

4-guide parallel Lathe

WMW DXWD 1800/2

2-carriage CNC

Technical data

DESCRIPTION	U.M.	VALUES
Maximum loading weight	t	80
Machine weight	t	160
Nominal turning diameter	mm	Ø 1.800
Maximum turning diameter	mm	Ø 1.900
Maximum passage diameter on the bed	mm	Ø 2.600
Maximum turning length (distance between centres)	mm	11.925 (12.025)
Spindle axis height	mm	1.300
Plateau diameter	mm	Ø 1.900
Gripping range plateau	mm	Ø 300 ÷ Ø 1.350
– Gripping range 1	mm	Ø 300 ÷ Ø 550
– Gripping range 2	mm	Ø 500 ÷ Ø 950
– Gripping range 3	mm	Ø 900 ÷ Ø 1.350
Clamping force (with maximum tightening torque of 250 Nm)	kN	200
Spindle power	kW	160
Total installed power	kW	310
Spindle maximum torque	kNm	155
Spindle rotation speed range	rpm	1 ÷ 150
– Spindle rotation speed - 1st range	rpm	1 ÷ 24
– Spindle rotation speed - 2nd range	rpm	20 ÷ 60
– Spindle rotation speed - 3rd range	rpm	50 ÷ 150
Carriage speed - transversal direction (“X-axis” – “U-axis”)	mm/min	1 ÷ 400
Carriage speed - longitudinal direction (“Z-axis” – “W-axis”)	mm/min	1 ÷ 400
Carriage speed (rapid) - transversal direction (“X-axis” – “U-axis”)	mm/min	6.000
Carriage speed (rapid) - longitudinal direction (“Z-axis” – “W-axis”)	mm/min	6.000
Minimum spacing between carriages	mm	1.600
Tool holder maximum overhang	mm	530
Carriages longitudinal stroke (“Z-axis” – “W-axis”)	mm	14.451
Carriage travel (“X-axis” – “U-axis”)	mm	795
Tailstock translation speed (rapid)	mm/min	3.000
Tailstock’s barrel stroke	mm	300
Tailstock’s barrel feed speed	mm/min	20
Tailstock’s barrel feed speed (rapid)	mm/min	100
Tailstock’s barrel maximum thrust	kN	600
Tailstock’s barrel diameter	mm	Ø 630
Large bezel - Maximum diameter (open type) - Dwg 175-42-6120:00-00	mm	550÷900
Maximum load permitted	t	40

Large bezel - advancing speed	mm/min	194
Small bezel - Maximum diameter (open type) - Dwg 175-42-6110:00-00	mm	200÷600
Maximum load permitted	t	20
Small bezel - advancing speed	mm/min	980
Small bezel's screw translation speed	mm/min	92
Main carriage shear force	kN	180
Back pressure force	kN	1.144
Feed force	kN	108
Maximum cross-sectional shear per carriage (workpiece material Ks = 1.800 N/mm ²)	mm ²	100
Chip removal – per carriage	kg/h	1.118
CNC	///	SINUMERIK 840D ONE

DEFINIZIONI

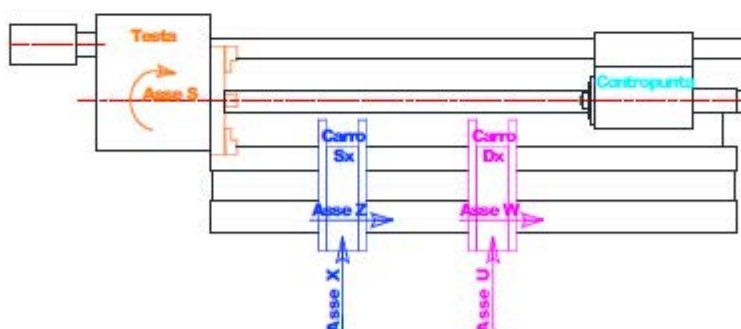
Z-axis = left- hand carriage movement, parallel to cylinder-axis

