Servo system components for injection moulding tools

Product Overview Ver. 2.0

- System components for fully-integrated “Mult” unscrewing device
- All-in-one servo control systems (SKS)
- “Single” servo unscrewing device
- Linear servo units
The use of drives based on servo-motors in the plastics industry continues to increase. While such drives were previously found primarily on hybrid or fully-electric injection moulding machines, a complete range of servo-motor drive solutions is now also available for injection moulding tools themselves.

Our product portfolio consists of standardised solutions for handling actuation controlled by servo-motors. You design your injection moulding tool with our support, and we deliver the system components customised to suit your individual requirements and ready for installation – up to and including complete, turnkey drive halves. Not forgetting, of course, the detailed technical advice, service and support that all i-mold customers receive as standard.

Simply talk to us to discuss the wealth of design possibilities that servomold® system components offer for your injection moulding tool.

Our team can also answer questions about interfacing your injection moulding machine or peripheral devices with an all-in-one servo control system. The flexibility offered by such systems means almost any popular injection moulding machine can be interfaced, and we are happy to advise you of possible options.

Ideal for multi-cavity tools!

For the first time, servomold® technology also makes it possible to deploy servo motors effectively for unscrewing threaded cores in multi-cavity tools.

The full integration of the unscrewing mechanism into a standard tool construction not only saves space but also means you can avoid cumbersome – yet still commonly-found – rack systems.

Trail-blazing – and pioneering!

Once linked up to the servo control system, you have full monitoring and control of your unscrewing operations at any time.

No more tool damage resulting from hydraulic cylinders that distinguish solely between insert and withdraw, and which simply ignore any mechanical damage. You yourself configure the force level at which the controls abort the operation or issue a visual warning.

Customer example: Wild & Küpfner, Schmerikon, Switzerland
Fully-integrated 8x servo unscrewing device “Multi” (SAM) for screw caps

For further information and CAD data files, please visit us online at www.i-mold.de

For comprehensive support, please contact us via email at info@i-mold.com or call us on +49 60 61 - 9 65 64 0
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</tr>
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</table>
SAM | All-in-one servo control systems

**Product highlights:**
- Rotary and linear movements with super repeatability
- Precise, individual control of torque and rotary speed
- Ability to combine complex rotary and linear movements
- Safety system integrated into controls (emergency stop and guard door)
- Controls can be configured and programmed individually
- Controls with in-built torque threshold monitoring
- User-friendly touch screen controls
- Universally usable with almost any popular injection moulding machine
- LED lights for indicating operating states/conditions
- Remote maintenance possible via Ethernet interface

**Independent – and flexible!**
You decide yourself, on which of your injection moulding machines servomold® technology will be deployed. Thanks to the flexible control system, any of your machines can be chosen, in principle: you simply need the output signals for starting the drives and input signals for continuing the injection moulding process. The rest is handled for you by the all-in-one servo control system.

**Reliable – and safe!**
Thanks to in-built safety systems, you have full peace of mind as regards questions of machine safety. You simply connect our interface plug to your emergency stop and guard door interface, and our safety relays then guarantee an immediate stop if the emergency stop button is activated on the injection moulding machine or the guard doors are opened.

**Durable – and protected!**
The motor plugs are attached across the back of the machine to prevent unintentional damage to the plugs and to make it possible to protect the cabling with an optional strain relief rail. The control system also has a protection class rating of IP32.

**Simple – and intuitive!**
Available in 4.3” and 5.7” sizes, the resistive touch screen makes it easy for users to operate the software. Password-protected user levels make it easy to manage authorisation roles. Optionally, the SKS-3 controls can also be fitted with a 7” touch screen.

**Informative and user-friendly: the LED light bar indicates the operating states!**
The servomold® all-in-one control systems use a high-visibility LED light band to signalise the various operating states plus incidents where torque thresholds are exceeded or other fault conditions.

This considerably improves the safety and user-friendliness of the controls, since you are kept informed of the status of your manufacturing process at all times.
Servo system components for injection moulding tools

Versions and expansion modules
All motors can be operated independently from one another or synchronously, and on 230 V or 400 V controllers. The main difference between the 230V and 400V models is the lower maximum rotary speed possible with the 230V version.

SKS-2 / 230 V servo-controller models
> Peak current: 17 A
> Power supply: AC 400 V 3/N/PE  fn 50–60 Hz  IN 16 A

SKS-2.1

SKS-2.2

SKS-3 / 400 V servo-controller models
> Peak current: 20 A
> Power supply: AC 400 V 3/N/PE  fn 50–60 Hz  IN 16 A

SKS-3.1

SKS-3.2

SKS-3.3

Software
The SKS is delivered complete with a software package that is specially configured for the deployment of injection moulding applications. Thanks to a wide range of options, however, it can also be deployed universally for other automation applications.

