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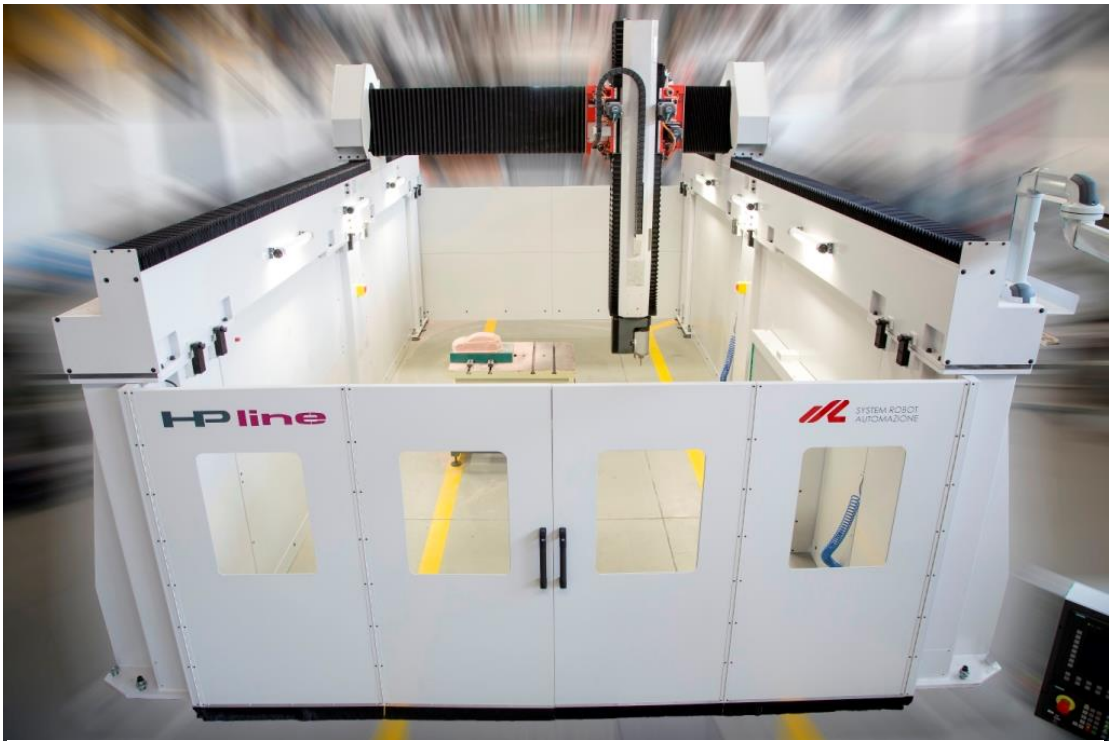
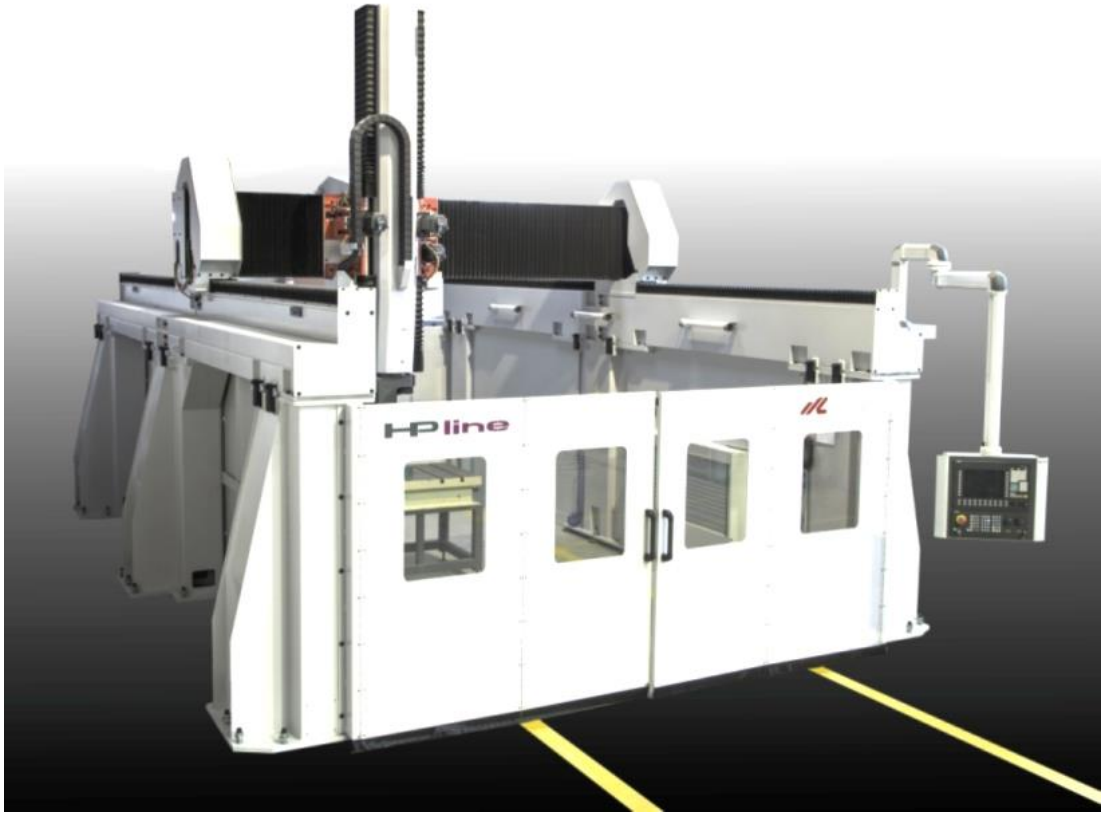
5-AXIS MACHINING CENTRE model ñHPlineò





