

Attachment**Technical Description****P-A0490**

Universal Machining Centre in monoBLOCK construction DMU 75

Traverse range: X = 750 mm / 29.5 in (longitudinal)
Y = 650 mm / 25.6 in (transverse)
Z = 560 mm / 22 in (vertical)

Main drive: AC motor, digitally controlled

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

Speed range: max. 20,000 rpm

Spindle taper: SK 40 DIN 69871 part 1

Tool clamping: DIN 69872 Form A or B

Acceleration: approx. 2.6 s

Deceleration: approx. 2.6 s

Drive capacity: 35 kW / 46.9 hp (40% duty cycle)
25 kW / 33.5 hp (100% duty cycle)

Spindle torque: 130 Nm / 95 ft lbs (40% duty cycle)
86 Nm / 63 ft lbs (100% duty cycle)

Spindle bearing inside diameter front: 80 mm / 3.15 in
rear: 55 mm / 2.16 in

Coolant circuit (liquid cooling)

Lubrication: Oil-air

Clamping force SK40: 9 kN / 2,000 lbs

Clamping force HSK-A63: 25 kN / 5,600 lbs

For spindle taper HSK-A 63, CAT 40, BT 40 see options for spindle.

Speeds > 18,000 min-1, only in connection with tools with dual contact system!

Note: Safety reasons and frequency of the complete spindle unit (spindle with tool) require consideration of size and balancing quality of the tools for machine with motor spindle.
Balancing quality G 6.3 for up to 18,000 rpm
Balancing quality G 2.5 for more than 18,000 rpm

MPC - Machine Protection Control: Preventive protection by vibration sensor technology (SDS) on the milling spindle: Machine protection by rapid shutdown.
Variable tool- and process specific shutdown limits.

Process monitoring (vibration and torque) by means of
 Bar graph display on the machine control
 Bearing condition diagnosis of the milling spindle
 Automatic replacement of the sister tool after the specified
 exceeding of the specified wear limit.

Note: No warranty can be given for collision damage.

Vertical milling head:

Tool changer: Program controlled tool change into the machining spindle,
 tool changing system with vertical chain magazine basic,
 integrated in machine cabin, separated from the machining area,
 changer with double gripper,
 60 magazine pockets SK 40 (standard)

Permissible tool diameter (diameter / length) for chain magazine basic SK40
 for occupied adjacent pockets: d 80 mm (3.15 in) / 315 mm (12.4 in)
 for free adjacent pockets: d 160 mm (6.3 in) / 315 mm (12.4 in)

Permissible tool diameter (diameter / length) for chain magazine basic HSK-A 63
 for occupied adjacent pockets: d 80 mm (3.15 in) / 315 mm (12.4 in)
 for free adjacent pockets: d 160 mm (6.3 in) / 315 mm (12.4 in)

If the tool length of two tools placed next to each other is identical, the max. tool diameter may be restricted. This limitation can be avoided by placing tools of different lengths next to each other.

Permissible tool length with use of Blum laser: 80 mm (3.15 in) - 315 mm (12.4 in)

Note: all length data from spindle nose

Max permissible tool tilting momentum SK 40: 12 Nm / 8.9 ft lbs
 (related to centre tool gripper slot)

Permissible tool weight 8 kg / 17.6 lbs

Permissible total weight of tools in magazine:
 60 pockets SK40/HSK-A63 160 kg / 352 lbs

Magazine loading manual, single loading

Note:

Restrictions of tool length and diameter, workpiece dimensions, traverse range of linear, rotary and swivel axes may arise depending on machine configuration (axis arrangement), position of swivel rotary table and max. tool and workpiece dimensions. For data see dimensioned drawing machining area / traverse range: on request.

Chip-to-chip time:	SK 40	HSK-A63
t2/t3	5,1	4,9
t1	5,1	4,9

(acc. to VDI 2852, given values t2/t3, tolerance + 10%, safety and retraction strategy,
 collision monitoring not considered, tool weight: 3 kg / 6.6 lbs)

