# Price List

## DMU 50 3rd Generation


### Highlights

By CELOS **simple operation** and holistic Integration in the business organization

- **Optimum flexibility** – swivel rotary table in standard for automatic 5-axis machining
- **Optimum space economy** – Excellent accessibility to the work area, good chip disposal, large working area in relation to small machine size
- **High stability** – one piece machine basement made of grey cast iron
- **Digital drives and direct measuring systems** guarantee highest precision and top surfaces
- **Mounting of tool magazine parallel to production time**
- **Powerful standard specification –** basic spindle 15.000 rpm, 137,8 ft/min rapid traverse, 30 tools
- **Tool magazine** optional **up to 120 pockets**

# Investment summary

| Machine and Options | | | | |
|---|---|---|---|---|
| **Basic machine** | | | | |
| DMU 50 3rd Generation | S-A3224 | 1 | 396,400.00 | USD |
| **Control** | | | | |
| CELOS X with Siemens Sinumerik ONE | S-B3292 | 1 | | USD |
| **Spindle** | | | | |
| Spindle speed 20.000 rpm, HSK-A63 | S-E3187 | 1 | 16,450.00 | USD |
| **Working table** | | | | |
| NC swivel rotary table | S-C3074 | 1 | | USD |
| **Options working table** | | | | |
| Version Rotary joint, 4 channels, outside of table | S-G3416 | 1 | | USD |
| **Tool magazine** | | | | |
| Tool magazine 60 pockets HSK-A63 | S-D3131 | 1 | 18,300.00 | USD |
| **Cooling media / chip removal** | | | | |
| Internal Coolant Supply 80bar/980l frequency control | S-K4054 | 1 | 49,000.00 | USD |
| Air blast through spindle centre | S-K3596 | 1 | 6,260.00 | USD |
| Swarf conveyor, with cleaned slot screen | S-K3792 | 1 | 14,250.00 | USD |
| Spray gun for swarf removal | S-N3004 | 1 | 1,570.00 | USD |
| Chip flushing for working area | S-K3591 | 1 | 6,220.00 | USD |
| Coolant tempering for internal coolant 980l | S-K3711 | 1 | 18,300.00 | USD |
| Rotating clear-view window | S-K3580 | 1 | 4,620.00 | USD |
| zeroFOG oil mist separator | S-K4024 | 1 | 13,750.00 | USD |
| **Measuring / Monitoring** | | | | |
| Infrared measuring probe PP60 optical | S-K3602 | 1 | 11,100.00 | USD |
| 3D quickSET | S-K3493 | 1 | 8,870.00 | USD |
| Laser tool measuring BLUM DIGILOG | S-K4119 | 1 | 17,650.00 | USD |
| MPC - Machine Protection Control | S-K3993 | 1 | 11,850.00 | USD |
| **Automation** | | | | |
| Signal lamp 4-colour | S-K3728 | 1 | 2,240.00 | USD |
| EROWA Automation Interface PH 150 / PH CELL | S-K4055 | 1 | 23,550.00 | USD |
| **General options** | | | | |
| Frequency 60 cycles, without surcharge | S-L3004 | 1 | 0.00 | USD |
| Machine version Inch | S-INCH | 1 | | USD |
| CSA Specification | S-N3088 | 1 | 3,330.00 | USD |
| UL conformity | S-CO-UL | 1 | | USD |
| **Options for software general** | | | | |
| Electronic handwheel | S-H3132 | 1 | 4,440.00 | USD |
| Application Tuning Cycle | S-H3131 | 1 | 7,960.00 | USD |
| **Documentation** | | | | |
| Documentation 1 english | S-GB_1 | 1 | | USD |
| **Screen Text Language** | | | | |
| Screen text german/english | S-D_GB | 1 | | USD |

* further description see attachment

| | | | | |
|---|---|---|---|---|
| **Price machine and options** | | | **636,110.00** | **USD** |
| **Services** | | | | |
| **Services supplier / Accessories** | | | | |
| 3D data model | S-R3004 | 1 | 2,810.00 | USD |
| **Special constructions services** | | | | |
| DMFS FFP Costing | SK001 | 1 | 40,686.00 | USD |
| DMFS Price Federal Compliance | SK002 | 1 | 27,124.00 | USD |
| **Sales company services** | | | | |
| SV1: Standard Machine Installation | Z-COST01 | 1 | 0.00 | USD |
| DMG MORI Precision Protection Program | Z-COST05 | 1 | 38,167.00 | USD |
| DMG MORI Connect | Z-COST06 | 1 | 1,000.00 | USD |
| EG1: Standard Machine Training | Z-COST07 | 1 | 0.00 | USD |
| **Price services** | | | **109,787.00** | **USD** |
| **Price machine and options** | | | **636,110.00** | **USD** |
| **Price services** | | | **109,787.00** | **USD** |
| **Total price** | | | **745,897.00** | **USD** |

* further description see attachment

**DMG MORI Connect**

Streamline your production process while maximizing output and machine lifecycle.
2 years of service included during standard machine warranty.

**DMG MORI Messenger Cloud**

- Real time monitoring and history analysis platform
- Convenient web access from PCs and mobile devices
- Simple data exports for in-depth evaluation and reporting

**DMG MORI NET*service***

- Remote diagnosis supported by DMG MORI service experts
- Immediate and direct support minimizes downtime and service costs
- Secure encrypted connection

YouTube video

* further description see attachment

# DMG MORI Seebach GmbH
# DMU 50 3rd Generation

| Machine and Options | | | USD | USD |
|---|---|---|---|---|
| **Basic machine** | | | | |
| Universal Milling Machine DMU 50 3rd<br>Stealth Design<br>X = 650 mm, Y = 520 mm, Z = 475 mm<br>X = 25,59 inch, Y = 20,47 inch, Z = 18,70 inch<br>42 m/min / 137,7 ft/min Rapid feed<br>direct drives<br>motorspindle speedMASTER® SK 40<br>speed range 20 - 15.000 min-1 SK40<br>suitable for BIG-PLUS® tools<br>21 kW (40% ED); 16 kW (100% ED)<br>28 hp (40% DC); 21.5 hp (100% DC)<br>tool taper SK40 (DIN ISO 7388-1-A, AD)<br>for Pull-Studs DIN ISO 7388-3-A, AD<br>active cooling for spindle<br>Toolchanger 30 places SK40<br>with set up station for tool loading<br>NC swivel rotary table<br>Chip tray<br>Direct Measuring system X,Y,Z<br>Half cabin | S-A3224* | 1 | | 396,400.00 |
| **Control** | | | | |
| CELOS X with Siemens Sinumerik One<br>including 24" ERGOline Control<br>with multi-touch screen.<br>SMARTride feed / rapid traverse<br>DMG MORI Connectivity<br>NETservice App<br>Service Agent<br>3D Shopfloor Programming<br>Advanced Electrical Energy Monitoring | S-B3292* | 1 | | |
| **Spindle** | | | | |
| Motor spindle speedMASTER® HSK-A63<br>Spindle speed 20 - 20,000 $min^{-1}$<br>Output 35 kW / 25 kW<br>(47 hp / 33 hp)<br>Torque 130 Nm / 86 Nm<br>(96 ft lbs / 63 ft lbs)<br>(40 / 100 % duty cycle) | S-E3187* | 1 | | 16,450.00 |