Special features:
> Program management (recipe management) utilising internal memory or USB flash drive
> Grouping of drives, for simpler definition of synchronous movements
> Torque monitoring via entry of real-world values in Nm.
> Use of autotuning to adjust the servo controller to match a wide range of mechanical requirements
> User management with 5 password-protected user levels
> Simple switchover of language versions
> Powerful program editor for universal creation of sequence programs (ramps, velocities, accelerations, etc.)

Calibration run mode
Since the calibration run is implemented as a standalone program, it can be executed automatically and according to a freely-definable sequence scheme.

Manual mode
This mode is subdivided into simple manual mode and advanced manual mode. Depending on your user level, you can:
> e.g. extend and retract the drive at the press of a button
> move a drive to a predefined starting position
> or, in advanced manual mode, move the drives as desired

Automatic mode
This mode is used to operate the controls fully automatically and offers a number of features, including torque display and monitoring, an integrated cycle counter, as well as a range of selectable display types, so as to e.g. show the time needed for an unscrewing operation.

Accessories for all-in-one servo control systems

Signal box
For system start-up in process monitoring mode
> Included in delivery

Strain relief rail
To protect plug connections from pull loads
> Optionally available

Cable gland pliers
For easy disengaging of cable glands
> Optionally available

Table trolley
For transport and setup of the SKS
> Optionally available
Servo system components for injection moulding tools

SERVOmold®

System components for fully-integrated servo unscrewing device “Multi”

Product highlights:
> Unscrewing device fully integrated into standard tool assembly
> Standardised system components save time and cut costs during the design, manufacture, assembly and maintenance of the injection moulding tool.
> High-precision, high-repeatability threaded core tolerance (<0.01 mm).
> Novel drive system simplifies tool assembly and enables thread lengths of up to 50 mm (longer lengths on request).
> Especially suited to clean-room manufacturing
> High-power: up to 200 Nm per threaded core, depending on model
> Optional cooling of one-piece threaded core with SERVOmold® SDD rotary feedthrough

Ideal for multi-cavity tools!

For the first time, SERVOmold® technology also makes it possible to deploy servo motors for unscrewing threaded cores in multi-cavity tools.

Our systematic approach to modularity has enabled us to develop a building-block system offering design engineers extraordinary flexibility when designing unscrewing tools.

The compact arrangement of threaded cores in a 4× matrix saves space while also enabling almost unlimited extension of the system by repeating the pattern.

The selection of a suitable system size is mainly influenced by the following factors:
> Thread size (diameter, length, wall thickness)
> Plastic type (Young’s modulus and shrinkage)
> Mould setup (distance, number of layout)

Using these values, our employees use the circumferential stress (DIN 2413) and a formula for “press fit” (using Dubbel) to calculate the necessary breakaway torque that applies once the component has fully cooled down.

Example: Screw cap
Thread size: M16, thread length 20 mm, wall thickness 2.5 mm plastic type: PP — Young’s modulus 1500 N/mm², shrinkage 1.5% Mould setup: 8x — cavity distance ~40–60 mm
Required breakaway torque with complete cooldown = 15 Nm

System size selected – SAM040

Standardised spur gears and pinion shafts

<table>
<thead>
<tr>
<th>System size</th>
<th>max. Ø threaded core</th>
<th>max. torque Nm / threaded core</th>
<th>Spur gear spacing</th>
<th>Sprocket modulus</th>
<th>Pinion shaft tooth count**</th>
<th>Spur gear tooth count</th>
<th>max. rotary speed*</th>
<th>RPM / threaded core</th>
<th>Unmached length, pinion shaft**</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAM020</td>
<td>As core holder only</td>
<td>14 Nm</td>
<td>20</td>
<td>0.5</td>
<td>18</td>
<td>38</td>
<td>1100 (700)</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>SAM030</td>
<td></td>
<td>20</td>
<td>20 Nm</td>
<td>30</td>
<td>0.8</td>
<td>18</td>
<td>35</td>
<td>900 (500)</td>
<td>270</td>
</tr>
<tr>
<td><strong>SAM040</strong></td>
<td></td>
<td>25</td>
<td>27 Nm</td>
<td>40</td>
<td>1.0</td>
<td>19</td>
<td>37</td>
<td>700 (400)</td>
<td>280</td>
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<tr>
<td>SAM060</td>
<td>40</td>
<td>60 Nm</td>
<td>60</td>
<td>1.25</td>
<td>23</td>
<td>45</td>
<td>330 (200)</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>SAM080</td>
<td>60</td>
<td>70 Nm</td>
<td>80</td>
<td>1.5</td>
<td>25</td>
<td>51</td>
<td>275 (165)</td>
<td>300</td>
<td>300</td>
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<tr>
<td>SAM120</td>
<td>80</td>
<td>150 Nm</td>
<td>120</td>
<td>2</td>
<td>28</td>
<td>57</td>
<td>165 (100)</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>SAM160</td>
<td>120</td>
<td>200 Nm</td>
<td>160</td>
<td>2.5</td>
<td>30</td>
<td>61</td>
<td>125 (75)</td>
<td>350</td>
<td>350</td>
</tr>
</tbody>
</table>