NC swivel rotary table
 clamping surface C-Axis: d 650 mm (25.6 in)
 integrated in rigid table: 800 mm x 650 mm (31.5 in x 25.6 in)
 number of T-slots: 1x 14 H7 / 0.55 in (alignment groove, table centre)
 8x 14 H12 / 0.55 in (clamping grooves)

table plate rigid table:

number of T-slots:	4x 14 H12 (clamping groove, outside area)
bore pattern:	8x thread M12
distance between T-slots:	63 mm (2.48 in)
centre bore:	d 50 mm H6(1.97 in)
swivel angle:	
to the working spindle:	+120°
from working spindle:	-120°
	from 0° position (horizontal)
turning range C-axis:	360°
torque swivel axis:	3,400 Nm (2,510 ft lbs) (100 % duty cycle)
holding mom. swivel axis:	3,400 Nm (2,510 ft lbs) (100 % duty cycle)
holding mom. swivel axis:	6,200 Nm (4,570 ft lbs) (hydraulic clamping)
torque rotary axis:	2,000 Nm (1,480 ft lbs) (100 % duty cycle)
holding mom. rotary axis:	2,000 Nm (1,480 ft lbs) (100 % duty cycle)
feed rotary axis:	14,400 °/min
rapid traverse rotary axis:	40 1/min
feed swivel axis:	7,200 °/min
rapid traverse swivel axis:	20 1/min
input and display resolution:	0,001°
Bi-directional accuracy of	swivel axis A: A ≤ 9 arc sec
positioning according to ISO 230-2:	rotary axis C: A ≤ 7 arc sec
max. table load (table centre):	600 kg (1.323 lbs)
max. permissible moment	rotary axis: 48 kgm ²
of inertia:	swivel axis: 59 kgm ²
max. workpiece dimensions:	
diameter clampable:	840 mm (33.1 in)
diameter machinable:	650 mm (25.6 in)
height:	500 mm (19.7 in)
Feed drives A-axis and C-axis as well as gear C-axis with liquid cooling.	
Feed drive linear axes:	digitally controlled AC motor and recirculating ballscrew spindle in each linear axis, recirculating ballscrew spindle in X-axis with liquid cooling, feed drive in Z-axis with liquid cooling
Maximum feed speed:	X-, Y-, Z-axis 40,000 mm/min / 1,575 in/min
Rapid traverse:	X-, Y-, Z-axis 40 m/min / 1,575 in/min
Maximum feed power:	X-axis (longitud.) 7 kN / 1,570 lbs (40% duty cycle) Y-axis (transverse) 10 kN / 2,250 lbs (40% duty cycle) Z-axis (vertical) 12 kN / 2,700 lbs (40% duty cycle)
Guideways:	roller guideways in all linear axes
Linear path measuring systems:	direct, absolute, resolution 0.00001 mm (10 nm) / 0.00000039 in
Temperature compensation:	electronical, temperature sensor for motor spindle, Multi-sensor compensation for linear drive Y/Z
Machine accuracy in X-, Y- and Z-axis:	A ≤ 0,006 mm / 0.00024 in (Bi-directional accuracy of positioning according to ISO 230-2)
All values subject to customer's compliance with DECKEL MAHO instructions on transport and installation (floor plate, bed, ambient conditions, etc.) Precision depends to a large extent upon external thermal influence. The stated accuracy is achieved in	

the temperature range 20° - 23°C with a maximum temperature gradient of 0.4° per hour. Max. permissible temperature deviation per day is 1.5°. Direct sunlight, strong draughts, vibrations from other units and build-up of heat are to be avoided.

All values apply to standard delivery without export restrictions.

All machines with export restrictions are built and delivered with accordingly higher values.

Central lubrication:	automatic minimum lubrication for roller guideways
Electrical cabinet:	integrated in the machine, with active cooling unit
Cooling unit:	integrated in the machine, for main spindle, recirculating ballscrew spindle in X-axis, recirculating ballscrew spindle bearing and -nut Z-axis, feed drive in Z- /A- /C-axis, gear C-axis, motor plate X-/ Z-axis and push bar of linear guideways Z-axis,
Cabin:	full-protection cabin including roof with sliding door, large safety glass windows
Note:	The safety glass panes are exposed to natural wear and aging due to ambient and machining influences (UV, coolant, chips, etc.).
Protection and operating equipment:	according to EU guidelines, straight-line steel cover for longitudinal and vertical guideways with deflector for chip removal and cleaning.
Chip removal:	manual, from the chip trough
Coolant supply:	Multi-jet strip at spindle head, switchable from coolant to air (max. 6 bar / 90 psi, 6 water jets, 6 air jets) Pump capacity: 70 l/min / 18 gallon/min (theoretical pump performance) Coolant tank capacity: approx. 500 l / 132 gallon
Note:	For machine operation with large chip volume the options "production package" or alternative "scraper flight conveyor" and "chip rinsing in cabin door" are strongly recommended. For productive machining, especially of light metals, or machining of non-metallic materials, the option "production package" are strongly recommended. Only use coolant according to the machine-specific recommendations of the manufacturer! Machining of materials containing magnesium or the use of oil as lubricant or emulsions with an oil proportion > 15% can lead to fire or explosion. An additional safety package and a special coolant unit are required (on request). Please contact your machine supplier. The ignition point of the coolant must be above 140° Celsius.
Machine lamp:	Planon-Light, 24V DC
Working hour recording:	for "machine on" and spindle hours
Colour (synthetic enamel):	
Machine column basic machine	
Cover sheets/cabin front, left side and electrical cabinet, base	
peripheral equipment:	titanium grey
Chip conveyor:	titanium grey / calcite white
Front door inside/outside	calcite white
Machining area:	calcite white / titanium grey / stainless steel

