SYSTEM ROBOT AUTOMAZIONE s.r.l.
Unipersonale

Via Isorella, 32
25010 VISANO (BS) ITALY
tel. +39 030 9961811
fax. +39 030 9962763
internet: www.systemrobot.it
E-Mail: info@systemrobot.it

Cod. Fisc. E Part. IVA
IT 01686890987
Registro imprese BS 50170
R.E.A. 340809/96
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5-AXIS MACHINING CENTRE
model ñCL kompactò

Segreteria Amministrativa: E-mail: administration@systemrobot.it ï **Segreteria commerciale**: E-mail: sales@systemrobot.it
Segreteria assistenza tecnica: E-mail: service@systemrobot.it ï **Segreteria produzione /Ufficio tecnico:** E-mail: info@systemrobot.it

The machining centre series ñCL kompactò is a 5-axis Numerically Controlled milling Machining Centre having following characteristics:

- Cartesian suspended portal design:
  - Monoblock base-frame with integrated plane and lateral girders.
  - Movable crossbeam which runs on slide rails placed on two lateral girders: longitudinal ñYò axis.
  - On the crossbeam it moves the carriage of the transversal ñXò axis, which supports the vertical arm movement for the ñZò axis.
  - The arm bottom is the fixing element of the operating unit.
- Working unit mounted on bi-rotating head.
- Working plane integrated in the base-frame.
- Safety fences.
- Separate electrical cabinet
- Numerical Control Unit with display on hanging arm.
- Systems

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

PERFORMANCE

The specific mono-block structure with the top quality mechanical components combined with managing systems of latest generation, allow the machine to reach high dynamic performances. This even following the paths managed at high speed with precision and repeatability for 3D operations up to 5 simultaneously interpolated axes. These characteristics make the machining centre very flexible with a high safety and precision standard. It is ideal for milling of complex models surfaces and light moulds, and processes of aluminium and composites structures.

MACHINE CONSTRUCTION

The structures of the machine are very rigid, 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.

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

Measuring positioning system: All linear axis are equipped with direct linear scale measuring system (inductive type lines).

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.

Vertical ñZò axis is managed by double motorization, each motor equipped with brake, allowing the best regulation of torques to manage the moving mass in both directions, zero clearance and precision of positioning without balancing.

Forced lubrication of blocks with grease, centralized and automatic.

Limit switches and mechanical stops are provided on both ends of axis to limit the maximum stroke.

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 diffusors pistol for cleaning within the work area.
- Emergency button placed inside the work area

LINEAR AXIS STROKE

LINEAR AXIS	STROKE mm	RAPID SPEED and max working feed m/min	RAPID ACCELERATION m/s²	* AXIS POSITION ACCURACY mm/m	* REPEATABILITY mm
TRANSVERSAL X	2200	70	up to 3	0,03	0,02
LONGITUDINAL Y	2000 ï 3000 - 4000	70	up to 3	0,03	0,02
VERTICAL Z	1300	60	up to 3	0,03	0,02

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

* Referred to international rules VDI DGQ 3441

WORKING UNIT CL-POWER

N°01 **Bi-rotating head**

The movement of the axis is made by Brushless motors coupled to high precision reduction gears with system of automatic recovery of clearance.
A and C axis are provided with hydraulic brake for the blocking of the axis in fixed position. This permits an increase of stiffness during the works in which the interpolation of the axis is not required.

