
<tr>
<td>- table top horizontal</td>
<td>kg 8 000</td>
</tr>
<tr>
<td>Mass moment of inertia of load (workpieces + fixtures), s. 9.</td>
<td>kgm² 7 500</td>
</tr>
<tr>
<td>Tilting moments:</td>
<td></td>
</tr>
<tr>
<td>- incl. moment exerted by workpieces + fixtures</td>
<td>Nm 60 000</td>
</tr>
<tr>
<td>Tangential moment against table top (with hydr. table clamping activated)</td>
<td></td>
</tr>
<tr>
<td>- torque limit during rotary milling</td>
<td>Nm 32 000</td>
</tr>
<tr>
<td>- transferable by worm drive</td>
<td></td>
</tr>
<tr>
<td>Maximum permissible motor torque when i tot. = 480</td>
<td>Nm 110</td>
</tr>
<tr>
<td>Motor torque requirement for positioning only when i tot. = 480</td>
<td>Nm 20</td>
</tr>
</tbody>
</table>

11. Installed dimensions

Drawings of DXF files available to order.

Right of alterations reserved
NC 2.10  Technical Data

1. Type designation
FIBROPLAN  NC2.
Size 10.

2. Table top
dimension  ø 1600 mm 1600
execution  round without T-slots 1

3. Locking, of rotary table spindle
without hydraulic table clamping 0
with hydraulic table clamping 1

4. Measuring system
see page 8

5. Drive motor arrangement
see page 8

6. Technical Data
Optional centre bore – max. ø mm 750
Table top bearing ID x OD mm 1030 x 1300
Diameter of worm wheel mm 1215
Ratio:
  Worm drive ratio  i = 320
  Basic version with gearwheel train  i_bas = 480
Table top speed (max.)  \( n_{\text{max}} \) = 3.1
Hydraulic table clamping:
  system pressure rating bar 64
  consumption cm³/min max. 50
  pump delivery rating l/min max. 24
Any mounting attitude of FIBROPLAN
Weight of FIBROPLAN
  (table top ø 1600, without drive motor) kg approx. 5500

7. Accuracies
Positioning accuracies:
  a) with indirect Measuring System
     in seconds of arc  \( \pm s \)  10
     indicator reading at  \( \varnothing 1600 \) mm  \( \pm 0.039 \)
  b) with Direct Measuring System
     in seconds of arc  \( \pm s \)  3
     indicator reading at  \( \varnothing 1600 \) mm  \( \pm 0.012 \)
Runout: centre bore
  in the rotary table mm 0.01
Runout: table top face
  (relative to  \( \varnothing 1600 \)) mm 0.025
Squareness: table top face to
  mounting face (relative to  \( \varnothing 1600 \)) mm 0.05
Higher geometrical precision on request

8. Sequence of motions

9. Switching times/moments of inertia (switching times rounded up/down)
excluding clamping process and excluding reaction times

<table>
<thead>
<tr>
<th>Turning angle at table (r.p.m. at main axis)</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
<th>3.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>r.p.m. at table</td>
<td>min⁻¹</td>
<td>10</td>
<td>30</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moment of inertia from transport load J kgm²</td>
<td></td>
<td>3000</td>
<td>5000</td>
<td>7000</td>
<td>9000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angular acceleration at table α s⁻²</td>
<td></td>
<td>0.65</td>
<td>0.45</td>
<td>0.30</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning time t s</td>
<td></td>
<td>1.05</td>
<td>1.25</td>
<td>1.50</td>
<td>1.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acceleration/deceleration time per t₉, tᵥ</td>
<td></td>
<td>0.50</td>
<td>0.70</td>
<td>1.05</td>
<td>1.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ordering inform. with code no.  NC2.10  . . . . . . . . . . Right of alterations reserved
10. Load data

Thrust against table top face:
- table top horizontal (load + machining forces) N 200000
- Radial thrust against table top N 400000

Table top loads (workpieces + fixtures):
- table top horizontal kg 12000

Mass moment of inertia of load (workpieces + fixtures), s. 9. kgm² 12000

Tilting moments:
- incl. moment exerted by workpieces + fixtures Nm 110000

Tangential moment against table top (with hydr. table clamping activated) Nm 40000

Torque limit during rotary milling Nm 24000

Maximum permissible motor torque when bulk = 480 Nm 145

Motor torque requirement for positioning only when bulk = 480 Nm 27

11. Installed dimensions

Drawings of DXF files available to order.