X-axis = left-hand carriage tool turret, orthogonal to cylinder-axis

W-axis = right- hand carriage movement, parallel to cylinder-axis

U-axis = right-hand carriage tool turret, orthogonal to cylinder-axis

S-axis = spindle rotation-axis



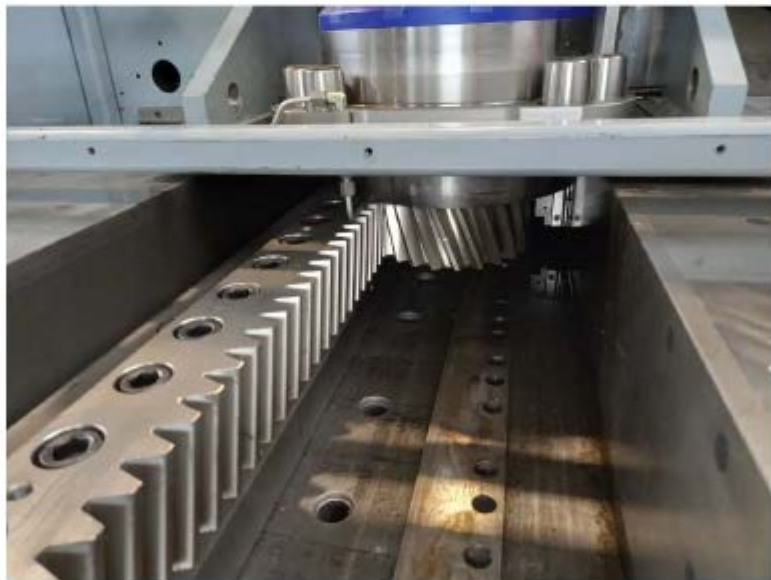
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Pictures during retrofit









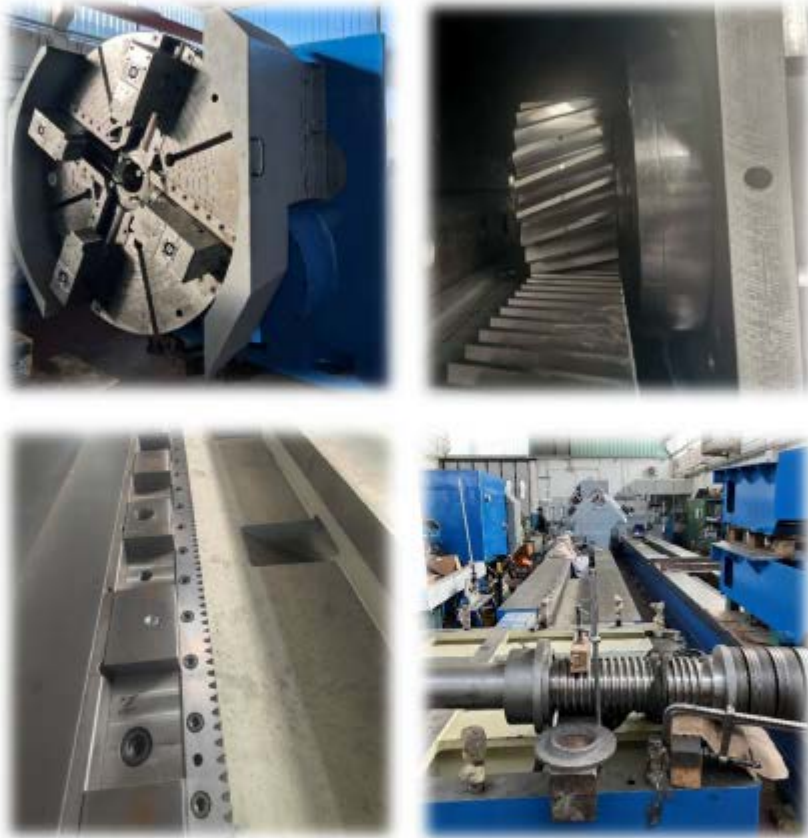






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Retrofit specification



Pictures during retrofit

The machine is retrofitted as NEW. Machine's retrofit activities are both mechanical and electrical.

An overview of the activities and illustrative pictures whilst retrofit are presented below.