Nominal torque
- Without brakes: A = 580 Nm C = 770 Nm
- With brakes: A = 1600 Nm C = 3080 Nm

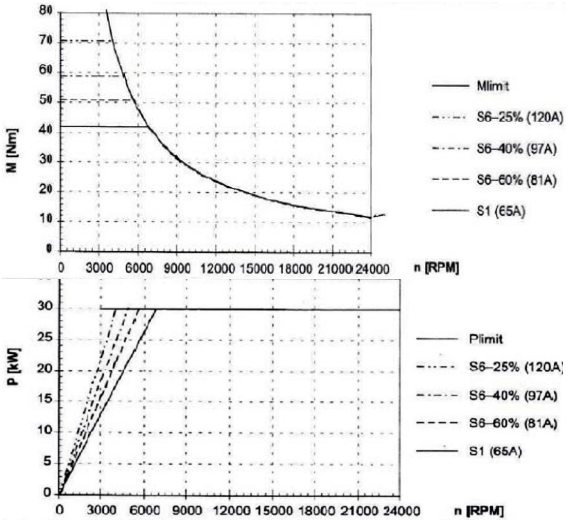
Direct measuring devices on rotating axis through angular, inductive type transducers.

ROTARY AXES	ROTATION ° (degrees)	RAPID SPEED °/sec	RAPID ACCELERATION °/s²	AXIS POSITION ACCURACY arcsec	REPEATABILITY arcsec
C	540	125	500	40	15
A	+/- 120	125	500	40	15

N° 01 **Electro spindle with automatic cone change:**

Mounted on the bi-rotating head and liquid cooled
Power 30 kW (continuous service S1) at 6.000 rpm nominal speed
Torque = 42 Nm in S1 (max 71 Nm in S6)
Rated speed **max 22.000 rpm**
Integrated tool change device for **HSK63-A** cone
Encoder for the control of the position of rotation, it allows screw threads, manage of special angular devices.

As option:
- *the electrospindle can be arranged for the axial passage of the coolant*

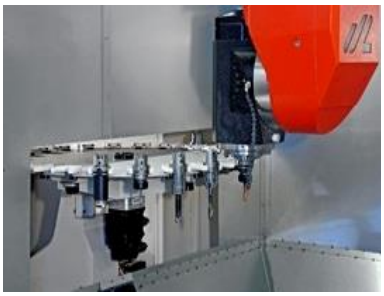


N° 01 **Electro spindle cooler:**

Ultra compact cooler for glycol water complete with pump for electrospindle 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:

Equipped with 24 stations it is placed on the right 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 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

N° 01 Device for tool setting and re-qualification of the origin of the headôs rotary axes

The Optical Tool Setter works with the transmission of radio signals.
This device allows the reliable and precise measurement of the length and the tool radius.
Equipping the spindle with a calibrated pin, it can also be used for the control of the alignment of the rotary axes A and C; procedure useful especially as a result of an excessive effort of work or in case of collision.

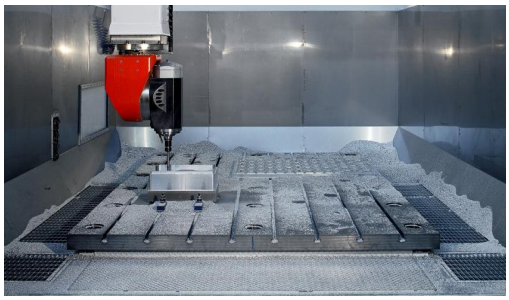
WORKING PLANE

The table is integral part of machine frame, and 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 for positioning and locking of piece-holders, other tables, or for rough material blocks to be machined directly.

N° 01 ñTOOLò plane:

Cast iron table with ñTò slot type 22 (for insert M20) centre distance 250 mm and parallel to the Y axis for reference and locking of pieces.
Fixed on the carpentry table.

Dimensions 2200 x 2100 /3100 /4100 mm
Thickness 80 mm
Height from floor 600 mm approx



NUMERICAL CONTROL UNIT

N° 01 **NUMERICAL CONTROL HEIDENHAIN MOD. iTNC640 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 (max 5000 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

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 max 16 characters each (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 *(if different, adequate transformer will be installed)*
Installed power:	75 KVA
Compressed air pressure	6 bar (minimum required):

Colours:
Machine structure: light grey RAL 7047

N°01 Technical documentation according to the European Standards:

A copy of the documentation supplied **on CD in English language** will be sent along with the machine. It will include:
- Operating manual
- Maintenance manual
- Programming manual
- Technical documentation

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.