* further description see attachment

## Working table

| | | | |
|---|---|---|---|
| Swivel Rotary Table for simultaneous machining<br>Clamping surface dia. 630 x 500mm / 24.8 x 19.6 in<br>swivel range -35 to +110°, rotary axis 360°<br>including direct measuring system for B- and C-axis<br>and working plane transformation | S-C3074* | 1 | |

## Options working table

| | | | |
|---|---|---|---|
| Rotary joint connections on the face side<br>for pneumatics or hydraulics<br>in rotary table with swivel axis, 4 channels<br>version Media connection on the face side of the table | S-G3416 | 1 | |

## Tool magazine

| | | | |
|---|---|---|---|
| Tool magazine 60 places HSK-A63<br>Vertical chain with double gripper<br>incl. set up station for tool loading | S-D3131* | 1 | 18,300.00 |

## Cooling media / chip removal

| | | | |
|---|---|---|---|
| Internal coolant supply for spindle<br>ICS with paper type filter<br>Papertype-Filter 20 - 80 Bar // 290 -1160 psi<br>frequency controlled<br>980-l tank // 37 - 25 l/min/<br>258.9 gallon tank 9.7 - 6.6 gallon/min<br>incl. cabin roof, rotary joint in spindle,<br>double cartridge filter 50µm for internal coolant | S-K4054* | 1 | 49,000.00 |
| Air blast through spindle centre<br>activated by M function,<br>maintained air | S-K3596* | 1 | 6,260.00 |
| Swarf conveyor, scraper type with<br>cleaned slot screen | S-K3792* | 1 | 14,250.00 |
| Spray gun for swarf removal | S-N3004 | 1 | 1,570.00 |
| Chip flushing for working area<br>rinsing line on the right side panel,<br>backside of machine bed, cabin left and right<br>activated or deactivate by M function's<br>(only in combination with internal coolant supply,<br>not with 20 bar ICS) | S-K3591* | 1 | 6,220.00 |
| Coolant tempering for internal<br>coolant unit 980l / 259 gallon:<br>Heating capacity max.: 4 kW / 5.3 hp<br>Cooling capacity max.: 4 kW / 5.3 hp<br>(only in combination with internal coolant unit 980l) | S-K3711 | 1 | 18,300.00 |

* further description see attachment

| | | | |
|---|---|---|---|
| Rotating clear-view window<br>(only available with option cabin roof) | S-K3580 | 1 | 4,620.00 |
| *zero***FOG** emulsion mist separator<br>Frequency-controlled and self-cleaning<br>emulsion mist separator system | S-K4024 | 1 | 13,750.00 |

## Measuring / Monitoring

| | | | |
|---|---|---|---|
| Infrared touch Probe<br>make Renishaw PP 60 optical (OMP 60) | S-K3602* | 1 | 11,100.00 |
| 3D quickSET<br>Tool kit for control and compensation<br>of the cinematic accuracy of<br>5 axis machine configurations<br>(only with option touch probe) | S-K3493 | 1 | 8,870.00 |
| Laser tool measuring Blum DIGILOG<br>fix mounted at machine column<br>Tool lenght and diameter measuring<br>automatically cleaning through external airblast<br>Calibration tool with taper<br>Includes LC-VISION standard function | S-K4119* | 1 | 17,650.00 |
| MPC - Machine Protection Control<br>Machine protection by quick shutdown | S-K3993* | 1 | 11,850.00 |

## Automation

| | | | |
|---|---|---|---|
| Signal lamp, 4 colours | S-K3728* | 1 | 2,240.00 |
| Automation interface PH 150 / PH CELL<br>for EROWA zero point clamping system consisting of:<br>Interface (Profinet) via M65<br>Working table with 4-channel rotary joint<br>Automatic loading door<br>Control of EROWA (MTS / UPC) Zero-point clamping system<br>Communication software for connection to a host computer<br>Interface only suitable for PH 150 / PH CELL!<br>**Connection PH 150/PH CELL in plant,**<br>**not included in the scope of services,**<br>**if necessary – selection of the service option required!**<br>**Please note the long text!** | S-K4055* | 1 | 23,550.00 |

## General options

| | | | |
|---|---|---|---|
| Frequency 60 cycles without surcharge | S-L3004 | 1 | 0.00 |
| Machine version Inch | S-INCH | 1 | |
| Machine following CSA specification,<br>but not certified according to UL or NFPA | S-N3088* | 1 | 3,330.00 |

* further description see attachment

| | | | | |
|---|---|---|---|---|
| UL conformity<br>(for internal use only, plant) | S-CO-UL | 1 | | |
| **Options for software general** | | | | |
| Electronic handwheel | S-H3132 | 1 | | 4,440.00 |
| Application Tuning Cycle<br>programmable feed parameter selection<br>for machining task:<br>accuracy/surface/speed | S-H3131 | 1 | | 7,960.00 |
| **Documentation** | | | | |
| Documentation-1 english | S-GB_1 | 1 | | |
| **Screen Text Language** | | | | |
| Screen text german/english | S-D_GB | 1 | | |
| **Price machine and options** | | | | **636,110.00** |

| **Services** | | | USD | USD |
|---|---|---|---|---|
| **Services supplier / Accessories** | | | | |
| 3D data model in STEP format for integration in CAD System by the customer. It is used for machine simulation.<br>(shipping against signed non disclosure agreement) | S-R3004* | 1 | | 2,810.00 |
| **Special constructions services** | | | | |
| DMFS FFP Costing | SK001 | 1 | | 40,686.00 |
| DMFS Price Federal Compliance | SK002 | 1 | | 27,124.00 |
| **Sales company services** | | | | |
| SV1: Standard Machine Installation | Z-COST01 | 1 | | 0.00 |
| DMG MORI Precision Protection Program | Z-COST05 | 1 | | 38,167.00 |
| DMG MORI Connect<br>A 2-year subscription of DMG MORI connectivity software:<br>+ Messenger Cloud - Machine monitoring through web application<br>+ NETservice 4.0 - Remote service by DMG MORI Hotline via CELOS APP<br>*NETservice is only available on machines with IoTconnector | Z-COST06 | 1 | | 1,000.00 |
| EG1: Standard Machine Training | Z-COST07 | 1 | | 0.00 |
| **Price services** | | | | **109,787.00** |

* further description see attachment

| | |
|---|---|
| Price machine and options | **636,110.00** |
| Price services | **109,787.00** |
| **Total price** | **745,897.00** |

* further description see attachment

## Attachment

## Technical Description

### S-A3224

**Technical Data:**

| | |
|---|---|
| Universal Milling Machine | DMU 50 in C-frame-design<br>Stealth Design |
| Machine basement | one-piece machine basement made of grey cast iron GG30 |