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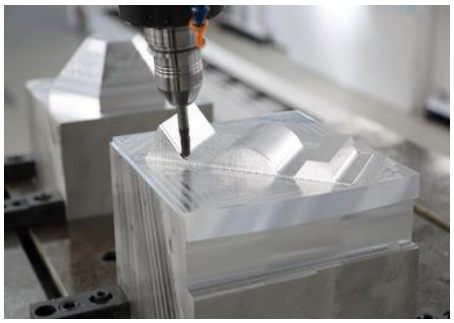


MACHINE DESCRIPTION

The machining centre series ñHP lineò is a 5 axis Numerically Controlled milling Machining Centre having following characteristics:

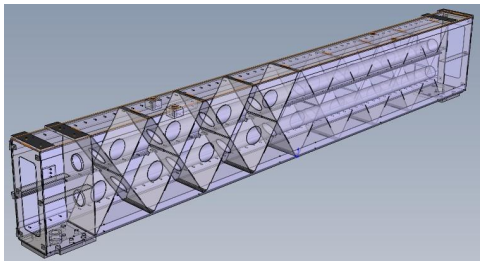
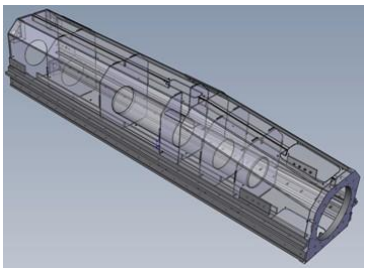
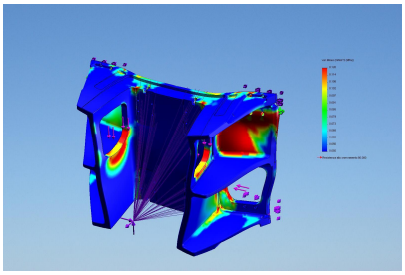
- Cartesian suspended portal design:
  - Movable beam running on slide rails placed on lateral pillars: longitudinal axis ñYò
  - On the cross-beam moves the carriage of the transversal axis ñXò supporting the vertical arm movement for the ñZò axis
  - The arm bottom is the fixing element of the operating unit
- Bi-rotating working unit: ñCò and ñAò axis.
- Safety fences
- Electrical cabinet on the right side
- Numerical Control Unit
- Systems

Specifically designed for the high-speed cutting of non-ferrous materials, it is a very flexible Working Centre combining typical characteristics such as precision, stiffness and reliability with high security standards and handling for milling, slotting, contouring, finishing and drilling operations and three-dimensional working up to 5 simultaneously interpolated axis: it is ideal for the milling of complex large models surfaces made of aluminium, wood, foams, Styroform, pastes, GRP and CFRP.

