The micro and nano precision specialist

SwissNano
SwissNano

The SwissNano was designed to meet the demand for small workpieces requiring very high precision. The kinematics of the machine enable it to produce the majority of turned parts of a watch movement measuring up to 4 mm; from the simplest to the most complex pieces, including cutting, with excellent finishes. Its capability extends beyond horological applications to include any type of workpiece requiring extreme quality and precision.
The micro and nano precision specialist

- Maximum diameter: 4 mm
- Maximum number of tools: 13
- Maximum number of rotating tools: 2
- C axes: 2
- Linear axes: 6

SwissNano
The SwissNano brings out unique emotions with its innovative design. Another layer is added to this small, ultra-high performing machine with the possibility of customisation in eight different colours.

**Precision**
- Offering the highest precision on the market, it meets the most exacting watchmaking requirements.
- A symmetrical cast iron structure provides the machine with excellent rigidity which allows it to achieve excellent finishes and extends the cutting life of tools.
- Unrivalled thermal stability thanks to a short thermal loop and comprehensive and active machine thermal management.
- Modular machining area adaptable to the requirements of the workpiece.

**Performance**
- Possibility of carrying out high value-added operations, for example gear hobbing, polygon milling, thread milling and internal thread-whirling.
- 2 positions for rotating tools, optional high-frequency spindle also available.
- Various workpiece recovery systems enable fragile and/or small workpieces to be extracted using a vacuum.
- Excellent reliability.

**Productivity**
- Kinematics with 6 linear axes and 2 independent tool systems enable turning and drilling, cutting/deburring and roughing/finishing operations.
- Fixed guide bush, rotating or operation without guide bush.

**Ergonomics**
- Ergonomics and visual access to the machine area of 180 degrees facilitates tool adjustment.
- Minimum footprint requirement: 1.1 m in front of the machine with bar feeder and a width of 0.65 m. The SwissNano is as compact as a cam-type machine.
- The counter spindle on 3 numeric axes enables fine adjustments to be made to the machine.
A unique concept
The SwissNano features a counter spindle on three linear axes. This solution gives the machine a unique advantage: Adjustment and tool centering for tools mounted under the counter spindle, centering of the counter spindle at the guide bush and even tools in counter-operations is extremely easy for the operator.

The SwissNano's unique design offers perfect access to the tools and allows the operator to position themselves facing the guide bush. In order to perfect such unique ergonomics, the operator benefits from a control panel on a swivel arm fitted with an electronic handwheel.

Minimal energy consumption
In order to minimise the machine's energy consumption, the power of the spindle and counter spindle has been optimised. The SwissNano's energy consumption is significantly lower than that of its direct competitors.
Foolproof repeatability and precision

Reliable, precise, and ergonomic, the SwissNano enables you to respond to the most demanding machining precision requirements. The SwissNano had to be able to produce the majority of turned parts of a watch movement. The machine had to satisfy the most exacting precision and repeatability requirements whilst guaranteeing high quality finishes and allowing the user to remain competitive in the market. The result of this equation is a machine that is unique in many ways. It all starts with the heart, the symmetrical cast iron frame benefiting from small thermal loops. Its rigidity has been optimised in order to guarantee flawless finishes. The machine warms up extremely quickly, and after a change of setup it does not need to be preheated, the first part comes out perfectly, the repeatability is very high and the precision of the machine is consistent throughout production.

The machine’s 6-axis kinematics offers numerical settings in all dimensions. The functionality offered by the counter spindle, mounted on three linear axes, is unique to the market. In addition to the counter spindle, the second platten can house tools under the counter spindle, increasing the SwissNano’s machining capacity.

Depending on the support, two, three or four tools can be fitted under the counter spindle, enabling the machine to perform operations in parallel on the two plattens.

The SwissNano is the only machine in the market able to make such a simple conversion; by switching from working with a guide bush to working with a collet in a matter of minutes. The machine is simple to use: Its TMI interface fully automates switching between fixed and rotating guide bushes or no guide bush at all. Simply select your preferred setup on the interface and the machine automatically makes all the settings for the operator. This option further reinforces the machine’s flexibility and truly makes it the perfect partner for machining small components that require extreme precision.

Small footprint of 0.7 m²

16,000 rpm
Foolproof repeatability and precision

The kinematics of the SwissNano have been specifically developed to produce small workpieces with high precision requirements. The symmetrical cast iron structure provides the machine with excellent rigidity and the ability to achieve superior finishes.

Unique machining operations

Cutting and deburring

Rough finishing

Turning and drilling
The possibilities are endless

**Thread milling device**
Occasionally used as a polygon milling unit, but more often as a device for milling threads on small screws, this device can be fitted as a tool that successfully performs thread chasing operations. It is possible to achieve very fine threads (S 0.5). To see this operation in more detail, go to our YouTube channel where you can admire the workpiece being machined up close.

**Gear hobbing**
The SwissNano not only performs turning, milling and polygon operations; it can also perform gear hobbing.
This means it can greatly simplify the value chain of your production by performing extremely competitive cutting operations.
Now this complex operation can be performed on a single machine.