**Working area:**

| | |
|---|---|
| Travel range: | X = 650 mm, Y = 520 mm, Z = 475 mm<br>X = 25.59 in, Y = 20.47 in, Z = 18.70 in |
| Distance spindle nose - table: | 150 to 625 mm (5.90 in to 24.60 in) |
| Table dimension | D630 x 500 mm<br>(further information in text module S-C3074 -<br>Swivel Rotary Table for simultaneous machining) |

**Feed drives:**

| | |
|---|---|
| Mode of drive: | digitally controlled AC-motors, direct drives<br>ball screw drives with tolerance class<br>IT1 for geometric tolerances |
| Feed rate: | X, Y, and Z axis maximum 42 m/min // 137,7 ft/min |
| Rapid traverse rate: | X, Y, and Z axis 42 m/min // 137,7 ft/min |
| Feed force: | |
| Nominal: | X, Y, and Z axis 6.5 kN // 1,461 lbs |
| Maximum: | X, Y, and Z axis 13 kN // 2,922 lbs |

**Guideways:** roller guideways

**Measuring systems:** Direct measuring system, incl. air seal,
absolute linear path measuring system,
resolution 0.00001 mm (10nm) // 0.00000039 in,
Positioning uncertainties A = 4 µm // 0.00016 in
(acc. to ISO 230-2)

Temp. compensation Z-Axis: An electronic temperature sensor (including evaluating unit) compensates for geometric changes occurring due to heat increase at the milling spindle. Permanent monitoring and control by machine control. The solid and intelligent construction of the machine elements helps to reduce heat build-up to a minimum and ensures that influence of heat is efficiently removed.

The accuracy is strongly dependent on the external thermic influences. The highest accuracy will be achieved in a temperature range of

Active cooling for main spindle, drives and table up to ambient temperature max.40°Celsius.
The active cooling unit is separately of the machine and is to placed beside of the machine!

**Main drive:**

| | |
|---|---|
| Mode of drive: | AC motor spindle vertical digital control |
| Speed range standard: | 20 - 15,000 rpm |
| Cooling AC main drive: | water circulation cooling |

| | |
|---|---|
| drive capacity: | 21 kW / 28 hp (40% duty cycle)<br>16 kW / 21.5 hp (100% duty cycle) |
| spindle torque: | 111 Nm / 82 ft lbs (40% duty cycle)<br>85 Nm / 63 ft lbs (100% duty cycle) |
| Tool clamping force: | 11 kN (+2/-3,2 kN) // 2,272 lbs (+450/-719 lbs) |
| Tool taper: | SK40 DIN ISO 7388-1A, AD40<br>suitable for BIG-PLUS® tools<br>for pull studs DIN ISO 7388-3-A, AD40 |
| Lubrication: | oil-air-lubrication |

Remark:
Tool fixtures and tools with a balancing rate of G6.3 (up to 5 kg / 11.02 lbs) respectively G2.5 (>5kg / > 11.02 lbs) have to be used.
The permissible tool dimensions have to be considered in accordance with the driving speed:

| | |
|---|---|
| up to 8,000 rpm | max. tool length 300 mm (11.81 in), max. diameter 130 mm (5.11 in) |
| up to 10,000 rpm | max. tool length 250 mm ( 9.84 in), max. diameter 100 mm (3.94 in) |
| up to 14,000 rpm | max. tool length 200 mm ( 7.87 in), max. diameter 65 mm (2.56 in) |
| up to 18,000 rpm | max. tool length 200 mm ( 7.87 in), max. diameter 50 mm (1.97 in) |
| up to 24,000 rpm | max. tool length 140 mm ( 5.51 in), max. diameter 40 mm (1.57 in) |

**Tool magazine:**

| | |
|---|---|
| Design: | vertical chain with tubular tool holder and double gripper unit<br>program and cam-controlled tool change into the working spindle<br>tool changing unit and memory integrated in machine cabin,<br>variable pocket coding,<br>pneumatic set up station for tool loading |
| Pockets: | 30 pockets SK40 |
| Permissible tool diameter: | diameter 80 mm (130 mm with free adjacent pockets) |

NOTE:
Maximum tool diameter is 80 mm. However, there are conditions when tool cannot be installed.
There is no possibility to install tools with the same length next to each other when both of the tools have 80 mm diameter. In this case it may cause tools contact.

Solution to avoid tool contact:
Tools with 80 mm diameter with different safe length allow to install next to each other.

| | |
|---|---|
| Permissible tool length: | 300 mm (from spindle nose) |
| Permissible tool weight: | 8 kg |
| Permissible magazine load: | 120 kg |
| Chip to chip time:<br>(acc. VDI 2852) | |

| Type tool magazine | | Rapid feed<br>42 m/min // 137,78 ft/min |
|---|---|---|
| 30 Pockets<br>SK40 / HSK-A63 | | t 1 = 5 s<br>t 2 = 5 s<br>t 3 = 5 s |
| 60 Pockets<br>SK40 / HSK-A63 | | t 1 = 5 s<br>t 2 = 5 s<br>t 3 = 5 s |
| 120 Pockets<br>SK40 / HSK-A63 | | t 1 = 6,5 s<br>t 2 = 5 s<br>t 3 = 5 s |

| | |
|---|---|
| Option: | 30 / 60 / 120 pockets (SK40 / HSK-A63) |

**Coolant supply:**

| | |
|---|---|
| Standard chip tray: | 6 nozzles for external coolant supply<br>Delivery volume: approx. 35 l/min at 4 bar<br>(theoretical pump performance)<br>Capacity of the coolant tank: 135 l<br>With option coolant/airblast: 6 nozzles for external coolant supply and 4 nozzles for air cooling. |
| Remark: | please use coolant (emulsion) only in accordance with the machine specific data of the manufacturer!<br>At an oil content of >15% in the emulsion there is a risk of deflagration resp. explosion; additional safety packages required. The flash point of the emulsion has to be above 140 °C. |
| Option: | |
| internal coolant types: | - internal coolant supply with pipe filter<br>20 bar / 245 l tank<br>- internal coolant supply with paper band filter and<br>40 bar / 600 l tank<br>- internal coolant supply with paper band filter and<br>40/80 bar / 980 l tank |
| Cooled devices: | spindle motor; spindle; ball screw nut (X/YZ ball screw); ball screw bearings<br>motor flange (X/Y/Z); pressure bar for linear guideways; B/C-axis-bearing |

NOTES FOR MACHINES OPERATED WITH CUTTING OIL (OPTIONAL)

Machines which are operated with non-water-miscible cooling lubricant (cutting oil) generally require an extended warm-up phase of 3-4 hours before the actual start of production. This necessity is based on the changed heating behavior of cutting oil compared to water-miscible cooling lubricants, such as emulsion. Cutting oil tends to reach a state of steady-state only at a significantly higher temperature of 35-45°C. The heat input into the cutting oil during this process is very high. The resulting heat input in the cast components affects the accuracy of the entire machine. This applies in particular to the machining of workpieces with high accuracy requirements. For this reason, we generally recommend connecting the coolant tank to an optionally available coolant temperature control system for such applications, which always keeps the coolant at a constant low temperature of by means of heating and cooling elements. This is particularly advantageous since quality assurance (measurement) of such precise workpieces is usually carried out in an air-conditioned measuring room at 20°C ambient temperature.