The machine complies the current European Standards regulations of security and it is equipped with all systems necessary to guarantee the safety of operators.

MACHINE CONSTRUCTION

The structures of the machine are made of welded and stabilized-treated steel and are designed and sized to maintain the maximum stiffness and stability even by high dynamic stresses arising from high speed displacements.
(Structures composed and sized according to the principles of finite element FEM integrated by the dynamic simulation)

The transmission of the movement is made through brushless servomotors coupled to precision gears on which are fixed the pinions which run on helical-toothed, hardened and grinded precision racks.

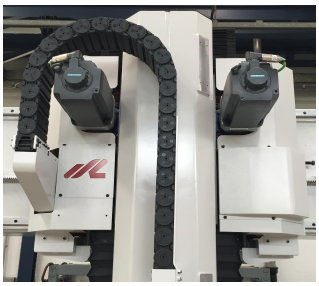
The sliding is made on prismatic precision rails with recirculation balls blocks.

Full digital pack of axes drivers and servomotors: type High Dynamic SIEMENS

The servomotors integrate the system for the transmission of position information.
The machine electric System is composed by high flexibility cables that guarantee max life and they are connected with chains cable holders with right dimensions.

The cross-beam is motorized on both ends: the movement system with two axis electrically synchronised (Gantry System) allows high quality and precision even with high speed and accelerations.

On the vertical ñŽò axis, the transmission of the movement is managed by double motorization. Both motors are equipped with brake and each one transmits the movement on a rack: one at the right side and one at the left side of the vertical arm.



This configuration with double pinion/gear/motor allows a better electronic regulation of the preload (depending from the different applied operative conditions) and the recover of backlash with consequent maintaining of precision and higher dynamic performances

Forced lubrication of blocks with grease, centralized and automatic.

The machine electric System is composed by high flexibility cables that guarantee max life and they are connected with chains cable holders with right dimensions.

Dust protection:

- The ball blocks have an external protection composed of special double scrapers.
- All rails and racks of linear axis are covered by bellows.

Safety fences:
The peripheral protection guarantees the maximum safety of the operator during working operations of the machine. The protection is made by sheet panels integrated to the structure on the back and on lateral sides. The front of the machine is protected by two manual sliding doors with large inspection windows -*stratified glass tempered*- and complete with safety switches to guarantee the control of doors closed while machine is running/working.
Accessories included:

- Interior lighting
- Air pistol for cleaning within the work area.
- Emergency button placed inside the work area

LINEAR AXIS STROKE

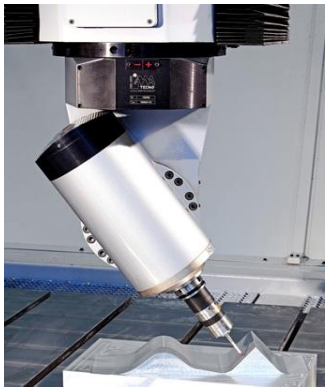
LINEAR AXIS	STROKE mm	RAPID SPEED m/min	RAPID ACCELERATION m/s²	* AXIS POSITION ACCURACY mm/m	* REPEATABILITY mm
TRANSVERSAL X	2800 / 4000	70	up to 3	+/- 0,03	0,02
LONGITUDINAL Y	4000 / 6000 /	70	up to 3	+/- 0,03	0,02
VERTICAL Z	1000 ï 1500 - 2000 / 2500	60	up to 3	+/- 0,03	0,02

* Referred to constant ambient temperature 20°C ± 1°

WORKING UNIT

N° 01 Bi-rotating head ñBASIC 2AX10ò composed by:

Rotating axis (C) co-axial to the vertical axis
Rotating axis (A) perpendicular to the vertical axis
The movement transmission is driven through servo-assisted Brushless motor and allows the programmable positioning at any point of rotation.
A and C axis are equipped with **brake with pneumatic attivation** to block the axis in fixed position: this allows higher rigidity during the operations in which the interpolation of such axis is not requested
Axis rated torque by continuos milling :A = 196 Nm C = 567 Nm
Brakes torque: A = 150 Nm C = 150 Nm



ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY	REPEATABILITY
C	450°	120	up to 500	25ò	15ò
A	+/-120°	162	up to 500	25ò	15ò

N° 01 Electro spindle with automatic cone change:

Mounted on the bi-rotating head and liquid cooled
Power **21 kW (17 kW continuous service S1)** at 12.000 rpm nominal speed
Torque = 13,7 Nm in S1 (max 16,9 Nm in S6)
Rated speed **24.000 rpm max**
Integrated tool changer device for **HSK 63F cone**

Or, as alternative

N° 01 **Bi-rotating head HS678**

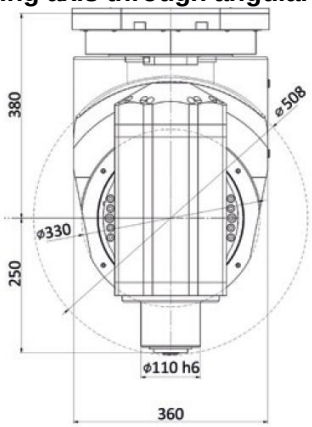
Universal head with 2 simultaneously controlled axes:
- rotating axis ñCò co-axial to the vertical axis
- rotating axis ñAò perpendicular to the vertical axis.

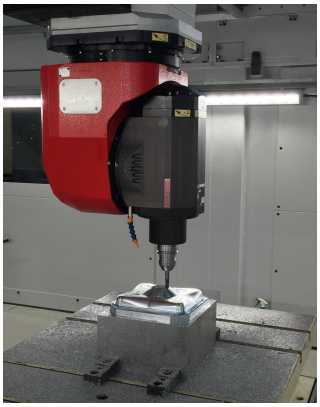
The movement transmission is driven through servo-assisted Brushless motor (Siemens) and allows the programmable positioning at any point of rotation.

A and C axis are equipped with brake with pneumatic attivation to block the axis in fixed position: this allows higher rigidity during the operations in which the interpolation of such axis is not requested.

Axis stall torque Nm: A = 470 (1400 max) C = 480 (1450 max)
Clamping torque (brake): A = 1800 Nm C = 1800 Nm

Direct measuring devices on rotating axis through angular transducers. (Heidenhain).



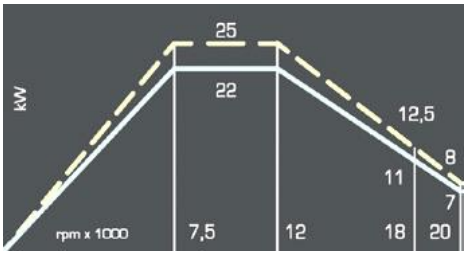


ROTARY AXIS	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C	+/-270°	90 (max 200)	max 500	30	10
A	+/-120°	70 (max 120)	max 500	30	10

* Max deviation , with RTCP active, at the distance from Pivot axis of 350mm = 0,05 mm

Electro spindle (ES798) with automatic cone change:

Power: **22 kW in continuous service S1 (25kW in S6)** at nominal speed of 7.500 rpm
Torque max = 28 Nm in S1 (32 Nm in S6)
Rated speed **max. 20.000 rpm**
Integrated tool changer device for **HSK A63 cone**
Liquid cooled
Encoder for the control of the position of rotation, it allows screw threads



N° 01 **Electro spindle cooler:**

Ultra compact cooler for glycol water complete with pump for electro spindle cooling circuit, interfaced with the Numerical Control for alarms management. It is equipped with control and maintain system for the optimal pressure, flow meter for the cooling re-circulating control, differential probe for self-regulation of delta temperature between environment and spindle to avoid thermal shock and consequent formation of condensation.