Foundation: suggested minimum requirements:

Industrial floor with the following data:
Suggested thickness 600 mm with double wirenet
Class 250 concrete
Steel for the concrete = Fe B 44K checked in the establishment
Ground tensions 0,7 Kg / cm^2
K Winkler 5,00 kg / cm^3

With these characteristics it is possible to fix the machine to the floor using plates and chemical anchors.
In the case in which the industrial floor where the machine will be positioned, has characteristics lower than what is described above, by the Customer must be realized foundations with buried metal plates on which are then welded the base-plate of the machine. The indications provided by System Robot Automazione, do not in any case constitute a civil project for the Customer; the project should be made at Customer care and charge.

N° 01 Data remote diagnostic:

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 Customerôs care.

Commissioning and Training

N° 01 Commissioning (Installation and start-up):

Installation and start-up carried out by skilled System Robot Automazione Srl technicians at Customerôs premises (2 technicians for 10 days).
At Customerôs care and charge will be the preparation of the following:
- Any civil engineering works such as foundations, masonry, etc...
- All means necessary for the machine download from the truck and its positioning inside the

company at final location and assembling
- Manual labour to support our technicians,
- Connection to the main power supply to be foreseen with preferential line (directly from the electrical board) with specified voltage and max fluctuation of +/- 5%;
- Compressed air service supply up to the connection of the machine.

N° 01 Operative training after installation:

Operative training in English language by 1 System Robot Automazione Srl skilled technician for 5 days at Customerôs site.
The training includes:
- Demonstration of all main functions of the machine including accessories.
- Technical support for a correct use of the machine and start-up of production.

Customer has further to guarantee for the entire period of training the constant presence of the operator which will be responsible of the programming and use of the machine.

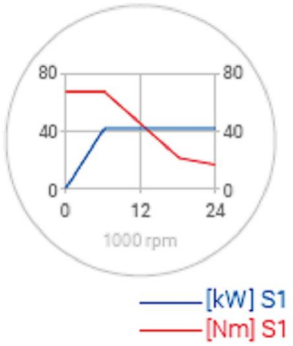
The above mentioned training is deemed sufficient for operators already having experience in programming and use of CNC machines. If at first experience, a preliminary training is suggested.

MAIN OPTIONS and Accessories

N° 01 Electrospindle (ES510) with automatic cone change:

Power: **42 kW in continuous service S1 (55 kW in S6)** at rated speed of 6000 rpm
Torque max = 67 Nm in S1 (87.5 Nm in S6)
Max speed: **- 18.000 rpm** (ceramic bearings grease life lubrication)
- or **24.000 rpm** (ceramic bearings air-oil lubrication)

Integrated tool changer device for **HSK A63 cone,** tool clamp position controlled
Pressurized spindle nose and taper, protection for carbon dust.
Liquid cooled (automatic fluid circulation closed circuit), with spindle temperature control
Encoder for the control of the position of rotation, it allows direct screw threads

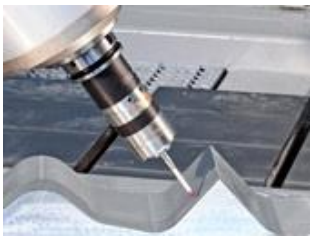


N° 01 Tool setter laser

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)

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 Ionization:

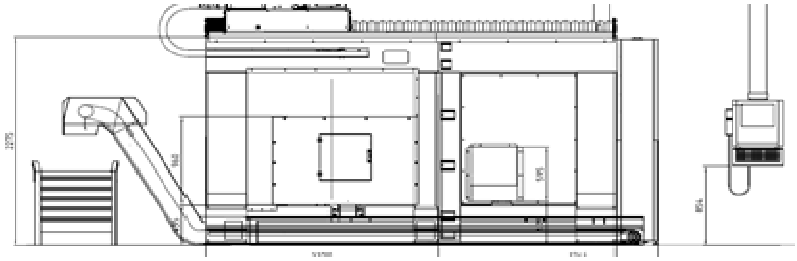
Itôs a ionizer nozzle at compressed air; It produces an air flow at high speed that neutralizes the electrostatic charge on the parts and on the removed material, facilitating the removal and therefore the piece cleaning.