* Rotary speeds when deploying the SERVO 3-400 V controls. Bracketed values when deploying the 230 V controls.
** Larger spacing dimension X possible by requesting change to number of teeth on pinion shaft.
Standard dimensions of servo unscrewing device “Multi”

The drawing below shows the minimum dimensions of the distance plate for installing the servo unscrewing device “Multi”. A larger plate thickness can also be selected, however (the length of the central pinion shaft permits variable positioning of the lower pinion shaft bearing and sprocket wheel, enabling custom adjustments to be made to your mould setup).

Standardised, one-piece threaded core blank with spline shaft profile

Material 1.2343 – 52+2 HRC – incl. guide thread – mould contours and mould thread can optionally be manufactured entirely to customer spec.

Guide thread nut (sample design)

Configured to threaded cores, incl. guide thread

Material: bronze alloy

Thread holder also available as core holder – data on request

| Article name | SAMxxx - xx - xxx |
| Example | SAM040-04-040 |

<table>
<thead>
<tr>
<th>System size</th>
<th>Core spacing</th>
<th>Distance plate min. height</th>
<th>Bearing cap Height</th>
<th>Spur gear cutout Height</th>
<th>Spur gear cutout Ø</th>
<th>Bearing 1 Height</th>
<th>Bearing 2 Height</th>
<th>Bearing 3 Height</th>
<th>Sprocket wheel Height</th>
<th>Sprocket wheel Ø</th>
<th>Sprocket wheel Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAM020</td>
<td>20</td>
<td>56</td>
<td>24.5</td>
<td>13</td>
<td>20</td>
<td>12</td>
<td>19</td>
<td>12</td>
<td>14</td>
<td>8</td>
<td>24</td>
</tr>
<tr>
<td>SAM030</td>
<td>30</td>
<td>46</td>
<td>15</td>
<td>15</td>
<td>35</td>
<td>5</td>
<td>26</td>
<td>8</td>
<td>26</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>SAM040</td>
<td>40</td>
<td>56</td>
<td>18</td>
<td>17</td>
<td>40</td>
<td>7</td>
<td>37</td>
<td>9</td>
<td>32</td>
<td>13</td>
<td>42</td>
</tr>
<tr>
<td>SAM060</td>
<td>50</td>
<td>76</td>
<td>22</td>
<td>25</td>
<td>60</td>
<td>7</td>
<td>58</td>
<td>12</td>
<td>42</td>
<td>17</td>
<td>62</td>
</tr>
<tr>
<td>SAM080</td>
<td>70</td>
<td>86</td>
<td>27</td>
<td>25</td>
<td>80</td>
<td>10</td>
<td>78</td>
<td>15</td>
<td>52</td>
<td>17</td>
<td>62</td>
</tr>
<tr>
<td>SAM120</td>
<td>100</td>
<td>96</td>
<td>36</td>
<td>27</td>
<td>120</td>
<td>13</td>
<td>115</td>
<td>19</td>
<td>85</td>
<td>19</td>
<td>85</td>
</tr>
<tr>
<td>SAM160</td>
<td>140</td>
<td>116</td>
<td>40</td>
<td>27</td>
<td>160</td>
<td>16</td>
<td>150</td>
<td>19</td>
<td>85</td>
<td>19</td>
<td>85</td>
</tr>
</tbody>
</table>

*Distance X can be increased by altering the number of teeth on the pinion shaft – please note the altered torque and rotary speeds thereby produced.

Thread holder also available as core holder – data on request

Material: bronze alloy

Threaded core holder

Threaded core attachment

Threaded core holder

Threaded core attachment

Threaded core holder

Threaded core attachment

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Threaded core attachment
Servo system components for injection moulding tools

**SMA** | Drive units (servo multi-drive)

The SMA drive units are used to drive the servo unscrewing devices “Multi” with a timing belt drive. The base plate is used simultaneously as the clamping assembly for the timing belt, whereby the clamping bolts jack the drive unit up from the fixing surface. They are available in three standardised sizes – custom sizes by request.