N° 01 Tool magazine:

12-station rack tool magazine placed on at the rear inside of the basement, with pneumatic disengagement.

- An automatic opening pressurized cover-cap keeps clean the tool-holders racks.
- Blowers to keep clean the storage area of the cones during the change

Accessories:

N° 8 HSK tool-holders complete with elastic pliers for the tool locking.

Or, alternative

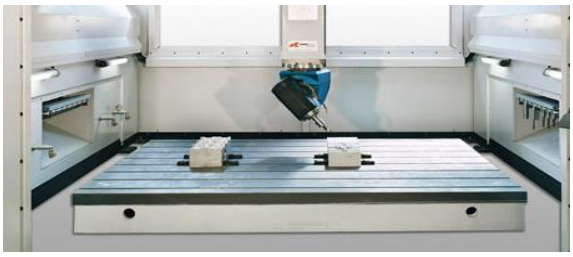
N°01 Tool magazine:

Equipped with 24 stations it is placed on the lateral side of the machine and is provided with automatic protection door.
Max diam. Tool = 145 mm adjacent positions, 350mm non-adjacent
Max tool length = 300 mm
Maximum weight on each position if fully loaded = 5 kg

N°01 Working table:

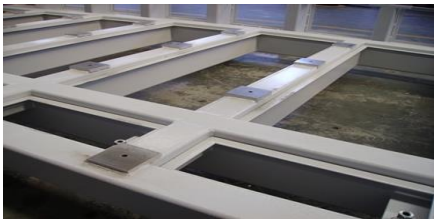
Cast iron table fixed on the floor with ñTòslot centre distance 250 mm and parallel to the ñXò axis for reference and locking of pieces fixed on the plane.
ñTòslot type 22.

Total dimensions of the plane in accordance with the machine strokes
Thickness: 240 mm



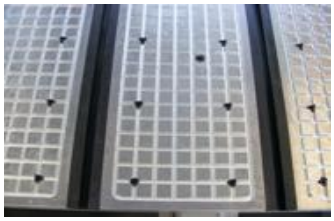
As an alternative:

The working table is separate from the machine base. It is made of a reticular structure, electric-welded carpentry .
Beams have blocks with machined plane parallel to X Y axis strokes, and complete with threaded holes M10 for positioning and locking of piece-holders, other tables, or for rough material blocks to be machined directly.
Dimension : in accordance with the machine strokes.



N° 01 Vacuum plane with ñT slotsò on top of table carpentry:

Aluminium plane having 28 mm thickness properly worked on the surface with grooves having 30 mm distance for the vacuum diffusion and for housing of gaskets necessary to limit the blocking vacuum zone.
The plane is provided with M8 threaded holes at 150 mm distance for the air passage through threaded nuts which can be used for the mechanical fixing of the jigs
The surface of the aluminum plate also includes
steel inserts at a distance of 300 mm with
hollow "T" 16 parallel to axis "Y", for the reference
and clamping parts.



N° 01 Vacuum System

The vacuum circuit for independent control of two working areas, can be activated manually or automatically by program. Every line of the vacuum circuit is equipped with filter to avoid the pumps stopping. To guarantee a suitable blocking of the jigs to the suction units, connections inside each working area are foreseen for a fast and easy coupling.

Foreseen vacuum pump : N° é . of é . m³/h *(to be defined based on the application)*

NUMERICAL CONTROL UNIT

N° 01 NUMERICAL CONTROL HEIDENHAIN MOD. iTNC530 HSCI:
Located in the electrical cabinet.