The nozzle is installed on the operating unit with oriented blow in proximity of the cutting area of the tool.

N°02 Belt type chip conveyors

Placed under the working plane, each composed by:

- Tub acting as chips collector inside which the conveyor belt runs
- Conveyor belt to move the chips up to the evacuation mouth placed at the end of the ramp placed outside of the machine
- Gear motor for belt movement
-



N°01 Filtering and liquid recirculation system

System for recovery and treatment of cooling and lubricating liquid to be then re-launched in circuit at high pressure for washing of the tool.

The system includes.

- N. 01 motor-driven pump, 50 lt/min approx. capacity and 15 bar maximum pressure
- N. 01 filtering group at 30 micron fabric with 150 lt/min maximum capacity
- Tub for containing of the cooling liquid already filtered before being re-launched in circuit
- Electrical board

N° 01 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 on front side

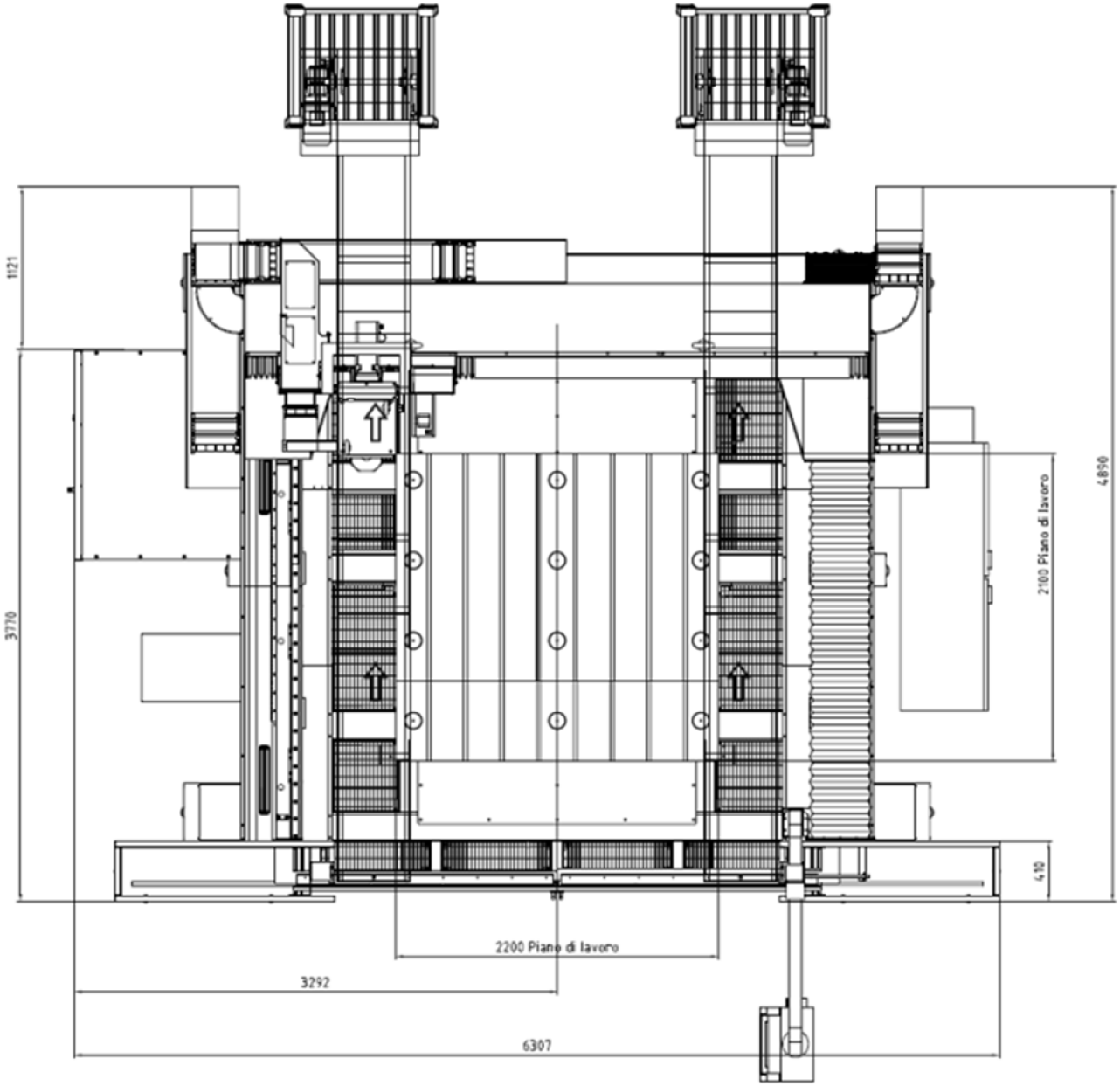
N° 01 Security system for detection of collisions