Drive motor with fully sealed shaft. Insulation class IP 64 (splashproof execution on request)

 PG 9 Cable entry for rotary resolver (both sides)
 PG 7 Cable entry for prox. switch cable (both sides)
 G ¼ Connection for air purge 0.5 bar (both sides)
 G ⅝ Connection for hydraulic locking (both sides)

See page 8 for additional arrangements for motor and rotary resolver
Reference slot (optional) indicate reqrd. location with order

Right of alterations reserved
FIBROPLAN® - combination models with multiple axes

One Swivel Axis with Four Rotational Axes

FIBROPLAN – combination models with multiple axes.

Applications

- operations with simultaneous tools control on multiple machining spindles
- machining of up to 5 component-sides in one clamping
- machining in complex angular positions
- machining of components with complex shapes, such as turbine parts, fan blades etc.

Technical Data/information on executions, sizes etc. on request.

Right of alterations reserved
One Swivel Axis with One Rotational Axis

Connection for hydraulic locking G1/4 (NC 1.03)
Cable exit for reference datum switch (NC 1.02)

Connection for hydraulic locking G1/8 (NC 1.02)

Overrun protection
Range scanning
Range scanning
Reference datum for NC 1.03

DC-motor with rotary resolver
1HU 3076, Fa. Siemens
Insulation class IP 55

DC-motor with rotary resolver
1HU 3056, Fa. Siemens
Insulation class IP 55
FIBROPLAN® - combination models with multiple axes

One Swivel Axis with One Rotational Axis

Cable exit for reference datum switch PG 7
Connection for hydraulic locking G1/4

track 1
track 2
track 3
track 4

M20 eye bolt for transport
Connection for hydraulic locking G1/4

Alpha 3/3000 motor
(to be supplied by customer)

Alpha 12/3000 motor
(to be supplied by customer)

Trunnion support bearing

Right of alterations reserved
One Swivel Axis with Two Rotational Axes

Connection for hydraulic locking, G1/4

Trunnion support bearing

NC 1.02
NC 1.02
Base
NC 1.04

Cable exit for reference datum switch (NC 1.02)

Connection for hydraulic locking G1/8 (NC 1.02)

Overrun protection

Connection for hydraulic locking G1/4

Range scanning
Range scanning
Reference datum for NC 1.04

AC-motor with rotary resolver 1FT 5076, Fa. Siemens
Insulation class P 55

AC-motor with rotary resolver 1FT 5074, Fa. Siemens
Insulation class P 55

Right of alterations reserved
Accessories

- CNC controls, 1, 2, 3 axes
- Small hydraulic units
- Rapid switching valve blocks
- Tailstocks
- Trunnion Support BEARING
- Sliding tables
1. Installation Attitude: horizontal □ vertical □
(position table top)

2. Dimensional Requirements:
table top Ø mm
height to table top face mm
centre height table top mm
Alignment groove position (1,2,3)

3. Table Loads/Machining Forces:
thrust against
table top face N
load: workpieces + fixtures kg
moment of inertia of above load* J kgm²
tilting moment Nm
rotary milling torque Nm
tangential moment (hydr. clamping) Nm

4. Accuracy Requirements:
positioning accuracy in angular seconds ±

5. Hydraulic Table top Clamping with □ without □

6. Displacement Measuring System
with direct/indirect system fitted □
Version prepared for installation of measuring system □
Measuring system arrangement

7. Motor
Version with motor □
Version prepared for installation of motor □
motor arrangement

8. Supplementary Elements

* Moment of Inertia – Formula:
solid body:
\[ J = \frac{1}{2} \cdot r_a^2 \cdot m \]
or
\[ J = \frac{m \cdot D_a^2}{8} \]

formula for several loads, placed on same radius of gyration:
\[ J = 1,1 \cdot r_m^2 \cdot m \cdot c \]

Ra = radius of gyration (m)
M = mass (kg)
c = number of individual loads
1. Calculation of division time $T_1$

Theoretical positioning time based on angle of rotation, maximum table r.p.m. and acceleration/deceleration times.