If, contrary to the recommendation, a coolant temperature control system is not installed, the optionally available WAKE-UP / WARM-UP software function should be purchased and used. With the help of this function, the machine can be started at a pre-set time and warmed up with a customer-specific warm-up program so that the machine reaches the necessary operating temperature for the actual start of production and the cutting oil reaches the steady state. This is important so that the machine can achieve consistent production results. Any influences on the dimensional accuracy of the workpieces due to the temperature differences between machining and quality assurance (measurement) must be considered by the customer in this case.

The warm-up program should include all machine functions normally used, such as spindle ON, traverse paths of all axes, coolant ON, etc.

In addition to the changed temperature behavior, it is necessary to provide the machine with further protective measures due to the flammability of such cooling lubricants. These include technical protective devices, such as:

- flame flap in the machine roof
- suitable exhaust system
- Bulkhead flap for opening the suction line
- flow sensor for extraction volume in case of central extraction at the customer's site
- flow sensors for internal and outside coolant supply channels

For correct design of the machine equipment, it is necessary in any case to contact the technical sales department of the supplying factory.

It is recommended to purchase the machine directly from the factory with a suitable extinguishing system. If, at the customer's request, such a system is not part of the delivery, the machine must in any case be provided with a preparation for the integration of an extinguishing system. In this case, the customer or operator of the machine is responsible for the retrofitting of a suitable extinguishing system on the machine, including safety acceptance. Without the integration of a suitable extinguishing system, the machine must not be operated with flammable cooling lubricants.

The conclusion of a maintenance contract with the manufacturer of the extinguishing system is the responsibility of the customer or operator.

The operator of the system is also responsible for groundwater protection and must take appropriate measures according to local requirements. (Tightness or sealing of the plant hall, oil sump, etc.).

**Chip disposal:**

The arrangement of the inclined surfaces aligned with the optimum chip fall
Including bed flushing

| | |
|---|---|
| Bed flushing | activated with program, softkey for deactivation or deactivation with door opening |
| Standard: | chip tray |
| Option: | scraper type chip conveyor |
| **Central lubrication:** | automatic minimal lubrication for roller guides and ball screw spindles |
| **Electric control cabinet:** | with cabinet filter fan<br>Remark: for ambient temperatures higher than 35 °C an additional cooling unit is required (option) |
| **Operating hour meter:** | Meter at the cabinet for „control voltage ON“ and “Program in operation” " |
| **Cabin:** | |
| Standard: | half-cabin with sliding door |
| Option cabin roof: | half-cabin with sliding door and roof (closed)<br>DMG LIGHTline® ensures optimum visibility of machine condition. |

| | |
|---|---|
| Machine lamp: | 2 LED lamp „Planonlight“ 24V / 33 Watt |
| **Protective device:** | acc. to EU directives<br>protective covers for X, Y, Z axis,<br>arrangement of the inclined planes for optimal chip fall. |
| Operation modes: | operation modes 2 + 3 activated |
| scope of supply: | 2 pieces SMART Key with activated operation modes 2 + 3 |

**Paint**

| | |
|---|---|
| Machine base frame: | titan grey / calcite- white (DMG specific special color) |
| Internal castings: | titan grey |
| Cabin rear panel, control cabinet, Media supply: | titan grey |
| Cabin working area inside and outside: | calcite-white (DMG specific special color) |
| Interior machine column: | titan grey |
| Slideway cover | unpainted stainless steel |
| Machine table: | titan grey |
| Working area door (inside and outside): | graphite black |
| Front cover beneath working area door: | graphite black |
| Front pane frame: | jet black |

**Setup dimensions and weight:**

| | |
|---|---|
| Dimensions of basic machine: | approx. T x B x H 2850 x 2350 x 2750 mm (basic configuration) |
| Machine weight in standard: | approx. 7500 kg / 16535 lbs |
| Space requirement of machine with space for maintenance and operation: | T x B 5250 x 5900 mm |

**Ambient conditions:**

| | |
|---|---|
| Room temperature (machine operation is ensured). | +15 bis +35°C |
| Room temperature (achieve assured accuracy): | +20 bis +23°C |
| Temperature fluctuation / h: | <0,4 °C |
| Temperature fluctuation / 24h: | < ± 1,5 °C |
| humidity at 20°C: | 20-75% |
| max. installation altitude: | 1000m above nsl |

**Connection values:**

| | |
|---|---|
| Requirement of compressed air: | approx. 35 m3/h; basic machine additionally approx. 20 m3/h for airblast |
| Compressed air supply: | 6.5...8 bar |

power input standard machine (with ICS):

spindle 15.000 $min^{-1}$: 27,5 (32) kVA

| | |
|---|---|
| | spindle 20.000 $min^{-1}$: 35 (39) kVA |
| (high torque) | spindle 15.000 $min^{-1}$: 39 (43) kVA |

In max standard machine (with ICS):

| | |
|---|---|
| | spindle 15.000 $min^{-1}$: 40 (46) A |
| | spindle 20.000 $min^{-1}$: 50 (56) A |
| (high torque) | spindle 15.000 $min^{-1}$: 56 (62) A |

Pre-fuse standard machine (with ICS) at 400V:

| | |
|---|---|
| | spindle 15.000 $min^{-1}$: 50 (50) A |
| | spindle 20.000 $min^{-1}$: 63 (63) A |
| (high torque) | spindle 15.000 $min^{-1}$: 63 (63) A |

| | |
|---|---|
| Operating voltage: | 3 L / N / PE / 400 V (±10%), 50 Hz (±2%) |
| Note: | Load-carrying neutral conductor N (zero conductor) or special transformer required! |
| Electrical connection: | During electrical installation it has to be ensured that EN60 204, Part 1, point 6.3.3 "protection through automatic switch-off of power supply" is being observed. Also refer to IEC 364-4-41. (DIN 57 100, VDE 0100, Part 410). The machine must not be connected to an electrical network with residual-current circuit-breaker. (please refer to EN 50 178, pt.5.3.2.3 old VDE 0160, pt. 5.5.3.4.2). As based on the measures for electromagnetic compatibility our machine has leakage currents of more than 3.5 mA AC it has to be firmly connected. Moreover, one of the measures mentioned below has to be carried out according to EN 50178 pt.5.3.2.1 (old: VDE 0160, pt. 5.5.3.4.1 and 6.5.2.1). |
| | a) protective conductor cross section must be at least 10 mm2 Cu (copper)<br>b) monitoring of the protective conductor by a device which in case of an error leads to an automatic switch-off of the electronic equipment.<br>c) installation of a second conductor electrically parallel to the protective conductor via separate clamps. This conductor alone has to comply with the requirements of the harmonization document (HD) 384.5.54 S1, chapter 543 (old: DIN VDE 0100 chapter 540) for protective conductors. |
| Machine transportation: | crane |
| Noise measurement: | max. 78 dB (A) acc. to DIN 45635 - 16 Kl. 2 |
| Machine installation elements: | 4 levelling pads (adjustable in height) |

**Technical description:**

Machine design
The machine design is based on the well-proven C-frame design in a well reflected, stable construction.