Installation dimensions and weight:

Space requirement machine incl. operation and maintenance: see dimensioned drawing

Weight with rigid table and tool magazine 60 pockets (approx.) 12,300 kg / 27,100 lbs

Connection data

In max. at 100% duty cycle:	59 – 70 A
Power input at 100% duty cycle:	41 – 48 kVA
Required net fuse:	80 A
Required short circuit performance:	2,15 MVA

Note: The connection data varies depending on machine configuration and control. Machine specific connection data on request! Due to the backfeed of energy and the possibility of short-term operation currents may occur which require the net fuse.

operating voltage: 3/N/PE/400 V/230 V 50 Hz

max. permissible deviation: + 10% / - 10%

control voltage: 24 V DC

Electrical connection: Power supply for our machines has to meet the requirements of standard EN 50160 "Voltage characteristics of electricity supplied by public distribution systems"
For electrical installation please ensure that EN 60 204, part 1, point 6.3.3 "protection for automatic switch off of power supply" and point 18.2 "Control of conditions for protection by automatic switch off of power supply" is observed.

The recommended short-circuit performance must be available at the power supply of the machine.

It is prohibited to connect the machine to a line with a RCD – protective (FI protective), see EN 50178, point 5.3.2.3.

The machine has to be connected to a net with 3 phases (L1, L2, L3), neutral wire (N) and Protective Earth (PE)

Due to the measures of electromagnetic compatibility, the machine has leakage currents higher than 3.5 mA and must be connected firmly. Apart from that, one of the following measures according to EN 50178, point 5.3.2.1 has to be performed:

- Protective conductor profile at least 10 mm² Cu (copper) or
- Control of the protective conductor by means of a device, which makes sure that in case of an error the machine is switched off self-acting or
- Installation of a second conductor, electrically parallel to the protective conductor, using separate clamps. This conductor alone must meet the requirements of protection conductors acc. to paragraph 543 of the IEC 60364-5-54:2011 (DIN VDE 0100 Part 540:2012) for protective wires.

For detailed information on machine connection see DECKEL MAHO installation guidelines.

Required air pressure: 6 bar / 90 psi

Average air consumption: approx. 20 m³/h / 710 ft³/h (basic machine)
approx. 70 m³/h / 2,500 ft³/h (with option air blast internal/external)

Machine transport:	crane (using hanging gear) or fork-lift truck
Transport hanging gear:	included in the standard scope of delivery
Machine mounting elements:	3 wedge blocks (height adjustable)
Assembly/Service:	For assembly and to carry out possible servicing (not for bringing in) a crane with a minimum lifting capacity of 2,000 kg / 4,400 lbs and hook height of 3,5 m / 138 in is required. The customer commits himself to give technical assistance for assembly and service, especially to provide the necessary step-ladders, assembly platforms, lifting gears etc.
Installation place:	Space requirement, surface conditions ambient conditions according to DECKEL MAHO information in the machine documentation as well as transport and installation instructions.
permissible ambient temperature:	+15° Celsius up to +35° Celsius
permissible relative humidity:	max. 75% at 20° Celsius
Note:	with difficult ambient conditions or ambient temperatures from 35° to 50° Celsius or with a installation high up from 1,000 m / 3,280 ft. absolute altitude, the option tropical package is absolutely necessary.

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

Machine quality:

During manufacture the machine undergoes several intermediate and a final test. After final assembly a test certificate is made out that is given to the customer upon machine delivery.