**Table: Model Specifications**

<table>
<thead>
<tr>
<th>Model**</th>
<th>For system size</th>
<th>Gear ratio</th>
<th>Gear</th>
<th>Nom. motor torque in mNm</th>
<th>Peak (max.)*** motor torque in mNm</th>
<th>Max. motor rotary speed in RPM</th>
<th>Nom. gear torque in Nm</th>
<th>Peak (max.)*** gear torque in Nm</th>
<th>Max. rotary speed in RPM</th>
<th>LxWxH</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMA-060-05-0207</td>
<td>SAM020</td>
<td>i = 5</td>
<td>AT3 - Z60</td>
<td>1850</td>
<td>9200</td>
<td>9000 (5000)</td>
<td>9.25</td>
<td>46</td>
<td>1800 (1000)</td>
<td>250x100x87</td>
<td>4 kg</td>
</tr>
<tr>
<td>SMA-060-05-0207</td>
<td>SAM030 / SAM040</td>
<td>i = 5</td>
<td>AT5 - Z36</td>
<td>1850</td>
<td>9200</td>
<td>9000 (5000)</td>
<td>9.25</td>
<td>46</td>
<td>1800 (1000)</td>
<td>250x100x87</td>
<td>4 kg</td>
</tr>
<tr>
<td>SMA-080-05-0409</td>
<td>SAM060 / SAM080</td>
<td>i = 5</td>
<td>AT10 - Z24</td>
<td>4150</td>
<td>23600 (20000)</td>
<td>5300 (3000)</td>
<td>20.75</td>
<td>118</td>
<td>1060 (600)</td>
<td>317x130x108</td>
<td>10 kg</td>
</tr>
<tr>
<td>SMA-120-12-0711</td>
<td>SAM120 / SAM160</td>
<td>i = 12</td>
<td>AT20 - Z20</td>
<td>6100</td>
<td>18500 (16500)</td>
<td>6000 (3600)</td>
<td>73.2</td>
<td>220</td>
<td>540 (360)</td>
<td>380x175x154</td>
<td>25 kg</td>
</tr>
</tbody>
</table>

* Rotary speeds when deploying the SKS-3 400 V controls. Bracketed values when deploying the 230 V controls.
** Name specifies: Servo multi-drive – gear type – transmission – motor type
*** Maximal possible torque for motor-gear combination – Values in brackets for 230 V controls – Caution! Values must NOT be exceeded.

**CAUTION:** Torque values depend on the application and are limited by the gear model chosen and the timing belt. Values must NOT be exceeded. In case of any uncertainty, please consult our application engineers!

**SAM** | Sample configuration – 32x servo unscrewing device “Multi”

The following example depicts the configuration of a 32x unscrewing tool using the SAM040 servomold® system component. To achieve the desired torque of 22.5 Nm per threaded core, the SMA-080-05-0409 drive unit is used in this example. The core spacing factor of 40 mm can be modified to suit customer requirements.
The following examples depict a possible mould setup for an unscrewing tool using the servomold® system components SAM080 in a configuration with the RZW100 pinion shaft for a centre distance of 100 mm. In this example, the guide thread nuts (11) are clamped using an additional clamping plate (12). This makes it easy to calibrate the threaded cores individually.

Our employees are able to draw on many years of experience in the design and engineering of unscrewing tools. All systems are designed and manufactured in close collaboration with our customers.

For comprehensive support, please contact us via email at info@i-mold.com or call us on +49 60 61 - 9 65 64 0
Fast and precise
For the injection moulding of an intricately shaped screw cap with a female thread, new unscrewing devices with a servo-electric drive were deployed in a tool. The result: improvements to the precision and reproducibility of the injection-moulded part, simpler tool setup and maintenance, cycle time is significantly shorter – it was reduced by almost 20 percent.

With the unscrewing tools built by Wild & Küpfer, Schmerikon, Switzerland, the rotary motion was previously generated by a hydraulically-actuated rack aligned on the rotating core. For some time, the company has set itself the task of reducing the dimensions of the tools, improving the options for configuration and monitoring and reducing the effort and expenditure for maintenance and servicing.

"The servomold® unscrewing devices with servo-electric drive from the Michelstadt-based i-mold company came to our attention while attending Euromold at the end of last year," reports Christian Gwerder, Project Lead at Wild & Küpfer. "We took a very close look at the portfolio. Overall, the idea impressed us: as regards the mechanics, the controls – and particularly in terms of cost and maintenance aspects."

Tool design and construction
The 8× unscrewing tool is designed as a twin-plate tool with two unscrewing devices and four unscrewing spindles on each device. The all-in-one servo-electric drive units are mounted on the upper and lower parts of the tool. A timing belt conveys the rotary movement to a pinion shaft, which in turn drives the spur gears with the guide thread bushings and the threaded cores inside them. A core spacing of 100 mm was chosen to ensure proper cooling.