- 1.1 Complete dismantling of the machine and cleaning of all its components (including cleaning and greasing of all levelling wedges).
- 1.2 Grinding of the legs for carriages (z/w axes) - L = mm 21,300
- 1.3 Grinding of the legs for tailstock and bezels - L = mm 18,000
- 1.4 Self-centring spindle head: motor modification with installation of position brake, range change and installation of new lubrication pump (100% overhauled)
- 1.5 Longitudinal carriages: No. 2 BIPLAST plates (z/w axes) bonding with coupling
- 1.6 Tool cross slide: bonding No. 2 BIPLAST plates (x/u-axes) bonding with adaptation
- 1.7 Lower-base tailstock: BIPLAST plate bonding with adaptation
- 1.8 Upper base: complete overhaul and anti-reverse supply
- 1.9 Supply of z/w axes and x/u axes gearboxes + tailstock with new racks + load cells
- 1.10 Machining of the two carriages, tailstock and No. 2 slides in order to install new gearboxes
- 1.11 Supply of No. 2 precision screw drives X-axis of the 2 carriages, hydraulic U-axis
- 1.12 Supply of No. 3 hydraulic units: 2 for carriages and 1 for tailstock
- 1.13 Supply of No. 2 units for lubrication z/w and x/u axes
- 1.14 Supply of No. 3 units for tailstock lubrication and 2 bezels
- 1.15 Assembly of new telescopic guards
- 1.16 Complete repainting
- 1.17 Bezels: overhaul and modification of automatic contact rollers, application of load cells
- 1.18 Geometry check - height and straightness of lathe centres between head and tailstock
- 1.19 Blank tests
- 1.20 Engineering and automation of the following axes:

LEFT CARRIAGE

- **Z-axis:** movement of left-hand carriage, parallel to cylinder axis, made with double pinion gear with electronic preload control: two motors, two gearboxes and single optical scale with W-axis
- **X-axis:** movement of left-hand carriage tool turret, orthogonal to cylinder axis, made with precision screw drive: one motor, one gearbox and optical scale

RIGHT CARRIAGE

- **W-axis:** movement of right-hand carriage, parallel to cylinder axis, made with double electronic pinion with preload control: two motors, two reduction gears and single optical scale with Z-axis
- **U-axis:** movement of right-hand carriage tool turret, orthogonal to cylinder axis, made with precision screw drive: one motor, one gearbox and optical scale

SPINDLE

- **S-axis:** spindle rotation, equipped with a parking brake from spindle motor and positioning brake with disc and a pair of hydraulically-powered jaws

- 1.21 Carriage leg (z/w axis) consisting of No. 3 pieces; total length 21,300 mm
- 1.22 Carriage leg (workpiece rotating head, 2 bezels, tailstock); total length 18,000 mm
- 1.23 Mirroring of right-hand carriage W-axis and left-hand carriage Z-axis; fitting of new WITTESTAIN gearboxes. Fitting of two pinion gears and two motors onto each carriage
- 1.24 Replacing of all bronze plates on the sliding chip pans, conical and plating gibs with BIPLAST material; scraping to complete
- 1.25 Restoring of the upper part of the carriage, where the tool carriage slides, by grinding the plates with post-machining residual hardness verification afterwards
- 1.26 Replacing of the bronze plates on the tool carriage slides and conical gibs with BIPLAST material; adaptation via scraping to complete
- 1.27 Replacing of the recirculating screws, gearboxes and motors
- 1.28 Machining of the slides as necessary for the application of the new drives: screw-gearbox-motor
- 1.29 Workpiece head: complete cleaning, checking of gearwheels, remaking of the lubrication system with replacement of the motor pump, pressure switches and various sensors, as well as all non-recoverable piping
- 1.30 Checking of the electro-mechanical screw-type range changer/ overhauling with replacement of the positioning limit switches; new electric motor
- 1.31 Complete overhaul of the workpiece clamping platform
- 1.32 Connections prepared to be used for the application of a temperature conditioning system for the lubrication oil inside the head; consequently, it is possible to install an oil heating/cooling system
- 1.33 Application on the workpiece-holding spindle of a motor to execute two actions: parking brake and hydraulic positioning brake
- 1.34 In the future, if necessary, it is possible to apply an encoder to the spindle + (drilling-milling) with possible motorised tools
- 1.35 Tool cross slides: No. 2 on the right carriage and No. 2 on the left carriage
 - Slide width: 150
 - Number of indexed positions: 3
 - Range of indexed positions per ram: 0.200 - 400 - 600 mm.
- 1.36 Performing of the following activities on the tailstock, in addition to general cleaning:
 - dismantling of the sub-base and its forward-backward movement system
 - replacement of existing forward-reverse kinematic motion with new WITTESTAIN single-pinion gearbox and supply of new racks
 - new gearbox support
 - changing of the tailstock clamping system on the bench from electric to hydraulic; installation of a new oil service unit for this purpose
 - upgrading of the tailstock anti-reverse safety system with new supports controlled by a hydraulic cylinder
 - regeneration of the tailstock sliding tables with BIPLAST, followed by adaptation via scraping
 - regeneration of the tailstock plating gibs with BIPLAST, followed by adaptation via scraping; No. 2 plating gibs re-fitted with new ones
 - complete dismantling of the upper part and inspection of the quill seat, modification of the quill locking system from electric to hydraulic
 - overhauling of tailstock cone and coupling flange
 - assembling of new load cell for measuring workpiece thrust
 - reassembling of each component