The machine is based upon FEM-optimized, rigid and ribbed cast iron components and an one-piece machine basement made of grey cast iron GG30.
The quality of the machine frame enables high long-term precision and cutting capacity throughout the entire lifetime. The one-piece grey cast machine basement, the wide 4 point support, the generous reinforcement and ribbing of all cast iron parts and the relatively wide construction of the slide unit (in combination with the well-balanced construction) are prerequisites for high flexural and torsional rigidity, thermal stability and high guiding accuracy.
The well reflected concept is the basis for a compact machine with high rigidity, precision and durability as well as an optimal balance between working area and footprint. Short setup and installation times are matter of course! Selectable individual options and special option packages enable a variable and target-oriented use of the machine.

Guideway concept in the linear axes
The new generation of well-proven recirculating roller guides enables high dynamics at high feed rates and rapid feed in combination with the digital drive technology and the high-performance control. The recirculating roller guides are characterized by low heat development, low friction, no stick-slip effect, long-term precision (resistance to wear) and extremely low lubrication requirement.
Ball screw spindles are being used in the linear axes, which transmit the feed force via solid bearings and spindle nuts.
All roller guides and ball screws are integrated in the water cooling circuit and thus contribute to a thermal stable machine.

Central lubrication system
The lubrication system for the recirculating roller guides and ball screws are based on a minimal lubrication with automatic feed.

Measuring systems
The standard machine is equipped with absolute direct measuring systems. The measuring systems are encapsulated. Their good arrangement guarantee high availability and protection against chips and coolant.

Feed drives
Continuously adjustable, digital AC drives with high dynamics and reduced maintenance efforts are used.
Minimal control times and high acceleration combined with recirculating roller guides enable short positioning times, high dynamics and thus excellent surface quality and contour accuracy at the workpiece.

Vertical spindle
Direct motor spindle drive.
The stable working spindle has high-precision hybrid bearings and comes with a closed cooling cycle (water cooling) to reduce the temperature. An electronic temperature sensor (incl. evaluation unit) compensates geometry changes caused by heating of the milling spindle. Permanent monitoring and regulation is performed via the machine control. Special bearings and a robust construction guarantee high constant speeds.

Temperature compensation
Geometrical changes, which are based on temperature increase in the milling spindle are being detected and compensated via an electronic temperature sensor (incl. evaluating unit). The permanent monitoring and regulation is being effected via the machine control. The solid and sophisticated design of the machine elements reduces the temperature rise to a minimum, respectively ensures that a good heat dissipation is being achieved.

Tool clamping
Clamping is effected via a laminated disk spring, the release cylinder is operated hydraulically.

Tool changer/tool memory
The 30 pockets tool magazine (vertical chain with tubular fixtures) is located in a protected position in the working

area. The tool changing operation is carried out by a double gripper and enables fast tool changing times. In order to secure the position of the tools they are fixed in tubulars via spring elements. The magazine will be equipped directly into the tool magazine, through a loading station.
At each tool change, the tapered tool holder is cleaned with compressed air.

Coolant unit
Wet machining is possible with large quantities of coolant. The separate large-volume tank, a powerful supply pump, short pipes and the nozzle assembly (adjustable ball type nozzles) ensure a functional coolant supply. During the recirculation of coolant easy-to-clean strainers ensure a separation of coolant and chips.

Machine covering/working area design
The machine has a very compact half-cabin. Steep walls ensure an optimal chip flow. Optimal accessibility to the working area is ensured by a large door. The design is especially characterized by good insight into the working area by large-scale safety window panes made of polycarbonate and easy cleaning possibilities. The machine can also be equipped with a cabin roof as an option.

This product detects machine relocation. Once the machine is relocated, it is not operable unless its legitimate relocation is confirmed by DMG MORI or it distributor representative.

Scope of delivery Documentation:
Operating Instructions:
- Germany and German speaking countries: German
- Europe (without German-speaking countries) German + national language
- USA, Korea English
- China, Japan, Russia: English + local language

Technical Documentation Mechanical Systems available in DE, EN, FR, IT
Technical Documentation Programming:
- Germany and German speaking countries: German
- Europe (without German-speaking countries) German + national language, (depending on the availability of the control manufacturer)
- USA: English
- China (simplified) English + local language
- Japan, Korea, Russia: English + national language (depending on the availability of the control manufacturer)

Technical Documentation Electrics (incl. electrical circuit diagram with fluid diagram): available in DE, EN, FR, IT.
The required languages must be ordered according to the country-specific legislation in consultation with the supplier plant.
The complete extent of manuals will be delivered either in myDMGMORI or by an individual download – link.
Only legal necessary parts (safety notes, transportation and installation instructions, logbook and circuit diagram) will be shipped on paper in either customer language or English.

Delivery quality
During manufacturing the machine undergoes various in-process inspections and a very thorough and careful final acceptance. An inspection protocol is issued after the final acceptance and is passed on to the customer on delivery.

## S-B3292

CELOS X with Siemens Sinumerik One
CELOS X "connects" and offers new possibilities for the digitalization of your shopfloor for DMG MORI high-tech machines with 24" multi-touch screen. CELOS X creates the basis for making your work on your shopfloor and at the machine more efficient, more transparent and, with future enhancements, more predictable.

Architecture
The hybrid software architecture was developed with high IT security requirements in mind. CELOS X can be

used without (offline) as well as with (online) internet access and extended functions. Updates of CELOS X are possible "over-the-air". These require an online connection to our update service, at least for the duration of the update.

Pre-installed apps:
TECH CALCULATOR, APPLICATION CONNECTOR**, DOCUMENTS, myDMGMORI*, TULIP PLAYER*
TULIP PLAYER* Use of TULIP apps on the control panel.
Example apps from DMG MORI available as a free trial version for 1 year (on request), continuous internet connection required. The customer is responsible for using the TULIP Player and TULIP apps on the control panel beyond the scope provided by us in the CELOS X operating instructions and any ssociated possible restrictions in the performance of the machine. We once again expressly point out the obligation to observe the contents of the operating instructions provided.

SERVICE AGENT Process-supported notification system for service and maintenance work with control function. Preventive service and maintenance planning.

NETSERVICE* - Remote service via remote connection to DMG MORI Service,

DMG MORI Connectivity
Standardized machine data interface (MDC)
Protocols: OPC UA, MTConnect, MQTT

*Internet access and connection to DMG MORI required.
**Configuration is done by customer

Note:
Depending on the country of installation of the machine, there may be restrictions on functionality, as well as availability of the local language in CELOS X.
DMG MORI reserves the right to remove free of charge apps and functions from the standard scope without prior notification or to switch to a paid monthly subscription model. There is no entitlement to the free apps and functions listed above.