Max r.p.m. achieved.

It is assumed that the speed of rotation accelerates and decelerates evenly.

With angular acceleration $\alpha$

$$T_1 = \frac{\Pi \cdot n}{\alpha} \cdot \frac{\rho}{360^\circ} \cdot \frac{60}{n} \geq 2t_a$$

With acceleration time $t_a$

$$T_1 = t_a + \frac{\rho}{360^\circ} \cdot \frac{60}{n} \geq 2t_a$$

If value $T_1$ is smaller than $2t_a$ then the calculation of $T_2$ should be carried out using equation 2.1 or 2.2.

Example of calculation

To calculate positioning time $T_1$ with given angular acceleration $\alpha$ or with given acceleration time $t_a$.

Given values:

$n = 27,5 \text{ [min}^{-1}]$ (from table “Technical Data”)
$\alpha = 14,4 \text{ [s}^{-2}]$ (from table “Technical Data”)
$\rho = 90^\circ$
$t_a = 0,2 \text{ [s]}$ (Given value from “Technical Data”)
$2t_a = 0,4 \text{ [s]}$

using 1.1 $T_1 = \frac{\Pi \cdot 27,5}{14,4 \cdot 30} + \frac{90^\circ}{360^\circ} \cdot \frac{60}{27,5} \geq 2t_a$

or

using 1.2 $T_1 = 0,2 + \frac{90^\circ}{360^\circ} \cdot \frac{60}{27,5} \geq 2t_a$

$T_1 = 0,745 \text{ s} \geq 0,4 \text{ s}$

The time for a division $90^\circ$ is 0,745 s and is greater than 0,4 s ($2t_a$).

$\Rightarrow$ No calculation required for $T_2$. 

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### Formulae

<table>
<thead>
<tr>
<th>Sign used</th>
<th>Meaning</th>
<th>Formula sign</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angular acceleration</td>
<td>$\alpha$</td>
<td>s$^{-2}$</td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td>$\beta$</td>
<td>° (angular seconds)</td>
<td></td>
</tr>
<tr>
<td>Turning angle</td>
<td>$\rho$</td>
<td>° Degrees</td>
<td></td>
</tr>
<tr>
<td>Angular velocity</td>
<td>$\omega$</td>
<td>s$^{-1}$</td>
<td></td>
</tr>
</tbody>
</table>

| Positioning time | $T_1$ | s |
| Positioning time | $T_2$ | s |
| Acceleration time | $t_a$ | s |
| Deceleration time | $t_v$ | s |

| Table top r.p.m. | $n$ | min$^{-1}$ |
| Moment of inertia | $J$ | kgm$^2$ |

| Arc length | $l_B$ | mm |
| Diameter | $d$ | mm |
2. Calculation of division time $T_2$

Theoretical positioning time based on angle of rotation, maximum table r.p.m. and acceleration/deceleration times. Max. r.p.m. not achieved. It is assumed that the speed of rotation accelerates and decelerates evenly.

With angular acceleration $\alpha$

$$2.1 \quad T_2 = 2 \cdot \sqrt{\frac{\beta}{57.3 \cdot \alpha}} \leq 2t_a$$

With acceleration time $t_a$

$$2.2 \quad T_2 = 2 \cdot \sqrt{\frac{\beta}{57.3 \cdot 2 \cdot \Pi \cdot n}} \cdot t_a \cdot 60 \leq 2t_a$$

If value $T_2$ is smaller than $2t_a$ then the calculation of $T_1$ should be carried out using equation 1.1 or 1.2.

Example of calculation

To calculate positioning time $T_2$ with prescribed angular acceleration $\alpha$ or with prescribed acceleration time $t_a$.