- 1.37 In addition to general cleaning, the following activities are carried out on the bezels:
- complete disassembly of the bezels for parts overhaul and bearing replacement
 - assembly of No. 4 electromechanical drives for approaching the stems to the workpiece
 - assembly of No. 4 new load cells for calibrated approach of rods to the workpiece
 - overhaul of gearboxes for moving bezels on pallet and supply of new pinions
 - overhaul of bezel manual locking and unclamping system
- 1.38 Rebuilding of the lubrication system; the following control units are fitted:
- No.1 control unit for right-hand carriage
 - No.1 control unit for left-hand carriage
 - No.1 control unit for tailstock
 - No.1 control unit for spindle head
 - No.1+1 control unit for bezels
- Channelling of the hydrostatic oil drive of each element into a single tank; disposal activity takes places once in a while
- 1.39 Covers: repair or refurbishment as necessary
- 1.40 Telescopic shelters newly supplied.
- 1.41 Complete painting of the machine with restoration of the base by grouting and sealing.
- Epoxy anti-oil interior painting.
- External polyurethane finish painting
 - Colour as per data sheet Annex A
 - (Fixed parts = matt orange)
 - (Moving parts = tailstock - right-hand carriage - left-hand carriage - bezels = matt grey)
- 1.42 Blank tests at retrofitting company site (Northern Italy)

Complete renovation of the electrical part of the WMW lathe. The new equipment (100% new) has been designed and built in accordance with current standards for electrical equipment EN60204-1, EN611439-1.

The accompanying Technical documentation, supplied in hard copy and digital format, includes:

- Wiring diagram with related bill of materials
- PLC software, CNC and programmable devices
- Operator manual in Italian language
- Product manuals
- Electrical technical file
- Product data sheet

Mains voltage	400vac +/- 10% triphasic
Mains frequency	50 Hz +/- 1%
Max power	350 kW
Auxiliary's voltage circuit	240 Vdc – 110 Vac
Signalling voltage circuit	24 Vdc
Solenoid valve voltage	24 Vdc
3-phase motor voltage	400 Vac
Ambient working temperature	0/35 °C
Storage temperature	-20/+70°C
Installation altitude without derating	≤ 1000m a.s.l.
Relative humidity	Max 80% mild climate

Main materials

<i>Description</i>	<i>Make</i>
Main switch	SIEMENS
Electromechanical components (thermal, counter fuse holders)	SIEMENS / LEGRAND
Output interface relays	FINDER
Safety relays	SIEMENS SAFETY
Miscellaneous relays	SIEMENS
Active interface modules - monitoring	SIEMENS
Control and signalling unit	SHNEIDER / SIEMENS
Limit switches	BALLUF / EUCHNER / SHNEIDER
Light plates	SCHNEIDER
Safety modules	SIEMENS (SAFETY)
Safety switches, barriers, etc	PILZ / SCHNEIDER
Access key management	SIEMENS
Control electronics	SIEMENS
Power electronics	SIEMENS
Main drives	SIEMENS
Enclosure conditioning	STULZ
Switch cabinet's carpentry	ZANARDO
Control panel's carpentry	ZANARDO
Cable marking	CABUR
Cable drag chains	TDK / IGUS / BREVETTI STENDALTO
Cable guides	TEAFLEX / RTA

