



Surface grinding machine

Technical introduction

For type : BP 4080- 2AX

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Obsah:

1	Machine introduction	3
2	Technical specification.....	5
3	Machine instalation and layout	7
4	Standard configuration and optional accessories	8
5	Description of main parts	15
6	Control system.....	21
6.1	Control system X-Solution.....	21
6.2	Basic information about operation	22
6.3	Optional functions	24
7	Machine components.....	25
8	Foto and references of M - MOOS.....	Chyba! Záložka není definována.

1 Machine introduction

Surface grinders series BP are based on many years experience of the company M-MOOS with the overhauling and modernization of the grinding machines for automatic production. They are designed for efficient and precise grinding of the flat and contoured surfaces. The overall machine concept follows the company philosophy to provide modern grinding machines and technologies that will meet the requirements of industrial production in the 21st century



The high level of automation and precision predetermines surface grinders M-MOOS to use in many fields of automotive and aerospace industry, for manufacturing tools and molds, and also in the global engineering industry. A wide variability allows to create customer-oriented programs and turn-key technology for each customer. This system doesn't require any basic programming knowledge or ISO code, even when the complex shapes are grinded.



Key features

- + Intuitive and simple operation
- + Fast dialog type programming
- + Sophisticated and easy cycles
- + Re-grinding to precise dimensions
- + Rigid cast-iron construction machines
- + V-V Guideways guarantee high precision
- + Wide range of standard equipment
- + Comfortable operation and maintenance

Machine marking – grinding machine versions

	Number of driven axis	Longitudinal table feed	Dressing attachment	Functions
BP XXXX 2AX (standard)	2	Hydraulic with propotional valve, which allows control direction and speed from operation panel	3-poits mounted on table	Automatic grinding of surface and shapes. Automatic wheel dressing as a part of working program include compensation
BP XXXX 2AX (economy)	2	Hydraulic without propotional valve	3-poits mounted on table	Automatic grinding of surface and shapes. Wheel dressing has to be done with manual feed on dressing attachment, compensation after dressing has to be set and confirmed by worker on the display The lenght of grinding is set by manual dogs
BP XXXX 1AX (basic)	1 (vertical axe)	Hydraulic without propotional valve	1-poits mounted on table	Automatic grinding of surface , Automatic pitch grinding with hand travel to required.

	Number of driven axis	Longitudinal table feed	Dressing attachment	Functions
BP XXXX 3AX (multi-task)	3	Ball screw	3-poits mounted on table	Automatic grinding of surface and shapes. Automatic wheel dressing as a part of working program include compensation
BP XXXX 3AX (option)	3	V-belt		

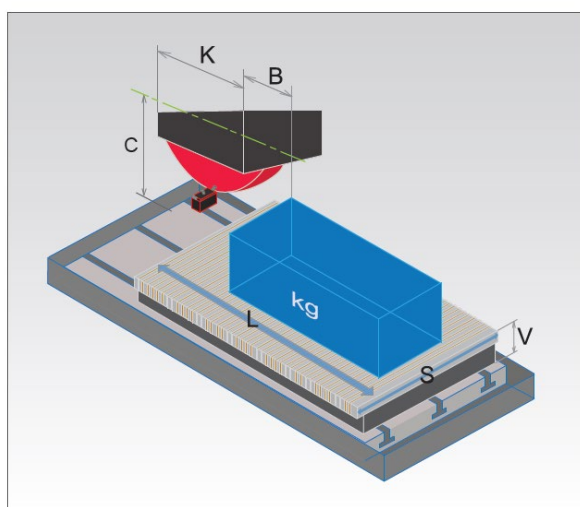
Ranking of each types

Type	Surface quality	Efectivity	Functions	Service Life	Purchase costs
BP XXXX 2AX (standard)	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
BP XXXX 2AX (opce economy)	●●●●●	●●●●●	●●●●○	●●●●●	●●●●○
BP XXXX 2AX (opce basic)	●●●●●	●○○○○	●○○○○	●●●●●	●○○○○
BP XXXX 3AX (opce multi-task)	●●●●○	●●●●●	●●●●●	●●●●○	●●●●○
BP XXXX 3AX (opce)	●●●●○	●●●●●	●●●●●	●●●●○	●●●●○