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.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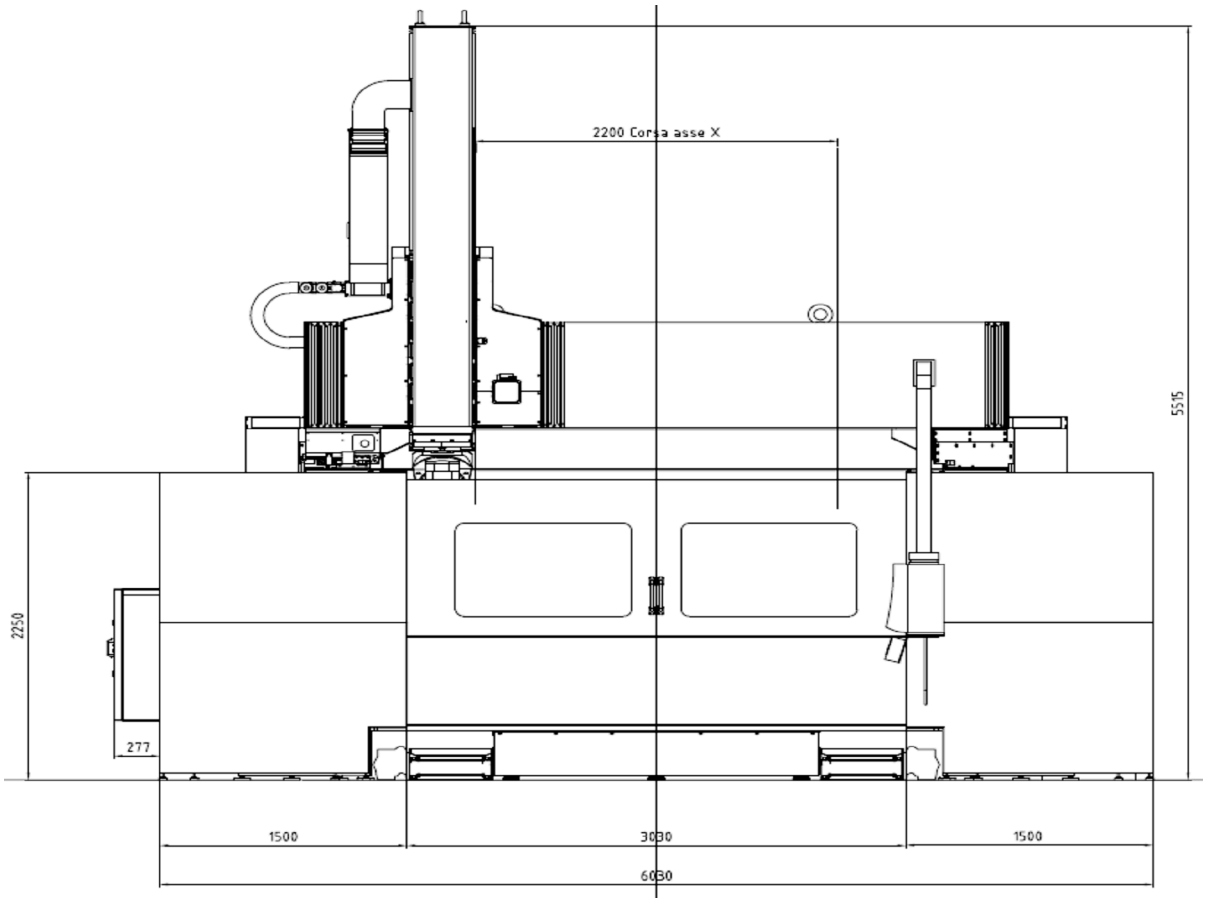