For the 8× tool, with which the screw cap is produced, two of the compact servo unscrewing devices "Multi" are required, each featuring four unscrewing spindles. They can be fully integrated into the standard tool construction. The drive units are located above and below on the tool, respectively: there are therefore no lateral projecting parts, which could make tool installation more difficult. Since no structures such as rack-and-pinion mechanisms, hydraulic cylinders and supports are necessary except for the drive, the tool has a comparatively small form factor.

With the corresponding SKS all-in-one servo control system, all movements – both the rotary velocities and the number of rotations of the threaded cores – can be programmed as required. Accordingly, the demoulding process can be modified to suit the conditions required by the moulded part and can be integrated into the injection moulding machine’s program sequence.

The modular, standardised construction of the system components reduces both design and engineering costs and, accordingly, the tooling throughput time. A complete 3D data set for the unscrewing device can be imported into the tool design with just a few clicks. This standardisation also saves time and cuts costs when assembling the tool. The pre-assembly drive unit is ready for installation and is mounted on the ejector tool half.
This tool half also houses the installation-ready unscrewing unit sub-assembly. This comprises the drive unit (a), the timing belt unit (b), the drive pinion shaft (c) and the specialised spur gears (d), the guide thread bushings (f) and the unscrewing spindles (e) with the moulding threaded cores. The pitch and length of the guide thread bushings and threaded cores were engineered to the manufacturer's requirements. The final installation of the tool on the injection moulding machine is simple – as is its later removal: since there are no lateral projecting parts, the tool can be hoisted into the machine with the crane.

Suited for clean-room use

The Swiss manufacturer has long sought improvements to its drives for injection moulding tools, and especially for the unscrewing systems. Both the mechanical and control properties of the unscrewing devices with servo-electric drives are impressive, and, comments Christian Gwerder, “represent an enhancement that is complementary to our own technical development work. Following thorough preparation, we planned the deployment of the unscrewing unit as a future-oriented strategy – and this has proven to be the right decision. Configuration and deployment of the tool is simple. It has proven to be durable and reliable during operation. The effort and expenditure for maintenance and servicing is very low. Our expectations in terms of manufacturing process profitability have also been more than satisfied – we’ve been able to significantly reduce cycle time. In addition, we’ve also gained a technological advantage: the unscrewing devices are suitable for clean-room use. The system operates without hydraulic oil or compressed air, and the moving parts require only a minimal amount of lubricant.”

Short cycle times, high precision

The unscrewing devices use the signal from the core pull controls; this adds an extra level of safety – especially during manual mode and setup. Actuation via a Euromap or robot interface, or via freely-programmable digital inputs and outputs is also possible. The easy-to-use all-in-one servo control system monitors the complete unscrewing operation. All movement sequences and velocities are programmable, as are the end positions of the threaded cores; they can be configured precisely and reproduced exactly. The ramps for acceleration and breaking results in a soft movement sequence: as a result, tool movement is highly uniform and steady, even at high movement velocities. The configurable unscrewing limit torque provides a safety net for the tool in case of an unpredictable fault. The control unit means that threaded cores can be positioned very precisely.

General project parameters

The technically sophisticated screw cap, with an outer diameter of around 52 mm and a height of 20 mm, is produced in large volumes by Wild & Küpfer on an all-electric Allrounder 470 A 1000-170 injection moulding machine. The lid is made from polypropylene (PP), weighs just under 6 g and features a specialised female thread about 12 mm deep with an outer diameter of 42 mm and a 4 mm pitch. Capacity considerations mean that the product is to be manufactured on an 8x unscrewing tool. Tool clamping plate dimensions are 470 mm × 470 mm. The extended clamping unit permits a maximum tool installation height of 700 mm.
Servo system components for injection moulding tools

SAE | “Single” servo unscrewing device

Product benefits at a glance:
> Unscrewing device can be screwed in at any position on the tool
> Standardised system components: largely identical to “Multi” servo unscrewing device (SAM)
> High-precision, high-repeatability threaded core tolerance (< 0.01 mm)
> Unscrewable thread lengths of up to 50 mm (longer lengths on request)
> Especially suited to clean-room manufacturing!
> Compact dimensions for the single-screw unit
> Optional cooling of one-piece threaded core with servomold® SDD rotary feedthrough
> Supplied ready for installation!

Installation-ready single-screw unit
Featuring simple exchange of threaded core and guide thread nut – without needing to disassemble the single-screw unit!