Design and delivery of the machine incl. documentation and acceptance according to DECKEL MAHO standard, in compliance with the fundamental safety and health requirements of the EU machine guideline.

Customer-specific delivery and acceptance conditions have to be clarified separately. Offer on request.

Subject to technical changes and price adaptations.

P-B0110

CELOS with Siemens 840D sl Operate

CELOS® offers a uniform user interface for all new high-tech machines from DMG MORI.

On a 21.5" multi-touch screen, CELOS® APPS enables a consistent administration, documentation and visualization of order, process and machine data, enabling CELOS® to uniquely combine the machine with higher-level corporate structures (e.g. ERP). In addition to the pre-installed APPS, customer-specific APPS can also be installed. Pre-installed APPS: CONTROL, JOB ASSISTANT, JOB MANAGER, JOB SCHEDULER, STATUS MONITOR, TECH CALCULATOR, APPLICATION CONNECTOR, DOCUMENTS, ORGANIZER, SETTINGS, SERVICE AGENT, NETSERVICE*, MY DMG MORI*, ENERGY SAVING, TOOL HANDLING, UPDATER*. Pre-installed services: JOB IMPORT** for individual connection to ERP systems.

*Internet access required

** Configuration by customers

Screen / Control panel:	21,5" ERGOline® Control with multi-touch screen Infinitely variable adjustment of screen and keyboard Display of admission Button for quick entry confirmation	
Hardware:	32-Bit-Multiprozessorsystem, decentral bus concept (MPI, industrial Ethernet, Profibus, Profinet, ASI-Bus) NCU 720.3B PN (monoBLOCK), NCU 730.3B PN (duoBLOCK, Portal) Working memory 4 GB on CF card, (only for machines without CELOS) (this memory can be used in standard with EES without EXTCALL) Buffered NC Memory 16 MB (optional max. 22 MB) (EELOS EES Speicher 20 GB, optional) PLC: AS 317-2DP with Profibus/Profinet	
Keyboard:	CNC keyboard, Gildemeister control panel	
DMG SMARTkey:	personalized operator authorization with corresponding access rights for control and machine. Scope of supply: 1. SMARTKey: OM 1 2. SMARTKey: OM 3 3. SMARTKey for Admin	
Block processing time:	0.5 ms	
Number of part programs / work pieces in memory:	750 (with EES unlimited)	
Number of tools/cutters	1,500 / 3,000 600 / 1.500	NCU 730.3B PN NCU 710.3B, NCU720.3B PN (monoBLOCK)
Number of axes:	5 out of 5 linear interpolating, digital 2 circular interpolating, helical interpolation,	
Data memory:	CF card with min. 4 GByte user CELOS IPC with 20 GB user	

Programming:	SINUMERIK Operate user interface with programGUIDE and JobShop programming
Compatibility	Disparities in the user interface, volume of cycles and Programming, as well as no secured program compatibility with the previous Siemens 840 D solutionline up to SW 1.5 / V4.5
Cycles:	drill- and mill cycles, geometry calculation, tapping with/without compensation chuck, reaming, boring, bore patterns, slot milling, rectangular and circular pockets, line by line milling of plane surfaces with JobShop manufacturer cycles, Rest material detection/machining for contour pockets, special machining cycles of the manufacturer can be integrated, measuring cycles
Only with Turn-Mill (FD):	Turning cycles/preconditions: turning axis programming like the spindle, registration unbalanced state, constant cutting speed, tool correction, contour violation control for tool clearance angle. In combination with the option turn-mill (FD) the following cycles for turning operations are available: Grooving cycle - CYCLE93 Undercut cycle - CYCLE94 Stock removal cycle - CYCLE95 Thread undercut - CYCLE96 Thread cutting - CYCLE97 Thread chaining - CYCLE98
Parameter programming:	mathematical functions: =,+,-,*,/,sin a, cos. a, logical connections: (=,<,>, >=, <=, <=) parenthesis functions, tana, arcs sin, arcs cos, tan, an, en, ln, log, absolute value of a figure, constant p, negation, cancel of numbers before and behind the semicolon, calculation parameter, global user parameter (GUDs), local user parameter (LUDs)
Program structure:	Sub programs, program part repetition, conditional jumps to labels, program grouping
Coordinate system	Cartesian, polar
Coordinate transformations:	movement, rotation, mirroring, measure factor TRAORI
Position details:	nominal/actual value, residual value for straight line and circles rectangular co-ordinates, absolute measures, display and input in mm or inch
Contour approach and departure:	via straight line: tangential or vertical via circle, via helix
Constant speed:	related to tool centre contour, related to cutting edge
Swivelling of machining plane:	Standard for machines with NC swivel rotary table or universal milling head with controlled swivel axis
Re-positioning:	After emergency off or power fault easy tool removing with

swivelled axis out of bore etc.