**High-frequency spindle**
As a special adaptation, the SwissNano can be equipped with high-frequency spindles, in main operation or counter-operation, as required by the workpiece. The machining of an illustrated dual tray with two front-mounted spindles, is one of the most difficult parts to produce on a bar turning machine and, as you will see in the video, the SwissNano does a marvellous job.
In addition to high-frequency spindles, the SwissNano can also be equipped with one or two mechanical drills for performing drilling or milling operations. There is also the option of performing splitting operations.
The smallest footprint in the market
Thanks to its reduced size and intelligent design, the SwissNano can easily take the place of a Tornos M7 cam machine in your workshop. Better still, you only need a width of 3.2 m to install three SwissNanos, whereas its numerical control competitors require more than 5 m. Your productivity will increase and your costs will reduce.

Vacuum
With the vacuum option, the parts are extracted and collected in one of the oil bath baskets to avoid marking.

Customisation
Unique machine, unique design and unique customisation options. Your SwissNano is customised according to your requirements and wishes, choose from amongst our range of colours or contact us to create a unique model.
Exceptional machining performance

The custom developments made by Tornos engineers allow users to improve the performance and flexibility of their machines, ensuring that they are able to meet the needs of their customers. The SwissNano has a modular machining area enabling different tool holders to be fitted according to the requirements of the workpiece. The machine’s tool holders have been developed with the same care as the heart of the machine, in order...
to preserve the same level of performance, whatever the constraints may be. An example of this is the rotating tool drive motors, which stay cool in order to avoid any thermal drift during machining.

The SwissNano, like all Tornos machines, can be equipped with a certain number of specific options, for example, a high pressure coolant pump or high-frequency spindles.
SwissNano
Unique machining operations

The kinematics of the SwissNano have been specifically developed to produce small workpieces with high precision requirements. The symmetrical structure of the frame provides the machine with excellent rigidity and the ability to achieve excellent finishes.

The SwissNano is the ideal partner to produce parts up to 28 mm long and 4 mm in diameter.
Automotive

Electronics

Stainless steel

Bronze

2.5 mm

0.20 mm

2 mm

9.5 mm
Connectivity pack
Option

Mobile app

TISIS

TISIS CAM
Option

3D simulation of operations

Complex operation

TISIS Lite

TISIS

3D simulation of operations

Complex operation

Programming

Scoring data

Compare parts

Virtual tool setup

Programming

Android

App TISIS tab

TISIS i4.0
Option

Monitoring TISIS screen & TISIS tab
Experience programming intelligence

In today’s competitive global marketplace, there’s not a moment to waste in meeting customers’ demands. Our available TISIS communication and programming software puts you on the fast track to truly effortless programming and real-time process monitoring. TISIS knows your Tornos machine fleet and can help you decide which machine to use for a specific part. But that’s not all: TISIS enables you to assess each machine’s options, reduces the risk of collisions and the resulting stoppages, and improves your production efficiency. TISIS is a smart and advanced ISO code editor that does the thinking for you. It knows your Tornos machine fleet, can help you write your code, and points out any coding errors. It puts the code in colour and can display your program in an easy-to-read Gantt diagram, making it easy for you to see the critical path and react quickly to optimise the process. As an option it is also possible to use our smart TISIS CAM solution, designed to help you master your Tornos machine when it comes to complex and very complex parts. TISIS CAM significantly reduces setup time and, coupled with TISIS, it is the perfect solution for efficiently programming and optimising parts.

Industry 4.0

At the same time, TISIS takes the complexity out of process monitoring, enabling you to take your first steps into the Industry 4.0 universe. Even from a remote location, you can keep an eye on the details of the machining process from your smartphone or tablet. The software also enables you to quickly transfer your programs, either by USB key, or directly onto the machine via your company network. Your parts designs in various stages of completion can be stored with your program. These can then be easily found in the database using a search function.
Buying a Tornos machine is much more than a business transaction. It is your investment in the future. Tornos Service thrives worldwide by guaranteeing the superior production capabilities of products carrying the Tornos name.

Situated close to its customers, as demonstrated by the 12 Tornos Service Centres strategically located across Europe, Asia, and the Americas, Tornos Service offers a comprehensive range of leading support services for Tornos machines, and encompasses the innovation, reliability and attention to detail expected of a premier Swiss brand. And it is all backed by a 100-year legacy of expertise and in-depth understanding of customers’ processes, applications and challenges across a wide range of industrial segments, including automotive, medical, electronics and connectivity, and micromechanics.

**Start-up assistance**
From the first feasibility tests prior to purchase, you are in good hands with Tornos Service. In our state-of-the-art Techno Centres, expert application engineers support you with tests to gauge the feasibility of machining processes and applications. With start-up assistance, you are secure in the knowledge that you will never be left alone to deal with a brand new machine.

**Expert training and coaching**
Engineered for intuitive and easy use, Tornos machines offer a vast range of options and enable myriad processes. Expert training and coaching help your employees become specialists proficient in programming, handling and maintenance, adding more value to your processes, applications and products.

**Free Hotline support**
Wherever you are in the world, highly qualified specialists who speak your language and understand your processes are just a phone call away to quickly support you with handling and programming solutions.