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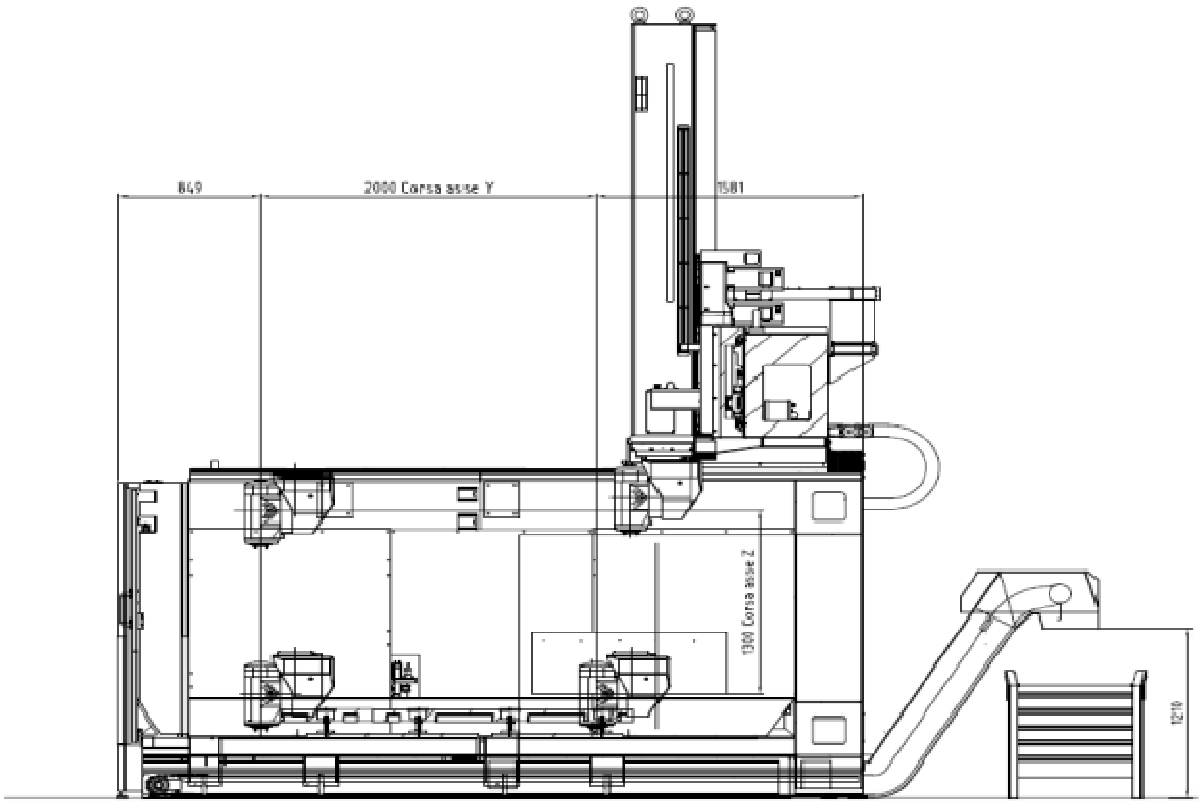
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