Screen / control panel:
24" ERGOline Control with multi-touch screen
Stepless adjustment of screen and keyboard, display of access authorization,
Button for quick input confirmation

SINUMERIK ONE:
CNC operation and programming with intuitive setup functions, program and tool management, as well as programming in programGUIDE incl. cycle support and the
Shop floor programming ShopMill 3D simulation from 3 to 5 axes simultaneously

Compatibility: differences in user interface, cycle range and
Programming, as well as no secured program compatibility to the previous Siemens SINUMERIK 840D sl up to SW NC1.5

SINUMERIK MDynamics:
The innovative Advanced Surface motion control extended to include the Top Surface function for extreme surface quality requirements (easy parameterization of moldmaking applications through high-speed settings)*, kinematic transformations, and a comprehensive range of technology and measuring cycles *Option

Hardware: current generation multiprocessor system, decentralized bus concept (industrial Ethernet, PROFIBUS DP, PROFINET IO RT/IRT)

Keyboard: CNC keyboard (QWERTY)

DMG MORI SMARTkey:
Personalized authorization of the operator with corresponding access rights to the control and the machine. With ERGOline IV control panel in space-saving card form.
Scope of delivery: 1. SMARTKey: OM 1
2. SMARTKey: OM 3
3. SMARTKey: Master

DMG SMARTride
The DMG MORI SMARTride enables innovative operation of the machine tool.
Features:
LED display of the override value on the SMARTride with value-dependent color change facilitates quick detection of prominent override values
Start and stop conditions for program run-in can be configured individually analogous to the single block behavior. Depending on the program context, the control can thus support the operator at critical program points and enable the program to be continued with full feed control in single-handed operation.
An integrated panic function sets the override to 0% when turning down quickly on the SMARTride
Haptic feedback facilitates operation and increases work safety, as distinctive override values become recognizable by means of specific vibration patterns without looking at the control screen

Block processing time: 0.3 ms (NCU1750)
0.2 ms (NCU1760)

Number of part programs (NCU)/workpieces (NCU)/workpieces (IPC) in the working memory:
1000 / 250 / 10000 (depending on the range of options)

Number of tools/cutting edges: 600 / 1500 (NCU1750)
1500 / 3000 (NCU1760)

Number of interpolating axes: Linear interpolating axes: 4 to 12 ( depending on option range)
Helical interpolation: 2D+6

User memory on NCU1750 or NCU 1760:
up to 28 MB on NCU (depending on the option scope)
>100 GB user memory for NC programs on IPC
On external memory without limit

Network connectivity:
Ethernet interface in the machine control cabinet: 10/100/1000 megabit
Network protocol: TCP/IP
USB interface in the control panel: USB 3.0

Note: To protect against malware, the USB interfaces are locked on both the software and hardware side. The hardware lock can be removed using the supplied key, the software lock can be removed on the control panel (see manual).

Programming option:
ShopMill work step programming or/and G-code programming language DIN 66025 and high-level language extension

Programming help: ShopMill
Graphical work step editor for small series and individual parts can be operated without G-code knowledge with input assistance/cycle support via animated elements
SINUMERIK programGUIDE
DIN/ISO G-code programming and high-level programming commands with input assistance/cycle support via animated elements

3D Shopfloor Programming
3D Shopfloor Programming supports shopfloor-oriented programming based on 3D models (STEP) that are loaded into the CNC system. The CNC control automatically detects part features (such as geometry, contours, position, and orientation) and suggests suitable machining cycles based on the detected features. All relevant machining cycles of the SINUMERIK ONE control are automatically filled out, so the user only needs to set the tool and process parameters to easily integrate the selected cycle into the program. This allows programming to be up to 80% faster for suitable parts.
The 3D detection is available for both ShopMill and ShopTurn, as well as ProgramGUIDE (DIN/ISO programming). This function can be used on any machine equipped with Sinumerik One and an Ergoline panel.

Mold making Quckview:
The quick 3D view of part programs (G1 blocks) offers more safety when handling mold programs. The Quick Viewer of CNC blocks can be selected in the editor for part programs.

Processing cycles:
Drilling and milling cycles, geometry calculations, tapping with/without floating tap holder, reaming, boring, hole patterns, milling of slots, rectangular and circular pockets, milling of flat surfaces via ShopMill, residual stock detection/machining of contour pockets, OEM cycles (special machining cycles created by the machine tool builder) can be integrated, measuring cycles

Calculation functions:
Extensive arithmetic functions can be performed with the user variables and the arithmetic variables. In addition to the 4 basic arithmetic operations, the following are available:
- Sine, Cosine, Tangent
- Arcussinus, Arcuscosinus, Arcustangens
- 2nd power (square), square root - amount
- Integer part, round to integer
- Exponential function, natural logarithm
- Displacement, rotation, mirroring
- Change of scale

Comparison operations and logical operations
Comparison operations with variables can be used to formulate jump conditions. The comparison functions can be:
- Equal, unequal
- Larger, smaller
- Greater or equal
- Smaller or equal
- Concatenation of strings

As logical links are available: AND, OR, NOT, EXCLUSIVE-OR.
These logical operations can also be performed bit by bit.

Coordinate system: Cartesian, polar

Maximum adjustable zero point displacements: 100

Coordinate transformations: Displacement, scaling, mirroring, rotation of coordinate systems so that they are aligned with the workpiece surface.

Position information:
Nominal/actual value, residual value for straight line and circles in rectangular coordinates, absolute dimensions, display and input in mm or inches
Approaching and leaving the contour:
via straight line, tangential or perpendicular via circle, via helical lines

Constant orbital velocity:
referenced to the tool center path, referenced to the tool cutting edge

Pivot plane/tool - CYCLE800:
Multi-sided machining via statically tilted planes. The rotation of the workpiece coordinate system in the program is automatically converted into rotations of the respective swivel axes of the machine when machining the workpiece.

Cylindrical surface interpolation - TRACYL:
The TRACYL cylindrical surface curve transformation enables the machining of longitudinal/transverse/arbitrary grooves on cylindrical bodies. The course of the grooves is programmed in relation to the unrolled, flat cylindrical surface.

Dynamic 5-axis transformation - TRAORI:
The tool is dynamically aligned to the machining surface during the milling process by interpolation of linear and rotary axes. The tool length is taken into account and the kinematic compensation movements are initiated by the TRAORI function during the rotation of the rotary axes.

3D tool radius correction:
The tool radius compensation in 3-D display or tool compensation in space enables the machining of inclined surfaces. With this function, circumferential milling and face milling with the specification of a path is possible. The oblique clamping position of a tool on the machine can be entered and corrected. The CNC control automatically calculates the resulting positions and movements. The radius of a cylindrical cutter at the tool engagement point is taken into account. The plunge depth of a cylindrical cutter can be programmed. In addition to the X, Y and Z planes, the cutter can also be rotated around the lead or camber angle as well as sideways angles.

Free Ride Logic:
After an emergency stop or power failure, the swiveled axis can easily be retracted from bores, threads, etc. using the RETRACT function.

Free contour programming:
Contour train programming (in ShopMill/ShopTurn and programGUIDE)

Manual machine:
For those switching from conventional machines, but also for experienced CNC machine operators who often only perform individual machining operations on the machine, we offer the Manual Machine function. After the machine has started up, the MANUAL basic screen appears immediately with the direct machining selection options without having to create a part program. Benefits A CNC machine can be operated like a conventional machine. A part program does not have to be created.

Parallel operation:
Create program and simulate while another program is being run.