**On-site support**
Fast, efficient on-site operations and preventive maintenance ensure the continuous high performance of your Tornos machines. Regular
scheduled preventive maintenance can help you avoid 70% of machine breakdowns and keep you on the path to productivity.

**Certified original spare parts**
Rapid, reliable, worldwide delivery of certified original spare parts is a speciality of Tornos Service. Regardless of the age of the your Tornos machine, we stock the essential certified spare parts to keep the machine running at peak performance.

**Machine overhauls**
Tornos machines inspire confidence. It’s no surprise, therefore, that many customers turn to Tornos for a complete overhaul of their machines. The Tornos overhaul service returns the machines in good-as-new condition, significantly extending their service life.

**Options, upgrades and X-change modules**
To help you achieve your manufacturing, productivity and quality objectives, our experts collaborate with you to manage complex machining processes, develop software features for machining complex shapes, design special equipment, and tailor peripherals to your needs. Tornos’ X-change modules expand your application capabilities and profitability.

![Tornos machines installed worldwide](image)

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**Statistics**
- **14** service centres around the world
- **100,000** CAM-type machines
- **10,000** DECO & EVODECO machines
- **6,000** conventional NC machines
- **3,000** multi-spindle machines

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Tornos Service
## Technical specifications

### Main spindle (Z1/S1/C1)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. bar capacity</td>
<td>mm 4</td>
</tr>
<tr>
<td>Standard workpiece length with fixed guide bush and synchronous rotating guide bush</td>
<td>mm 28</td>
</tr>
<tr>
<td>Spindle rotation speed</td>
<td>rpm 0-16000</td>
</tr>
<tr>
<td>Spindle power (nominal/max)</td>
<td>kW 1.3/1.5</td>
</tr>
<tr>
<td>Torque (nominal/max)</td>
<td>Nm 0.8/1.0</td>
</tr>
</tbody>
</table>

### Guide bush holder (X1/Y1/S11)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tool positions on guide bush</td>
<td>7 (8)</td>
</tr>
<tr>
<td>Turning tool section</td>
<td>8x8 (7x7)</td>
</tr>
<tr>
<td>Positions for radial rotating tools (option)</td>
<td>2</td>
</tr>
<tr>
<td>Rotating tool speed of rotation</td>
<td>rpm 8000</td>
</tr>
<tr>
<td>Rotating tool power</td>
<td>kW 0.5</td>
</tr>
</tbody>
</table>

### End attachment and counter spindle (X4/Y4/Z4/S4)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tool positions</td>
<td>3x Ø 16</td>
</tr>
<tr>
<td>Positions for rotating tools</td>
<td>2</td>
</tr>
<tr>
<td>Max. bar capacity</td>
<td>mm 4</td>
</tr>
<tr>
<td>Insertion length of workpiece into counter spindle</td>
<td>mm 26</td>
</tr>
<tr>
<td>Spindle rotation speed</td>
<td>rpm 0-16000</td>
</tr>
<tr>
<td>Spindle power (nominal/max)</td>
<td>kW 1.3/1.5</td>
</tr>
<tr>
<td>Torque (nominal/max)</td>
<td>Nm 0.8/1.0</td>
</tr>
<tr>
<td>Counter spindle ejector stroke</td>
<td>mm 25</td>
</tr>
</tbody>
</table>
### TECHNICAL SPECIFICATIONS

**SwissNano 4/6**

#### Counter operation

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tool positions</td>
<td>2x Ø 16</td>
</tr>
<tr>
<td>Total number of basic machine tools</td>
<td>12 (13)</td>
</tr>
<tr>
<td>Positions for rotating tools</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Basic machine equipment

- Fixed guide bush + oil filter
- Front platten rotating tool motor
- C1 axis
- Polygon operation (and gear hobbing) function programming
- Thread milling device
- Gear hobbing device
- Radial drills
- Adjustment of S4 counter spindle end of clamping
- Pneumatic ejection of workpiece + air/oil cleaning of collet
- Automatic centralised lubrication cycle
- Beacon (1 colour)
- Fire extinguisher interface

#### General specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. length</td>
<td>mm 1800</td>
</tr>
<tr>
<td>Length with LNS Tryton 3 m</td>
<td>mm 5900</td>
</tr>
<tr>
<td>Max. width</td>
<td>mm 650</td>
</tr>
<tr>
<td>Height (without signalling lamp)</td>
<td>mm 1575</td>
</tr>
<tr>
<td>Spindle height</td>
<td>mm 1150</td>
</tr>
<tr>
<td>Weight</td>
<td>kg 700</td>
</tr>
<tr>
<td>Cutting oil tray capacity</td>
<td>l 45</td>
</tr>
<tr>
<td>Coolant pump power</td>
<td>kW 0.18</td>
</tr>
<tr>
<td>Colours: RAL 9006 grey, RAL 9011 graphite black</td>
<td></td>
</tr>
<tr>
<td>CE/CEM certified</td>
<td></td>
</tr>
</tbody>
</table>

### Standard  ●  Optional  ○  Not available