Given values:
- $\beta = 3$ $^\circ$  
- $n = 27.5$ [min$^{-1}$] (from table “Technical Data”) 
- $\alpha = 14.4$ [s$^{-2}$] (from table “Technical Data”) 
- $t_a = 0.2$ [s] (Given value from “Technical Data”) 
- $2t_a = 0.4$ [s]

Using $2.1$ $T_2 = 2 \cdot \sqrt{\frac{3}{57.3 \cdot 14.4}} \leq 2t_a$

or

Using $2.2$ $T_2 = 2 \cdot \sqrt{\frac{3}{57.3 \cdot 2 \cdot \Pi \cdot 27.5 \cdot 0.2 \cdot 60}} \leq 2t_a$

$T_2 = 0.121$ s $\leq 0.4$ s

The time for a division of $3^\circ$ is $0.12$ s and is less than $0.4$ s ($2t_a$).

$\Rightarrow$ No calculation required for $T_1$.

3. Calculation of angular acceleration $\alpha$ and acceleration time $t_a$

$$3.1 \quad \alpha = \frac{2 \cdot \Pi \cdot n}{t_a \cdot 60}$$

$$3.2 \quad t_a = \frac{2 \cdot \Pi \cdot n}{\alpha \cdot 60}$$

Calculation examples

For calculation of angular acceleration $\alpha$ or acceleration time $t_a$.

Given values:
- $n = 27.5$ [min$^{-1}$] (from table “Technical Data”) 
- $t_a = 0.2$ [s] (Given value from “Technical Data”)

Using $3.1$ $\alpha = \frac{2 \cdot \Pi \cdot 27.5}{0.2 \cdot 60} = 14.399$ s$^{-2}$

Angular acceleration $\alpha$ is $14.4$ s$^{-2}$

Using $3.2$ $t_a = \frac{2 \cdot \Pi \cdot 27.5}{14.4 \cdot 60} = 0.200$ s

Acceleration time $t_a$ is $0.2$ s (200 ms)

4. Conversion of angular seconds into arc measurement

$$4.1 \quad \beta = \frac{\beta \cdot d}{412530}$$

$$4.2 \quad \beta = \frac{412530 \cdot \beta}{d}$$
Determination of the moment of inertia

1. Bodies with central axis

1.1 Solid cylinder or flat disc rotating about its own axis.
   \[ J = \frac{D^2}{8} x m \]

1.2 Hollow cylinder or flat ring rotating about its own axis.
   \[ J = \frac{D^2+d^2}{8} x m \]

1.3 Solid cylinder rotating about an axis perpendicular to its central axis.
   \[ J = \left(\frac{L^2}{12} + \frac{D^2}{16}\right) x m \]

1.4 Hollow cylinder rotating about an axis perpendicular to its central axis.
   \[ J = \left(\frac{L^2}{12} + \frac{D^2+d^2}{16}\right) x m \]

1.5 Rectangular plate of any thickness rotating about one central axis.
   \[ J = \frac{A^2+B^2}{12} x m \]

1.6 Long thin rod of any cross-section rotating about one central axis.
   \[ J = \frac{L^2}{12} x m \]

J = Moment of inertia in kgm²
Dimensions in metres, masses in kg

2. Bodies with offset axis

2.1 Solid cylinder or flat disc rotating about an external axis.
   \[ J = \left(\frac{D^2}{8} + r^2\right) x m \]

2.2 Hollow cylinder or flat ring rotating about an external axis.
   \[ J = \left(\frac{D^2+d^2}{8} + r^2\right) x m \]

2.3 Solid cylinder rotating about an external axis perpendicular to its own central axis.
   \[ J = \left(\frac{L^2}{12} + \frac{D^2}{16} + r^2\right) x m \]

2.4 Hollow cylinder rotating about an external axis perpendicular to its own central axis.
   \[ J = \left(\frac{L^2}{12} + \frac{D^2+d^2}{16} + r^2\right) x m \]

2.5 Rectangular plate of any thickness rotating about an external central axis parallel to the axis of symmetry.
   \[ J = \left(\frac{A^2+B^2}{12} + r^2\right) x m \]

2.6 Long thin rod of any cross-section rotating about an external axis perpendicular to its own central axis.
   \[ J = \left(\frac{L^2}{12} + r^2\right) x m \]

J = Moment of inertia in kgm²
Dimensions in metres, masses in kg