TRAORI:	Offset of the swivel axes is compensated so that the position of the tool tip to the contour is maintained. Here the 4th and 5th axis (Standard for universal machining centres; option for horizontal machining centres)
3D machining, 3D tool compensation with surface normal vector (only with 5X configuration)	
Free contour programming:	contour programming (in JobShop and programGUIDE)
Manual operation:	easy input and running of cycles with take-over of position in HMI SL
Parallel operation:	Programming during machining of another program
Programming support:	graphical support for programming in HMI SL, dialogue with graphical support
Simulation:	graphical simulation of the machining process: top view, presentation in 3 planes, 3D presentation, selective enlargement Simulation on machines with automatic head change not possible
Programming graphics:	during contour programming the NC blocks are drawn (2D line drawing).
Machining graphics:	synchronous graphics during machining
Machining time:	display of actual machining time in the standard interface
Re-enter into the NC-Program:	Re-enter to any block in the program and approach of the calculated nominal position to continue machining program: interruption, contour departure and re-approach
Zero point tables:	zero point tables with 99 zero point's inclusive text
DMG MORI Pallet management:	Selection via Softkey, for 1-50 pallets Pallet management shows pallet- and work piece info Pallet status (ready, active, finished, blocked) Work piece status (raw part, in work, finished, defective) Machining with prioritization Mapping of NC-programs and zero points
Network connection:	Ethernet interface in electrical cabinet of machine: Fast Ethernet 10/1000 BaseT (1000 mBaud) Network protocol: TCP/IP USB interface at control: USB 2.0
MMP (ManageMyPrograms):	Data transfer between network and SINUMERIK 840D Network-communication with Operate is standard
DMG AUTOshutdown: (Standard)	Intelligent Standby-control for avoidance of unnecessary absorption of energy by time controlled switch-off of not used aggregates. The times and switch-off conditions can be adjusted individual

per machine with a easy to use NC-screen by the customer for his production.

DMG Wake Up: The Function "Wake Up" allows a time-controlled and user defined configurable re-switch-on of the machine. In connection with DMG AUTOSHUTDOWN it offers specific start of warm-up programs or machining programs by config screens. (The customer is responsible for the creation of the program) Consideration of safety instructions against undesired start of the machine.

DMG GREENMODE (Standard): Intelligent adaptive feed control for reduction of the piece time with concurrent energy saving

DMG MORI Tool Filter: The function TOOL FILTER allows to create and execute loading / discharge- and conversion lists for tools. To generate this lists user-specific, different filter criteria can be used. It can be executed a determination of tool requirements (WBE) for the selected NC programs.

Batchwise tool setup (version with wheel magazines): Toolchange during production and idle times for magazines with more than one wheel. Specified loading area in the loading wheel. Readout of the tools via TDS-System (optional) possible.

Additional Options: on request

P-W0546

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

Speed range: max. 15,000 rpm
Spindle: SK 40/DIN 69871 part 1
Tool clamping: DIN 69872 Form A or B
Acceleration: 2.8 s
Drive capacity: 46 kW / 62 hp (40% duty cycle)
30 kW / 40 hp (100% duty cycle)
Spindle torque: 200 Nm / 148 ft lbs (40% duty cycle)
130 Nm / 96 ft lbs (100% duty cycle)
Spindle bearing inside diameter front: 80 mm / 3.15 in
rear: 55 mm / 2.17 in
Bearing: O-arrangement
Coolant circuit (liquid cooling) to reduce heat build-up
Clamping force SK40: 9 kN / 2,000 lbs
Clamping force HSK-A 63: 25 kN / 5.600 lbs (option)
For spindle taper HSK-A 63, CAT 40, BT 40 see options for spindle.

P-K0220

Infrared measuring probe Renishaw OMP 60

Version for SK 40 or optionally chosen spindle taper

The measuring probe is changed out of the tool magazine automatically into the working spindle.