Display and operative panel located on the hanging console

Logic Unit MC 7522 i7-3 :
- Colour Display TFT 15òwith soft key
- 2 Fast Ethernet port 100MB
- 1 USB available on the front and 2 USB inside
- Processor Intel Core i7-3 1.7 GHz Dual Core
- 4 GB RAM
- SSDR Solid State Disc 32 GB (free 21,4 GB)
- Bus digital HSCI (Based on Ethernet Hardware)

Axes Controller Unit CC61xx, 2CPU :
- Position controller cycle time: 0,2 ms
- Speed controller cycle time: 0,2 ms
- Block processing time: 0,5 ms (3-D straight line without radius compensation)
- Xx Control loops of speed and position with Input 1Vpp or Endat. Max 20 Control loops (18 axes + 2 spindles)
- Bus digital HSCI (Based on Ethernet Hardware)

Operative panel TE730
- Axis Keys and Operating Mode Keys
- Ascii Keyboard and TouchPad Mouse
- Spindle-speed and feed-rate override potentiometer

Macchina Keyboard MB720 HSCI
- 36 keys with status LED, freely definable via PLC
- Operating elements: NC start, NC stop, emergency stop button, control voltage on and 2 holes for additional keys or keylock switches

Five-axis machining with swivel head:
- Inclination of the working plane
- TCPM (Tool Center Point Management)
- 3-D tool compensation
- Fast execution through short block processing times
  - Look-ahead 1024 blocks and Spline interpolation
  - n.2 Input dedicated to the tool setter and piece touch-probe including the fix probing cycles.
  - Compensation of Linear and non-linear errors, and backlash

PORTABLE KEYBOARD HR410 with Electronic hand wheel, with 3 m extensible cable, or 10 m linear cable.

Or, as alternative

N° 01 NUMERICAL CONTROL SIEMENS MOD. 840D sl

Display and operation panel located on the hanging console.

Hardware architecture with high calculation power for high speed milling (HSM) of complex surfaces.

Operative panel OP12 with:

- Colour 12,1òTFT display
- SVGA graphic card
- Membrane keyboard with 59 buttons and 32 soft keys of which 16 can be configured
- Integrated mouse and USB interface
- PCU 50.5 ï C
- Processor 1,86GHz / RAM 1024Mbyte / Memory 40G
- Sinumerik Operate Interface
- Windows XP operating system
- Ethernet connection
- Interfaces: 2x Ethernet RJ45 / 4x USB 2.0 / 1x RS232C
- NCU 720.3 managing max 31 axis (max 20 interpolated)
- CNC user memory 3 MB expandable to 15MB
- Look Ahead function (500 blocks) and dynamic feed-forward buffer
- Programmable acceleration management with jerk limitation
- ISO programming
- Interpolation on 5 axis
- Block change time 0,6 msec
- Management of Gantry and Master/Slave axis couple
- 5 axes spline
- RTCP
- Possibility to manage two feeler
- Up to 16 levels of sub-programs
- High level language by scheduling and writing variables, calculation and angular functions, control structures and macro technique
- Graphic simulation of scheduled paths
- Position Teach-in
- Compensation of backlash and of measure system error
- SW and HW end stroke sensor control
- Messages and alarms in language
- SINUMERIK MCP 483C keyboard with mechanical buttons and interface MPI potentiometers

N° 01 Handheld Terminal SINUMERIK HT2

Characteristics:

- Display with 4 lines (128x64 pixel)
- 20-keys membrane keyboard
- Magnetic hand wheel
- Rotary override switch
- Emergency stop button
- Key-operated switch
- 2 Enabling button - 3 stages (1 right & 1 left hand side of the device)
- Standard cable 20 m
- Degree of protection IP65

Performance:

- Visualisation of the count of the hand wheel increases, of the step selection and of the selected axis
- Status visualization of all axis and of the spindle
- Recall axis for manual movement or from hand wheel
- Jog control with rapid function
- Separate stall and restart controls of axis and spindle

GENERAL FEATURES

Electrical cabinet:
Separate electrical cabinet placed **at the right side of the machine:**
- Air conditioning included
- Degree of protection IP54

Power supply:	400 V 50Hz 3 phase + Earth
Installed power:	55 KVA
Compressed air pressure	6 bar (minimum required):
Colour machine structure:	light grey RAL 7047