<table>
<thead>
<tr>
<th>Model**</th>
<th>LxWxH</th>
<th>Pinion teeth</th>
<th>Spur gear tooth count</th>
<th>Gear ratio</th>
<th>Threaded core</th>
<th>Nom. motor torque in mNm</th>
<th>Peak (max.)*** motor torque in mNm</th>
<th>Nom. threaded core torque in Nm</th>
<th>Peak (max.)*** threaded core torque in Nm</th>
<th>Max. rotary speed in RPM</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAE040-050-12-0055</td>
<td>218x110x60</td>
<td>25</td>
<td>37</td>
<td>12</td>
<td>GWK040</td>
<td>460</td>
<td>1250</td>
<td>8</td>
<td>22</td>
<td>840 (750)</td>
<td>5 kg</td>
</tr>
<tr>
<td>SAE040-060-16-0105</td>
<td>253x165x80</td>
<td>37</td>
<td>37</td>
<td>16</td>
<td>GWK040</td>
<td>900</td>
<td>2800</td>
<td>14</td>
<td>45</td>
<td>750 (560)</td>
<td>6.5 kg</td>
</tr>
<tr>
<td>SAE060-060-09-0207</td>
<td>268x177x90</td>
<td>29</td>
<td>45</td>
<td>9</td>
<td>GWK060</td>
<td>1850</td>
<td>5000</td>
<td>25</td>
<td>70</td>
<td>645 (385)</td>
<td>10 kg</td>
</tr>
<tr>
<td>SAE080-080-09-0409</td>
<td>354x225x110</td>
<td>30</td>
<td>51</td>
<td>9</td>
<td>GWK080</td>
<td>4150</td>
<td>13000</td>
<td>60</td>
<td>200</td>
<td>340 (195)</td>
<td>24 kg</td>
</tr>
</tbody>
</table>

* Rotary speeds when deploying the SKS-3 400 V controls. Bracketed values when deploying the 230 V controls.
** Name specifies: Servo multi-drive – gear type – transmission – motor type
*** Maximal possible torque for motor-gear combination – Values in brackets for 230 V controls – Caution! Values must NOT be exceeded.

For further information and CAD data files, please visit us online at www.i-mold.de

For comprehensive support, please contact us via email at info@i-mold.com or call us on +49 60 61 - 9 65 64 0

Custom sizes on request!

Standardised threaded cores with spline shaft profiles (GWK)
Material 1.2343 – 52HRC – incl. guide thread and matching guide thread nut. Mould contours and mould thread can optionally be manufactured entirely to customer spec.
Servo system components for injection moulding tools

SAD | “Double” servo unscrewing device

Start-up couldn’t be simpler:
> Specify operating parameters or load an existing program
> Execute a calibration run
> Start automated operation: done!

Installation-ready double-screw unit
Featuring simple exchange of threaded core and guide thread nut – without needing to disassemble the double-screw unit!
Fine-tuning of one threaded core to another is achieved by rotating the guide thread nut and fixing it with the clamping plate.
Each threaded core can also have a different thread size and pitch in relation to the other cores, since the guide thread nuts can be adjusted independently.

SAD040-080-060-09-0207 Motor setup
Max. torque 5000 mNm
Max. rotary speed 9000 RPM
Application torque 45 Nm (22 Nm)

SAD040-200-060-09-0207 Motor setup
Max. torque 5000 mNm
Max. rotary speed 9000 RPM
Application torque 45 Nm (22 Nm)

All SADs are manufactured individually to customer specifications: threaded core size, distance X and maximum torque are configured to match customer requirements – please contact us for further details!

Also available as a 4× screw unit (SAV)!

Standardised threaded cores with spline shaft profiles (GWK)
Material 1.2343 - 52+2 HRC – incl. guide thread and matching guide thread nut. Mould contours and mould thread can optionally be manufactured entirely to customer spec.

<table>
<thead>
<tr>
<th>Model*** (Customer samples)</th>
<th>Distance X</th>
<th>L×W×H</th>
<th>Pinion teeth</th>
<th>Spur gear tooth count</th>
<th>Gear ratio</th>
<th>Threaded core</th>
<th>Nom. motor torque in mNm</th>
<th>Peak (max.)*** motor torque in mNm</th>
<th>Nom. torque (each GWK) in Nm</th>
<th>Peak (max.)*** torque (each GWK) in Nm</th>
<th>Max. rotary speed in RPM</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAD040-080-060-09-0207</td>
<td>80</td>
<td>258×140×140</td>
<td>37</td>
<td>37</td>
<td>9</td>
<td>GWK040</td>
<td>1850</td>
<td>5000</td>
<td>16 (8)</td>
<td>45 (22)</td>
<td>1000 (600)</td>
<td>10 kg</td>
</tr>
<tr>
<td>SAD040-200-060-09-0207</td>
<td>200</td>
<td>264×260×110</td>
<td>37</td>
<td>37</td>
<td>9</td>
<td>GWK040</td>
<td>1850</td>
<td>5000</td>
<td>16 (8)</td>
<td>45 (22)</td>
<td>1000 (600)</td>
<td>13 kg</td>
</tr>
<tr>
<td>SAD060-xxx-080-09-0409</td>
<td>x</td>
<td>x</td>
<td>36</td>
<td>45</td>
<td>9</td>
<td>GWK060</td>
<td>4150</td>
<td>13000</td>
<td>46 (23)</td>
<td>160 (80)</td>
<td>450 (260)</td>
<td>x</td>
</tr>
</tbody>
</table>

* Rotary speeds when deploying the SKS-3 400 V controls. Bracketed values when deploying the 230 V controls.
** Name specifies: Servo multi-drive - gear type - transmission - motor type
*** Maximal possible torque for motor-gear combination – Values in brackets for 230 V controls – Caution! Values must NOT be exceeded.