Functions:

- Compensation of workpiece alignment by positioning of the NC rotary table
- Determining circle centre and radius of a bore or of a cylinder
- Compensation of zero point movement
- Modification of tool compensation
- Checking of workpiece tolerances

Scope of supply:

- Measuring probe with sending and reception unit; optical axis 70°
- Spindle taper
- probe insert (ball type)
- 9 V battery

Note: The NC macros required for automatic operation are not included in the scope of supply.

P-K0792

Automation interface includes the mechanical, electrical and software preparation, consisting of:

- operating modes for manual / automatic loading, switchable via softkey.
- Automatically operated lift door integrated into the workspace cladding (W 700 mm / H 750 mm – W 27.5 in / H 29.5 in), opening vertically
- Control of EROWA zero-point clamping system through the machine by means of 4-channel rotary joint.
- Profibus interface for coupling the workpiece handling system to the CNC control of the Machine tool.
- Interface for coupling the hardware (workroom door, safety fence, etc.) with the machine.
- Sequential processing (program assignment by the operator).
- Emergency stop is executed as a global emergency stop
- Automation Software Interface for connection to a host computer (Siemens CMI or Heidenhain DNC)

Notes:

In order to minimize disturbances during pallet or workpiece change, it is necessary to clean the pallet or workpiece before ejection. Cleaning is the responsibility of the operator!

We recommend the "Production package" option.

Not in conjunction with the "tandem drive" NC swivel rotary table or clamping hydraulics options!

For DMU 75 not available in conjunction with control cabinet content according to CSA / UL specification.

P-H0038

Operation mode 4 "Process monitoring in the production"

Manual intervention with open doors of machining area - Release after check list has been filled in.

Machining of workpiece programs with open doors of machining area without pressing the enabling keys (tool change, pallet change, swiveling of head and internal coolant supply not possible).

Together with the order confirmation the customer receives a check list incl. safety instructions and description of the individual operation modes.

Necessity of the use of operation mode 4 "process monitoring in the production" has to be proven with the check list. The check list has to be filled in completely, signed legally binding and returned to DECKEL MAHO Pfronten GmbH.

Note:

Only after return of the filled-in and legally signed check list operation mode 4 is released for delivery.

Safety-related instructions are given to machine operators during machine commissioning; further training, if necessary, is offered by DMG MORI Academy.

P-K0816

Package increased accuracy consisting of:

- Feed drives X-/Y-axis with liquid cooling
- Recirculating ballscrew spindle Y-/Z-axis with liquid cooling
- Motor plate Y-Axis with liquid cooling
- Increased number compensation base points C-axis

Bi-directional accuracy of positioning according to ISO 230-2 with reduced tolerance:

Linear axes: $A \leq 0,005 \text{ mm} / 0.00020 \text{ in}$

A/C-axis: $A \leq 8 / 6 \text{ arc sec.}$

Optimization measures or acceptance at customer's site on request.

Note: The options measuring probe, production package 40 / 80 bar, coolant tempering as well as an HSK tool

holder or the use of tools with shoulder planer are recommended for best possible machining results.

D-CO200

D-CO200

Digital Manufacturing Package

1) IoTconnector

The integrated IoTconnector enables to use the DMG MORI online services (eg NETservice). With the integrated firewall, the machine is protected against attacks despite the online connection. In addition, the IoTconnector receives security updates via an integrated Device Management.

Notes:

For the secure operation of a machine tool within a network, DMG MORI recommends orientation on IEC62443 IT-security for industrial automation systems.

2) Machine Data Connector

Uniform machine data interface as an integrated function of the DMG MORI Connectivity Hardware independent of the machine controller, the machine signals are available as a signal output through one of the following protocols:

- MQTT (MQTT Client)
- MTConnect (MTConnect Agent Version 1.4.0.3)
- OPC-UA (DMG MORI OPC-UA Server Konfiguration)

The used protocol is to be configured at machines with CELOS (Version 5) through the App "Connector Management" or through the Windows application "Connector Management" which is directly installed to an external PC (recommended) operated within the same network than the DMG MORI Connectivity Hardware.

CELOS Connector Management is included in CELOS or/ and is provided as a separate software for standalone usage.

Updates for the software function of the Machine Data Connector will be provided directly to the DMG MORI Connectivity Hardware via DMG MORI Device Management. An Internet connection of the DMG MORI Connectivity Hardware is required for this update function.