Suggested Foundation minimal requirement:
Industrial floor with the following data:
Class 250 concrete
Steel for the concrete = Fe B 44K checked in the establishment
Ground tensions 0,3 Kg / cm^2
K Winkler 4,00 kg / cm^3
Suggested min thickness 300 mm

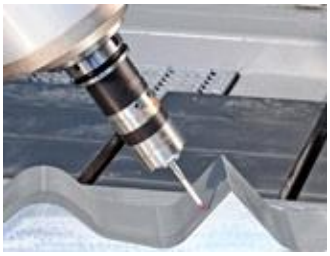
N°01 Technical documentation according to the European Standards:
A copy of the documentation supplied **on CD in German or English language** will be sent along with the machine. It will include:
- Technical dossier of the machine, including all the diagrams all the plants and mechanical drawings with the identification and classification of components
- Maintenance manual
- Programming manual
- Operational manual
- Technical documentation of components

For industrial secrecy reasons, no structural drawings, software listings of operative systems, electronic diagrams of the single printed circuits or other similar documents, will be supplied.

N° 01 Teleservice:
This service allows to reproduce on the remote control PC, through Internet, the condition of running machines connected; this permits the assistance personnel to effect remotely the diagnosis and suggest the solution of the possible anomaly.
The connection between CNC and Internet service is at Customer's care.

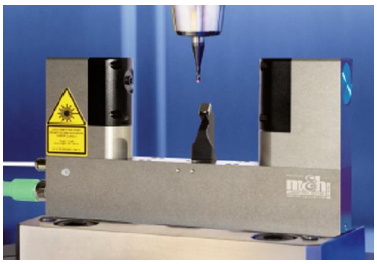
Main Accessories / Options

N° 01 Automatic feeler system (Radio Probe)
Electronic measuring probe mounted on the tool holder with signal transmission via radio. In contact with an element, this device allows to detect the coordinates of a point. It is useful for measurement or survey of the exact position of the working piece referring to one or more predetermined references.



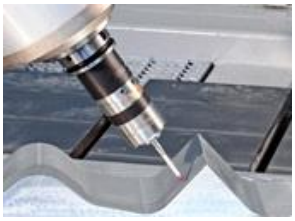
Alternatively

N° 01 Tool setter laser



Laser device for non-contact measurement tools. This system ensures the measurement, control wear and tool breakage.
- Model m&h LTS35.65-160:
- Passage for measurement of 160mm
- Radius Measuring range up to dia.0,06 mm
- Nozzle cleaning tool integrated
- Laser optics protected by air curtains and shutters
- Waterproof IP68
- Scan function for measuring tools spherical and toric

N° 01 Automatic feeler system (Radio Probe) (m&h)



Electronic measuring probe mounted on the tool holder with signal transmission via radio. In contact with an element, this device allows to detect the coordinates of a point. It is useful for measurement or survey of the exact position of the working piece referring to one or more predetermined references.

N° 01 Security system for detection of collisions (Montronix)

The system "Montronix Spectra Pulse" is a system of monitoring in real time, vibrational 3-axis based, able to detect and quickly lock the machine tool or the production process before it causes serious damage to the machine.
The sensor Spectra Pulse is able to provide a stop signal to the machine in 1 millisecond from the collision.
In addition, the sensor is equipped with a non-volatile memory, and non-deletable, where are registered up to 8000 events not comply.
A software is loaded on the PC of the numeric control, allows the visualization of the signal and the modification of the limits and parameters relating to the monitoring.

N° 01 Tool Minimal lubrication:

(necessary in case of aluminium working).
Box and distribution plant with diffuser nozzle mounted outside the spindle nose, for the minimal lubrication of the tool (chemical for cut pure sprayed with compressed air).
- 3 litres tank.
- Possibility of flow regulation and from Numerical Control activation
- Possibility to use only air

Ceiling bellows cover

Protection bellows mounted on ceiling of the machine. Moves at the moving of the crosshead.
His special translucent tissue allows the brightness of the work area.
Structured aluminium frame.
Sliding on aluminium guide using rollers.
Motorized system for automatic opening / closing one side