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Servo system components for injection moulding tools

**SAZ** | Servo drive unit “Cogwheel”
---|---
**SWZ** | Servo angular drive “Cogwheel”

**Product benefits at a glance:**
- High-precision, high-repeatability positioning
- High torque and thrust specifications possible!
- Especially suited to clean-room manufacturing!
- Supplied ready for installation!

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### Ideally suited for upgrading existing rack-and-pinion drives

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**SAZ**

**SAZ-060-16-0207**
- Motor setup
  - Max. torque: 2800 mNm
  - Max. rotary speed: 9000 RPM
  - Application torque: 45 Nm
  - Max. thrust: 2400 N

**SAZ-080-16-0409**
- Motor setup
  - Max. torque: 7500 mNm
  - Max. rotary speed: 5300 RPM
  - Application torque: 120 Nm
  - Max. thrust: 5300 N

**SWZ**

**SWZ-070-16-0207**
- Motor setup
  - Max. torque: 4800 mNm
  - Max. rotary speed: 5500 RPM
  - Application torque: 75 Nm
  - Max. thrust: 4000 N

**SWZ-090-16-0409**
- Motor setup
  - Max. torque: 9400 mNm
  - Max. rotary speed: 5300 RPM
  - Application torque: 150 Nm
  - Max. thrust: 6600 N

---

**CAUTION:** Torque values depend on the application and are limited by the gear model chosen. Values must NOT be exceeded. In case of any uncertainty, please consult our application engineers!

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**Model** | L | Motor L | Shaft L | Width | F | Belt width | Belt teeth | Pinion teeth | Nom. motor torque in mNm | Peak (max.)*** motor torque in mNm | Pinion modulus | Pinion teeth count | Gear ratio | Nom. gear torque in Nm | Peak (max.)*** gear torque in Nm | Max. gear rotary speed* in RPM | Nom. thrust in Nm | Max. thrust in Nm | Weight
**SAZ-060-16-0207** | 209 | 48 | 70 | 60 | 28.5 | 16 | 25 | 1850 | 2800 | 1 | 37 | 16 | 29.6 | 45 | 560 | 1600 | 2400 | 3.8 kg
**SAZ-080-16-0409** | 279 | 56 | 80 | 70 | 32.5 | 23 | 37 | 4150 | 7500 | 1.5 | 30 | 16 | 66.4 | 120 | 330 | 1850 | 2950 | 5300 | 7.6 kg
**SWZ-070-16-0207** | 137 | 253 | 48 | 70 | 28.5 | 16 | 29 | 1850 | 4800 | 1 | 37 | 16 | 29.6 | 75 | 340 | 1850 | 1600 | 4000 | 6.1 kg
**SWZ-090-16-0409** | 151 | 304 | 56 | 80 | 32.5 | 23 | 30 | 4150 | 9400 | 1.5 | 30 | 16 | 66.4 | 150 | 330 | 1850 | 2950 | 6600 | 9.7 kg

* Rotary speeds when deploying the SKS-3 400 V controls. Bracketed values when deploying the 230 V controls.
** Name specifies: Servo multi drive – gear type – transmission – motor type
*** Maximal possible torque for motor-gear combination – Values in brackets for 230 V controls – Caution! Values must NOT be exceeded.
Servo system components for injection moulding tools

SLG | Linear servo unit “Screw drive”

Product benefits at a glance:
- Enables complex linear movement for plungers, plates and cores
- High-precision, high-repeatability positioning
- Very high thrust specifications possible!
- Stroke lengths possible up to 975 mm
- Especially suited to clean-room manufacturing!
- Supplied ready for installation!