- CNC SIEMENS
- N. 2 PO 15" LED backlight with membrane keys and mouse type 6FC5203-0AF05-0ABB1
- No. 1 SINUMERIK 840D ONE sl TCUU 30.3 (thin Client Unit) type 6FC5312-0DA000 0-1AA1
- No. 2 SINUMERIK emergency stop membrane keys type 6FC5303-0AF22-1AA1
- No. 1 SINUMERIK 840D ONE to NCU 720.3B pn with PLC 317-3 PN/DP type 6FC5372-0AA30-0AB0
- No. 1 SINUMERIK 840D ONE sl integrated run MYHM/pro type 6FC5800-0AP47-0YB0
- No. 1 CNC software 31-3
- No. 2 Numeric Control Extension
- No. 1 SINUMERIK 840D ONE SL 1 additional machining channel
- No. 4 SINUMERIK 840D ONE SL 1 additional spindle positioning axis
- No. 2 SINUMERIK 840D ONE SL 1 additional axis/spindle
- No. 1 SINUMERIK 840D ONE SL master/slave for drives
- No. 1 Tool management software
- No. 1 SIEMENS Extension Drive Control SINUMERIK 840D ONE SL, SINUMERIK 828D type 6SL3040-1NC00-0AA0
- No. 3 HT2 insertion boxes type 6AV6671-5AE11-0AX0 mounted on X1 X2 axis and tailstock
- No. 2 HT2 handheld pushbutton boxes type 6FC5303-0AA00-2AA0

PLC/CNC Message and Error Handling

- PLC wizard messages
- PLC alarm messages
- PLC machine confirmation messages
- CNC errors with Help (SIEMENS)
- Messages on part program

Axes designations

Axes can be named X1/Z1 for Carriage 1 and X2/Z2 for Carriage 2.

The dimension will be written after the equal sign between axes designation and dimension.

EG: G1

X1=145,34 Z1=444,80 F1

With dual-channel 2-bugs management it is possible to set channels with different machining.

(e.g. Channel 1 Jog Channel 2 Auto).

Selection of the working mode

The machine control panel is equipped with a pawl with three different coloured keys, which identify the different types of operators (who is allowed to access and to do what) and access levels (what the user can do).

The authorisation for a specific machine function is assigned in the control system (CNC) for each access level detected and in the Safety system (Safety).

The supply includes (already programmed):

- N°01 BLACK KEY
- N°01 GREEN KEY
- N°01 RED KEY

Function

Inexperienced Operator
Experienced Machine Operator
Trained Service Technician

BLACK KEY: Inexperienced Operator

- Can start the machine protected by Safety.

- Can work in manual and jog
- Can produce part.
- CANNOT MODIFY CNC AND PLC PROGRAMS
- Has password for non-expert operator

GREEN KEY: Experienced Operator

- Can start the machine protected by Safety.
- Can work in manual and jog mode
- Can produce workpiece.
- Can access and edit tool data.
- Has expert operator password

RED KEY: Experienced Mechanical and Electrical Technician

- Can perform any operation

There is an additional security level via dedicated password that can replace the above-mentioned keys.

Axes movement X1, Z1, ZS1 – Carriage 1

Wiring inside General cabinet (QG)

Axes movement is SIEMENS driven via synchronous motors controlled by digital drives powered by dedicated unit.

- SIEMENS machine control unit type 6FC5303-0AF22-1AA1
- X1-axis synchronous motor type 1FK7105-2AF71-1RA0 with 48 Nm stall torque
- Z1-axis synchronous motor (master) type 1FK7105-2AF71-1RA0 with 48 Nm stall torque
- ZS1-axis synchronous motor (slave) type 1FK7105-2AF71-1RA0 with 48 Nm stall torque
- SIEMENS filter type 6SL3100-0BE28-0AB0
- X1-axis digital drive type 6SL3120-1TE23-0AD0
- Z1-axis digital drive (master) type 6SL3120-1TE23-0AD0
- Digital drive ZS1-axis (slave) type 6SL3120-1TE23-0AD0
- Speed control and safe stop Safety SIEMENS
- 1000W conditioner
- Terminal boards
- 30m SIEMENS cables transducers (mobile laying) type 6FX5002-2DC10-1DA0
- SIEMENS power cables type 6FX50002-5CN56-1DA:

Low-capacity shielded power supply cables for EMC applications with control conductors.