The following signals are available*:

- Machine Serial Number
- Operating hours
- Power On Time
- Controller Mode
- Status Stack Light
- Number of active alarms
- Notifications (Alarm/Warnings)
- Part Program Name
- Current Program Execution Time
- Spindle Override
- Desired Parts
- Feed Override
- Number of active Tool
- Rapid Override
- Execution State
- Part Counter
- Part Counter overall

*Additive DMG MORI machines (powder nozzle or powder bed) have a different signal set because of their

machine technology.

3) NETservice

The NETservice stands for a couple of new features for optimal remote service support. Besides of an interactive remote desktop feature for a direct view on HMI and control, direct file transfer of service related files the experts of DMG MORI can be involved in a single or multi-user-conference. A chat and whiteboard functionality complete the conference functionality. To use the DMG MORI NETservice the supplied software DMG MORI NETservice Customer Application has to be installed on a PC/notebook.

Your customer benefits at a glance:

- Fast support through access to CELOS, IPC and NC
- Intuitive operation
- High transparency thanks to logging of all service activities
- Deposit of individual user profiles and rights
- Chat functionality for communication between customer and service

The usage of NETservice is free of charge for the duration of the machine warranty and ends automatically. NETservice after Warranty is subject to monthly costs. The DMG MORI Service is able to create a suitable offer.

Requirements of usage:

- Requires IoTconnector

Requires Internet connection to the machine

D-MO002

DMG MORI Messenger V4

The latest version of DMG MORI Messenger displays web based the machine live status. It allows to analyze the machine run-time, downtime, alarms in individually configurable dashboards and transparently shows the actual status in the manufacturing shopfloor through the subscription to e-mail reports. The DMG MORI Messenger needs to be installed on a PC/Server. The access to the application is done web based through a web browser.

Scope of delivery:

- 1x Software "DMG MORI Messenger V4" on DVD
- 1x License key to connect a single machine
- 1x Manual on DVD

The Software needs to be installed and configured by the customer himself on his own computer or server. In case of any questions, the support team from DMG MORI Software Solutions GmbH will be available over the DMG MORI regio service by telephone and via E-Mail (support@dmgmori-digital.com, keyword "Messenger").

Requirements for connecting a machine:

- DMG MORI Connectivity Hardware with Machine Data Connector (min. version 2.4) or
- DMG MORI MAPPS control with active MTConnect interface or
- DMG MORI machine from at least 2013 with DMG MORI Connectivity Hardware Retrofit or
- Third party machine on request (professional-service@dmgmori.com).

System requirements server:

- Installation on an exclusive server or virtual machine
- Supported operating systems: Microsoft Windows Server 2019 Standard (1809), Microsoft Windows Server 2016 (current version 1607 [Build 14393.2828]) or Microsoft Windows 10 Enterprise LTSC (Long Term Service Channel version for corporate clients).
- Hardware requirements: CPU min. x64 2x1.4 GHz, min. 8 GB RAM, min. 80 GB SSD
- For further requirements, please visit <https://dmgmori.com/messenger-preinstallationcheck>

Besides applies the End-user license agreement for DMG MORI Messenger, which is available under

www.dmgmori.com.

D-MT001**Service Agent**

The SERVICE AGENT as integrated APP of the CELOS CNC-Control gives an overview of all maintenance work on the machine and makes in process support possible.

Advance warning of upcoming maintenance and service work.
List of all necessary spare parts and equipment.

Note:

The Service Agent can also be used with the CELOS PC-Version with an established network connection to the machine.

Y-CT612

DMQP: KENNAMETAL Certificate

Value €2,500.00 list price

- + All orders placed with KENNAMETAL on the basis of the Certificate are subject to the general terms and conditions of Kennametal Deutschland GmbH in their relevant version exclusively.
Find the current general terms and conditions of Kennametal Deutschland GmbH at
[<https://www.kennametal.com/content/dam/kennametal/kennametal/common/legal/kennametal-inc-terms-and-conditions-of-sale.pdf>].
- + You agree that DMG MORI will proceed your contact details and the machine type to Kennametal Deutschland GmbH for establishing contact and for further processing for marketing purposes.
Learn more about the processing of personal data by Kennametal Deutschland GmbH at
[<https://www.kennametal.com/en/about-us/data-privacy.html>].
- + In principle, the certificate can only be processed once. This means that the volume of the certificate is not processed in partial deliveries, but rather as part of one order.