For further information and CAD data files, please visit us online at www.i-mold.de

For comprehensive support, please contact us via email at info@i-mold.com or call us on +49 60 61 - 9 65 64 0

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Model | F | L | D | H | Stroke | Spindle | Belt drive | Max. force | Nom. force | Max. rotary speed | Max. torque | Max. speed | Size | SW | Weight
---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---
SLG-060-xxx-05-0105 | 60 | 138.8 | 61.3 | 146×66 | 20 - 950 | S | 1 | 6000 | 900 | 5000 (5000) | 6000 | 400 (400) | 12×1.25 | 26 | 3.8 kg
SLG-060-xxx-05-0205 | 60 | 138.8 | 77.6 | 206×96 | 20 - 950 | S | 2 | 6000 | 1800 | 10000 (10000) | 8000 | 400 (400) | 12×1.25 | 26 | 3.8 kg
SLG-060-xxx-05-0207 | 60 | 138.8 | 68.5 | 179×86 | 20 - 950 | S | 1 | 6000 | 1800 | 5000 (5000) | 6000 | 400 (400) | 12×1.25 | 26 | 4.7 kg
SLG-060-xxx-05-0207 | 60 | 138.8 | 77.7 | 206×96 | 20 - 950 | S | 2 | 6000 | 3600 | 9500 (5400) | 3000 | 380 (216) | 12×1.25 | 26 | 4.7 kg
SLG-090-xxx-05-0409 | 90 | 203.5 | 206×96 | 90 - 975 | S | 1 | 16000 | 4100 | 3000 (3000) | 15500 | 250 (250) | 20×1.5 | 34 | 12.7 kg
SLG-090-xxx-05-0409 | 90 | 203.5 | 91.8 | 275×130 | 90 - 975 | S | 2 | 16000 | 8200 | 5300 (3000) | 17750 | 220 (125) | 20×1.5 | 34 | 12.7 kg

* Rotary speeds when deploying the SKS-3 400 V controls. Bracketed values when deploying the 230 V controls.
** Name specifies: Servo multi-drive – gear type – transmission – motor type
*** Maximal possible torque for motor-gear combination – Values in brackets for 230 V controls – Caution! Values must NOT be exceeded.

CAUTION: Torque and rotary speed values are derived from the linear unit specifications: please note that different values are needed when using a larger belt ratio (S20) Values must NOT be exceeded. In case of any uncertainty, please consult our application engineers!

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SDD | Rotary feedthroughs

Rotary feedthroughs
For cooling rotating cores (e.g. GWK040), complete with replaceable cooling rod (can be cut to length)

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Model | Suitable for threaded core | L | Ø | Width | Max. core l. | Core Ø | Connection thread | Conn. type | Max. pressure in bar
---|---|---|---|---|---|---|---|---|---
SDD-030-320 | GWK040 | 95 | 30 | 35 | 320 | 4 | 1/4" | E2002/9/1/8 | 10
SDD-042-400 | GWK060 | 102 | 42 | - | 400 | 6 | 3/8" | E2002/13/1/4 | 10
SDD-057-400 | GWK080 | 152 | 57 | - | 400 | 10 | 1/2" | E2002/13/1/4 | 10
A modern, medium-sized company based in Fränkisch-Crumbach, Germany, aha Kunststofftechnik GmbH has deployed hydraulically driven unscrewing tools for producing a range of screw caps for many years now.

However, this technological approach necessitates relatively complex mould assemblies, which certainly leave room for improvement in terms of their assembly, operation and maintenance.

The Managing Director of aha Kunststofftechnik GmbH, Mr Achim Kreim, contacted us to request that we perform a feasibility analysis for implementing the servomold® system solution in an 8x injection moulding tool. One especially interesting feature in this system was that a 57 mm product variant had previously been implemented using a hydraulic 6-cavity unscrewing tool, thus enabling a direct comparison to be made between hydraulic and servo-motor systems.

**Assignment:**
- Implementation of servomold® system components to construct an 8x injection moulding tool

**Objective:**
- Reduction of mould size in comparison to typical hydraulic drive systems while simultaneously increasing cavity count from the previous 6 to 8 cavities, and enlarging the product diameter from the previous 57 mm to 74 mm
- Simplification of tool layout to make it simpler to install, operate and maintain
- Improved control and monitoring function for unscrewing processes

**Solution:**
- Use of 120-gauge system components, arranged in a space-saving 2x4 matrix
- The threaded cores are constructed as sleeves, to permit the use of a support core to compensate for injection pressure
- High-performance cooling of the support cores via screwed-in cooling cores, which also work to improve support core rigidity.
- Deployment of SKS-3.2 (400 V) controller for controlling 2 high-torque servo motors

**Previous hydraulic solution**

Achim Kreim: "The servomold® system solution enabled us to achieve all of the objectives we had set in terms of optimising the overall process. What’s more, the simpler design of the tool assembly compared to hydraulic unscrewing tools of the same size meant we could reduce costs by about 15%.

Lastly, this setup now gives us the opportunity to control and monitor the unscrewing process with great precision: this safeguards the tool and lets us plan maintenance intervals more effectively.

For us, servomold® is the drive technology of the future!"