Suitable for connecting frequency converters to motors, for use in cable drag chains with medium dynamic, electrical and mechanical requirements; in automatic machines, machine tools, robotics and general automation. Can be used in dry and damp environments. DESINA-compliant, UL/CS approved. Silicone-free. Complies with RoHS. Conforms to 2014/35/EU- (Low Voltage Directive) CE. Fully shielded with tinned copper braid with min. 85% optical coverage

Axes movement X2, Z2, ZS2 – Carriage 2

Wiring inside General cabinet (QG)

Axes movement is SIEMENS driven via synchronous motors controlled by digital drives powered by dedicated unit.

- SIEMENS machine control unit type 6FC5303-0AF22-1AA1
- X2-axis synchronous motor type 1FK7105-2AF71-1RA0 with 48 Nm stall torque
- Z2-axis synchronous motor (master) type 1FK7105-2AF71-1RA0 with 48Nm stall torque
- ZS2-axis synchronous motor (slave) type 1FK7105-2AF71-1RA0 with 48 Nm stall torque
- SIEMENS filter type 6SL3100-0BE28-0AB0
- X2-axis digital drive type 6SL3120-1TE23-0AD0
- Z2-axis digital drive (master) type 6SL3120-1TE23-0AD0
- ZS2-axis digital drive (slave) type 6SL3120-1TE23-0AD0
- Speed control and safe stop Safety SIEMENS
- 1000W conditioner
- Terminal boards
- 30m SIEMENS cables transducers (mobile laying) type 6FX5002-2DC10-1DA0
- SIEMENS power cables type 6FX50002-5CN56-1DA:

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Spindle movement and control

Wiring inside General cabinet (QG)

The spindle is driven by SIEMENS DC motor type 1GG5312-5WD40-Z overhauled with control via a four-quadrant inverter managed by AD14.

Its safety is handled by a 630° contactor type 3TF6833-1D and protected by SIEMENS 630A fuses.

- SINUMERIK Analog Drive Interface (ADIS) for 4 axes via Profibus
- DC converter for 4-quadrant drives input 3AC 400V 498° output dc 420V 600A type 6RA8085-6DV62-0AA0
- Switching reactor for phase converter type 6RX1800-4DK10
- Switching reactor for phase converter type 6RX1800-4DE04
- Rope for power connection 95MMQ
- Preload brake control for MI9 function
- Parking brake control
- Control and protection components
- Terminal boards

Lathe sleeve

Wiring inside General cabinet (QG)

- Lathe sleeve brushless synchronous motor type 1FT7108-5SC71-CB0 with stall torque 91 Nm, ventilated with brake
- SIEMENS digital translation drive type 6SL3120-1TE24-5AC0 for sleeve
- Sleeve thrust control depending on workpiece weight.
- Analog converters for thrust/weight display
- Digital instrument for displaying thrust/weight on the tailstock
- Thrust/weight manager with dedicated page on board CNC
- Commands Forward/Reverse CP, Forward/Reverse quill, Locking Unlocking CP on board tailstock.
- Automatic clamping search
- Control and protection components
- Terminal board
- Tip rotation control proportional to spindle rotation
- Frequency/voltage converter
- 30m SIEMENS cables transducers (mobile laying) type 6FX5002-2DC10-1DA0
- SIEMENS power cables type 6FX50002-5CN6-1DA

Low-capacity shielded power supply cables for EMC applications with control conductors. Suitable for connecting frequency converters to motors, for use in cable drag chains with medium dynamic, electrical and mechanical requirements; in automatic machines, machine tools, robotics and general automation. Can be used in dry and damp environments. DESINA-compliant, UL/CS approved. Silicone-free. Complies with RnHS. Complies with directive 2014/35/EU - (Low Voltage Directive) CE. Fully shielded with tinned copper braid with min. 85% optical coverage

Tailstock

- Tailstock translation synchronous motor type 1FK7083-2AC71-1RA0 with stall torque 16.5 Nm
- SIEMENS digital tailstock translation drive type 6SL3120-1TE21-0AD0.
- Dedicated electric box on tailstock with HT2 portable push-button panel type 6FC5303-0AA00-2AA0
- Tailstock thrust control according to workpiece weight
- Analogue converters for thrust/weight display
- Digital instrument for displaying thrust/weight on the tailstock
- Thrust/weight manager with dedicated page on board CNC
- Commands Forward/Reverse CP, Forward/Reverse quill, Lock Unlock CP on board tailstock. Possibility of executing these commands via video pages on the general push-button panel and via HT2 portable push-button panel
- Automatic clamping search
- Control and protection components
- Terminal board
- Removed Tip rotation control proportional to spindle rotation
- Inputs and outputs present for possible future installation of such control
- Frequency/voltage converter
- 30m SIEMENS cables transducers (mobile laying) type 6FX5002-2DC10-1DA0
- SIEMENS power cables type 6FX50002-5CN56-1DA:

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Bezel 1 – dwg. 175-42-6120.0-0

Bezel can be removed via 4 Harting plugs

- Junction box containing 4 Harting plugs and terminals
- Junction box containing push buttons for movement
- Three-phase AC motor direct start lunette drive 1.5 kW
- Three-phase AC motors direct start thrust cylinder movement 3 kW each (2 motors each bezel)
- Motor for lubricating the steady rest with state level controls and pressure switches
- Cylinder's thrust load cell management. In the PLC there are analogue boards for managing the load cells and their video pages. Load cell assembly at retrofitter's charge.
- Digital instrument for indicating cylinder thrust. Subordinated to the load cell
- Maximum current magneto-thermal switches for motor stop at maximum thrust
- Forward/Rear bezel, Forward/Rear Cylinder 1, Forward/Rear Cylinder 2 controls
- Dedicated electrical box on bezel 1 and bezel 2 named Bezel 1 and Bezel 2
- Control and protection components
- Terminal board

Bezel 2 – dwg. 175-42-6110.0-0

Bezel can be removed via 4 Harting plugs

- Junction box containing 4 Harting plugs and terminals
- Junction box containing push buttons for movement
- Three-phase AC motor direct start lunette drive 1.5 kW
- Three-phase AC motors direct start thrust cylinder movement 3 kW each (2 motors each bezel)
- Motor for lubricating the steady rest with state level controls and pressure switches
- Cylinder's thrust load cell management. Arrangement for possible mounting
- Digital instrument for indicating cylinder thrust. Subordinated to load cell management
- Maximum current magneto-thermal switches for motor stop at maximum thrust
- Forward/Backward bezel, Forward/Backward Cylinder 1, Forward/Backward Cylinder 2 controls
- Dedicated electrical box on board bezel 1 and bezel 2 named Bezel 1 and Bezel 2
- Control and protection components
- Terminal board

Workpiece head-holder – Spindle

- Junction box containing push buttons for clockwise and anticlockwise spindle rotation and range change, which can also be carried out from the general push button panel
- Motor for bezel lubrication, state level control and pressure switches
- Three-phase AC motors direct start spindle range change 1.5 kW
- Dedicated electrical box on board Headstock called CT
- Control and protection components
- Terminal board

Hydraulic management and X1 - Z1 axes lubrication

Managed by motor controlled by level states and pressure switches

Set as time or cycle from video pages

- Control and protection components
- Pressure control with pressure switches
- Axis lubrication system management independent and parameterizable from CNC (dedicated page, mode selection, times)
- Lubrication error management parametrizable by CNC (Dedicated page)
- Motor for lubrication
- Terminal board

General Switchboard Equipment

The power, management and control components of the machine are wired inside a painted sheet steel cabinet called QG (General Switchboard) complete with climate control systems. It includes:

- Main switch 800A SIEMENS type 3VA1580-5EF32-0AA0
- SIEMENS circuit breaker type 3VA9687-0FK21
- Differential module
- Deferred operation
- Phoenix Switch communication module
- Wiring accessories
- Terminal covers
- Power contactors
- Protection components
- SIEMENS Safety I/O modules
- CNC
- I/O profinet modules
- Spindle drives
- Distributors
- Bars system
- Screw terminals
- Im ET 200sp SIEMENS type 6ES7155-6AA01-0BN0
- SIEMENS input boards type 6ES7131-6BH01-0BA0
- SIEMENS output boards type 6ES7132-6BH01-0BA0

Handheld push – button panel

Further movement of the axes, spindle, tailstock, steady rests can be carried out via 2 handheld pushbuttons:

- No. 2 SINUMERIK Handheld Terminal HT2 with SIEMENS display type 6FC5303-0AA00-2AA0
- No. 2 SIEMENS connection box type 6AV6671-5AE11-0AX0
- No. 2 SIEMENS spiral connection cables type 6FC5348-0AA08-3AA0