CNC Simulation:
Simulation operation is supported with its own interpreter and with its own simulation data environment in SINUMERIK Operate. The simulation takes into account the complete syntax of the SINUMERIK CNC control family, including the possibility of including special user options on the machine by means of a data comparison with the NCK environment. Simulation data can be matched statically with the NCK environment (initialization data, macros, user data, tool data, working cycles) or dynamically when tool data or working cycles are changed, if required. Machining simulations can be executed in the workpiece coordinate system on the user interface of the CNC control. The simulation of the finished part is performed with the real CNC data. The CNC data are automatically adjusted each time the part program is changed.

Co-sign:
During the program run, the processed NC blocks are drawn (2D dash graphic).

Processing time:

Display of the current and remaining machining time in the Automatic mode.

Workpiece counter:
Indicator of the current number of workpieces and remaining workpiece quantity

Program re-entry:
Block scan to any block in the program and approach the calculated nominal position to continue machining, interrupt the program, leave the contour and approach again.

Top Surface:
Innovative optimization of the milling path with regard to surface quality and speed, which was caused by impurity of the target path specification of the CAM system. Deficient surface transitions are smoothed out by means of polynomial sets (mathematically defined "soft" curves) that merge into one another in an acceleration-continuous manner.

Look Ahead Function:
IPO rates buffered: 1000
Number of recorded part program blocks: 4000 (NCU1750)
6000 (NCU1760)

Spline interpolation:
According to DIN 66025, a constant feed rate over the part program block can be specified with address F. For a more flexible specification of the feed rate course, this function extends the programming according to DIN 66025 by linear and cubic courses over the path. The cubic curves can be programmed directly or as an interpolating spline.

High-speed settings:
The SINUMERIK machining cycle for roughing/pre-finishing and finishing as a simplified high-speed setting cycle for all milling applications, especially in tool and die making and aerospace. (Optional - included in option Application Tuning Cycle).

DMG MORI GREENmode
(standard): Intelligent adaptive feed rate control for reducing the piece time while saving energy. HEIDENHAIN AFC: Adaptive feed rate control adjusts the contouring feed rate to the current spindle power.

Advanced Electrical Energy Monitoring
Display of electrical energy consumption. Detailed analysis options directly on the machine's control panel. Conversion into energy costs and CO2 emissions with freely configurable conversion factors. Ability to export recorded energy data.

Advanced Auto shut down
Setting the standby time for the control panel screen, the work area light, the pneumatic supply and the entire machine (not in combination with automation solutions)

Wake up
Automatic switch-on of the machine according to schedule per weekday and time possible. Confirmation via key switch on the control panel.

Warm up
Automatic start of an NC program to be selected by the customer to warm up the machine.
Note: The automatic execution of the NC program and any resulting risks are the responsibility of the operator and must be confirmed by switching the key switch.

**S-E3187**

Integrated motor spindle speedMASTER® HSK-A 63 with 36 months warranty period
for the component spindle without restriction of spindle hours.

| | |
|---|---|
| Speed range: | 20 - 20.000 $min^{-1}$ |
| Tool taper: | HSK-A63 DIN 69893-1<br>hydro-mechanical clamping |
| Drive power: | 35 kW / 46.9 hp (40% DC)<br>25 kW / 33.5 hp (100% DC) |
| max. Spindle torque: | 130 Nm / 94.25 ft lbs (40% DC)<br>86 Nm / 62.35 ft lbs (100% DC) |
| Spindle bearing Inside diameter | front: 2x 80 mm / 3.15 in<br>rear: 2x 55 mm / 2.17 in |
| Bearing: | O-arrangement |

Coolant circuit (liquid cooling) to reduce heat build-up

includes: active chillerfor electrical cabinet, for ambient temperature up to max. 40° C

| | |
|---|---|
| Lubrication: | oil-air-lubrication |
| Tool draw-in power HSK-A63: | 25 kN (+10/-7 kN) / 5512 lbs (+2248/-1574 lbs) |

Note:
For speed up to 18.000 $min^{-1}$ tool mounting fixtures and tools should have a balancing grade of G6.3 (up to 5kg / 11.02 lbs) and G2.5 (>5kg / 11.02 lbs).

The following tool dimensions should be chosen for:

| | | |
|---|---|---|
| up to 14,000 $min^{-1}$: | max. tool permissible tool length | 200 mm / 7.87 in |
| | max. tool dia. | 80 mm / 3.41 in |
| up to 18,000 $min^{-1}$: | max. permissible tool length | 200 mm / 7.87 in |
| | max. tool dia. | 50 mm / 1.97 in |
| up to 20,000 $min^{-1}$: | max. permissible tool length | 180 mm / 7.08 in |
| | max. tool dia. | 50 mm / 1.96 in |

## S-C3074

Swivel rotary table for simultaneous machining

| | |
|---|---|
| Swivel range | - 35° to +110° |
| Rotating range | 360° |
| Speed B- and C-axis | 30 rpm, axis permanent in position control |
| Clamping Area | Dia. 630 x 500mm / 24.8 x 19.6 in |
| Number of T-Slots | 7 |
| Distance between T-Slots | 63 mm / 2.4 in |
| T-Slot width | 14 mm / 0.55 in, 1 x alignment slot 14H7 |
| Centre bore | Dia. 30 H6 |
| Permissible table load (table centre) | 300kg |
| Positioning uncertainty B-Axis | A = 8 arc sec (acc. to ISO 230-2) |
| Positioning uncertainty C-Axis | A = 8 arc sec (acc. to ISO 230-2) |
| Direct measuring system B- and C-axis | Included |
| Working Plane transformation | Included |

## S-D3131

**Tool magazine 60 places HSK-A63**

| | |
|---|---|
| Version: | Vertical chain with pockets for tool tapers and<br>double gripper unit<br>Program- and cam-controlled tool change to main spindle<br>Tool position in magazine is variable.<br>Tool changer and memory integrated inside cabin of machine<br>pneumatic set up station for tool loading |
| Tool taper: | HSK-A63 DIN 69893 |
| No. of magazin pockets: | 60 places |
| Permissible Tool diameter: | Diameter 80 mm / 3,14 inch (130 mm / 5,11 inch with free neighbouring pockets) |
| Permissible Tool length: | 300 mm / 11,81 inch (from spindle nose) |
| Permissible Tool weight: | 8 kg / 17.64 lbs |
| Permissible Load of Magazine: | 240 kg / 528 lbs |
| Tool change time: | 3 s |

NOTE:
Maximum tool diameter is 80 mm. However, there are conditions when tool cannot be installed.
There is no possibility to install tools with the same length next to each other when both of the tools have 80 mm diameter. In this case it may cause tools contact.

Solution to avoid tool contact:
Tools with 80 mm diameter with different safe length allow to install next to each other.

**S-K4054**

Internal coolant supply / paper type filter

Internal coolant supply with paper type filter
- Pump pressure 20 - 80 bar // 290 - 1160 psi frequency controlled
- Flow rate 37 l/min. / 25 l/min. // 9.7 gallons/min. / 6.6 gallons/min.
  (60 Hz version: Flow rate 46 l/min. - 35 l/min. // 12.1 gallons/min. - 9.2 gallons/min)
  (theoretical pump performance)
- Tank capacity: 980 l // 258,9 gallon
- Flow rate max.: max. 300 l/min // 79 gallon/min
- Filterfineness: 50µm // 0.0019 inch
- size L x W x H: 1920 x 1910 x 1803 mm / 75.6 x 75.2 x 71 in
- low level detection, automatic filter feed

Coolant supply of low-pressure options via frequency-controlled low-pressure pump

The filter is no endless filter paper, this subject has to replace by the operator according to the maintenance manual.

Further included:
Cabin roof,
Rotary inlet for spindle,
double cartidge filter 50µm for internal coolant

| | |
|---|---|
| Standard | ICS through spindle centre |

Note:
Tool clamping

| | |
|---|---|
| Standard | Pull-studs DIN ISO 7388-3 – AD40 |
| Option | Pull-studs DIN ISO 7388-3 – UD40 |

Internal coolant supply is through the spindle centre.

For HSK shape, internal coolant supply is through an additional coolant pipe
which is not included in the delivery of HSK tool holding fixtures
and has therefore to be ordered separately.

### S-K3596

Air blast through spindle centre
activated by M function, maintained air

| | |
|---|---|
| spindle 15.000 rpm: | no Oil |
| spindle 20.000 rpm: | no Oil |
| spindle 15.000 rpm (200 Nm): | no Oil |

### S-K3792

Scraper type chip conveyor with cleaned slot screen
suitable for medium chip volume and Aluminum machining

The new discharge height of the chip conveyor is 950 mm in accordance with safety guideline DIN EN ISO 16090.
The conversion will take place within a running series, which is why chip conveyors with an extended discharge funnel - discharge height 725 mm - can still be delivered. In this case, the extension can be dismantled if necessary.

Please consider footprint of machine.

### S-K3591

**Chip flushing for working area**
rinsing line on the right side panel,backside, cabin door
(only in combination with internal coolant supply,
not with 20 bar ICS S-K3584)

### S-K3602

**Infrared touch probe PP 60 optical**

The measuring probe is automatically loaded from the tool magazine
into the work spindle.

Functions include:
- Correction of workpiece position by positioning the NC rotary table
- Determination of circle centre and radius of a bore or a cylinder
- Zero shift
- Modification of tool correction
- Workpiece tolerance checks

Delivery includes:
- Measuring probe c/w transmitter and receiver unit
- tool taper
- 1 (ball-shaped) probe insert
- 9V Battery

### S-K4119

**Laser tool measurement**

Length, radius and true running can be measured in the actual clamping system and at nominal speed. Tool or tool mounting defects are directly detected and corrected.

| | |
|---|---|
| Repetitive accuracy: | ± 0.001 mm / ± 0,000039 in |
| System of protection: | IP 68 |
| Power supply: | 24 V / 160 mA |
| Laser class 2 | |
| restriction of tool dimensions: | |
| | |
| min tool length: | 65 mm / 2.56 in (50 mm / 1.97 in on request) |
| max. tool length: | 300 mm / 11.02 in (SK40, HSK-A63, CAT40) |
| min. tool diameter: | 1 mm / 0.04 in (tool measurement) |
| min. tool diameter: | 0.4 mm / 0.016 in (tool breakage control) |
| max. tool diameter: | 130 mm / 5.11 in (SK40, HSK-A63, CAT40)<br>Measurement of tool diameters up to 130 mm,<br>allowed with DMG MORI-specific parameter set. |

There are restrictions on the radius offsets, which means that not all tool types can be measured, e.g. face milling cutters with rectangular or round inserts

In addition to these specifications, workpiece fixtures are also to be taken into account for tool dimensions. Depending on tool length and diameter collisions with the workpiece might occur.

### S-K3993

MPC Machine Protection Control
Preventive protection by vibration sensor (SDS) at the spindle:
Machine protection by quick shutdown
Variable Tool- and Process-specific shut down limit
Process control (vibration and torque) with bar display in the machine control
Bearing condition diagnosis of the spindle
Automatic replacement of the sister tool after exceeding the defined tool wear limit.
Note: No warranty in case of collisions

### S-K3728

**Signal lamp 4 colour**
Red: general error
Yellow: intervention necessary
Green: automatic mode
Blue: set-up mode

### S-K4055

Automation interface PH 150 / PH CELL for EROWA zero point clamping system
Interface only suitable for PH 150 / PH CELL!

Automation interface Includes the mechanical, electrical and software preparation,
consisting of:
- Operating modes for manual / automatic loading selected with a key switch.
- Automatically operated lift door integrated into the workspace cladding
- Controll of EROWA zero point clamping system by the machine by means of 4-channel rotary joint EROWA UPC / MTS - 2 channels of rotary joint are used:
1x REALESE
1x PRESENCE CHECK / CLEANING
- Profinet interface for the connection of the part handling system to the CNC control of the machine
- Interface for the connection of the hardware (working area door, protective barriers, etc.) with the machine

- Sequential processing of parts (processing order pre-defined by operator)
- Emergency stop will be done as global emergency stop
- Communication software - CNC master computer for connection to a host computer
Siemens 840D - CMI
Siemens Sinumerik ONE - OPC/UA
Heidenhain - DNC)
- extended control panel connection

Note:
To minimize errors at the pallet or part change, it is required to clean the pallet/part. Cleaning of the pallet or part is responsibility of the user

**A connection of PH 150 or PH CELL in standard version to the machine in the plant of DECKEL MAHO Seebach GmbH is generally not included in the scope of services.**
**If a connection of the automation in the Seebach plant is desired or technically necessary due to pre acceptance, technology pre acceptance, special versions of the PH 150 / PH CELL or a special customer request, this connection is chargeable and must be purchased separately as a selected service option (S-R3016 – PH 150 or S-R3017 – PH CELL).**

## S-N3088

The machine was developed in accordance with the European directives for machines and electrotechnical products to achieve CE conformity.
The electrical cabinet and machine components are therefore not certified according to UL or NFPA.

However, the electronic machine components are largely, as far as technically possible, confirmed according to UL and CSA standard.

## S-R3004

**3D data model in STEP format**

Simplified 3D data model in STEP format (Standard for the Exchange of Product Model Data) as data base for integration in CAD system for machine simulation by customer.
For simulation purposes the model is divided into essential component groups linked by machine kinematic. These are mainly machine bed, milling head, machine table and cabine.
Peripherals such as coolant tank are not part of the model.
Editing and integration in the CAD or simulation system of the user is responsibility of the customer.
Even accurate checking may not avoid that data errors occur. There may be the possibility that measurement deviations in reference to you machine may arise.
The Seller shall not be responsible for any damages resulting out of machine crashes. Any further claims or rights of the Buyer shall be excluded. Supplier shall in no event be liable as a result of any breach, default or claim under this contract for any special, consequential, indirect, contingent or incidental damages, including, but not limited to, loss of profits or revenues, loss of production. .
The buyer will receive a non disclosure agreement togehter with the order confirmation.
The delivery time of a the model in standard is 8 weeks but not before receiving of the effective signed non disclosure agreement.
Supply via email or CD as ZIP file.