2 Technical specification

Type	BP-2550	BP-3060	BP-4080
Max. cross x longitudinal travel	280 x 600 mm	340 x 700 mm	440 x 900 mm
Spindle center height from table	560 mm	560 mm	600 mm
Grinding surface of table	250 x 500 mm	300 x 600 mm	400 x 800 mm
Table speed in longitudinal axis	1-25 (30) m/min		
Hydraulic motor	2 kW		
Working feed	1240 mm/min		
MPG step feed	0,001/0,005/0,01/0,05 mm		
Grinding wheel dimension	355 x 25 x 127 mm	355 x 38 x 127 mm	
Grinding wheel cover dimension	450 x 155 mm		
Spindle motor	2,2 kW	3.7 kW/5HP	
Spindle speed	plynulá regulace 2400 ot/min		
Machine net weight	2500 kg	2600 kg	3000 kg
Machine gross weight	2900 kg	2600 kg	3600 kg

Working area



Max. rozměr obrobku = rozměr magnetického stolu

Distance between spindle axis and surface of working table

C max = 560 or 600 mm

Workpiece height = 600 – Wheel radius – height of magnetic desk = 600-177,5 – 85 = **337,5 mm**

Length of wheel cover : K = 400 mm

In frequent dressing wheel has to be considered a safe distance B between the workpiece and the wheel cover, to avoid collision during the wheel dressing. Or choose another type of dressing devices

Type	Loading capacity			Magnetic table		
	Max. loading of working table	Weight of magnetic table	Max. workpiece weight	Lenght (L)	Width (S)	Height (V)
BP-2550	250~350 kg	65 kg	185 ~ 285 kg	500 mm	250mm	81 mm
BP -3060	250~350 kg	95 kg	165 ~ 255 kg	600 mm	300 mm	81 mm
BP -4080	500~730 kg	170 kg	330 ~ 560 kg	800 mm	400 mm	88 mm

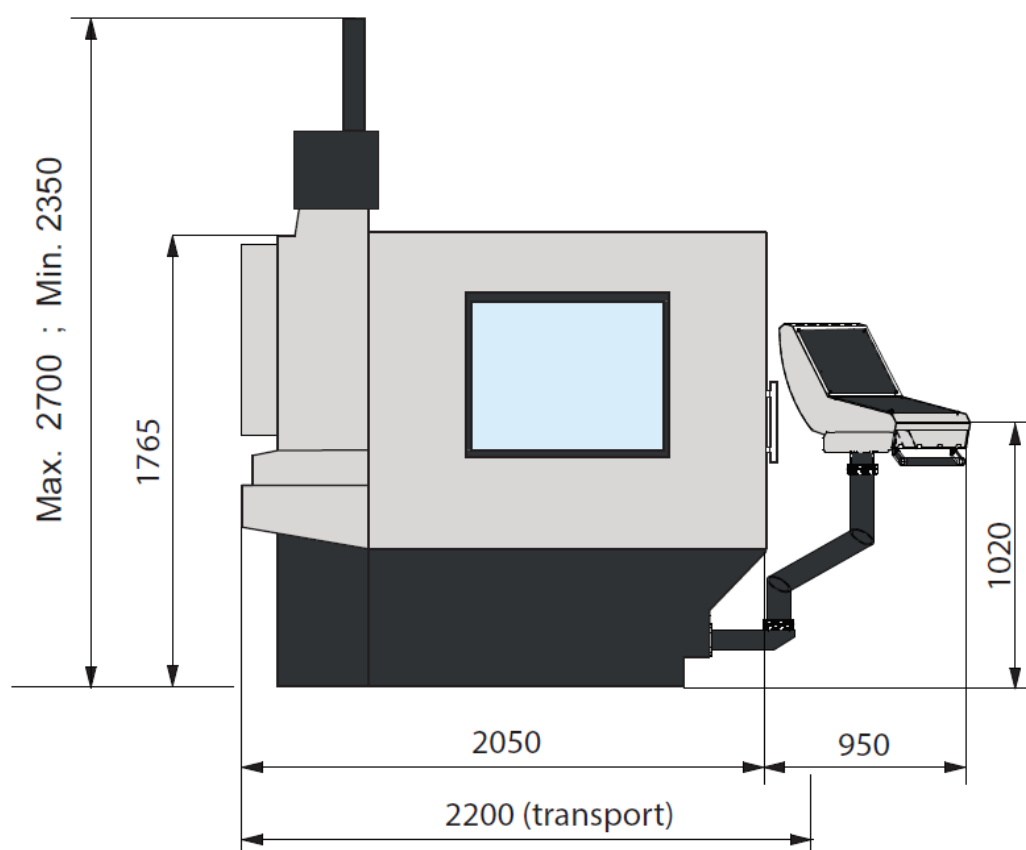
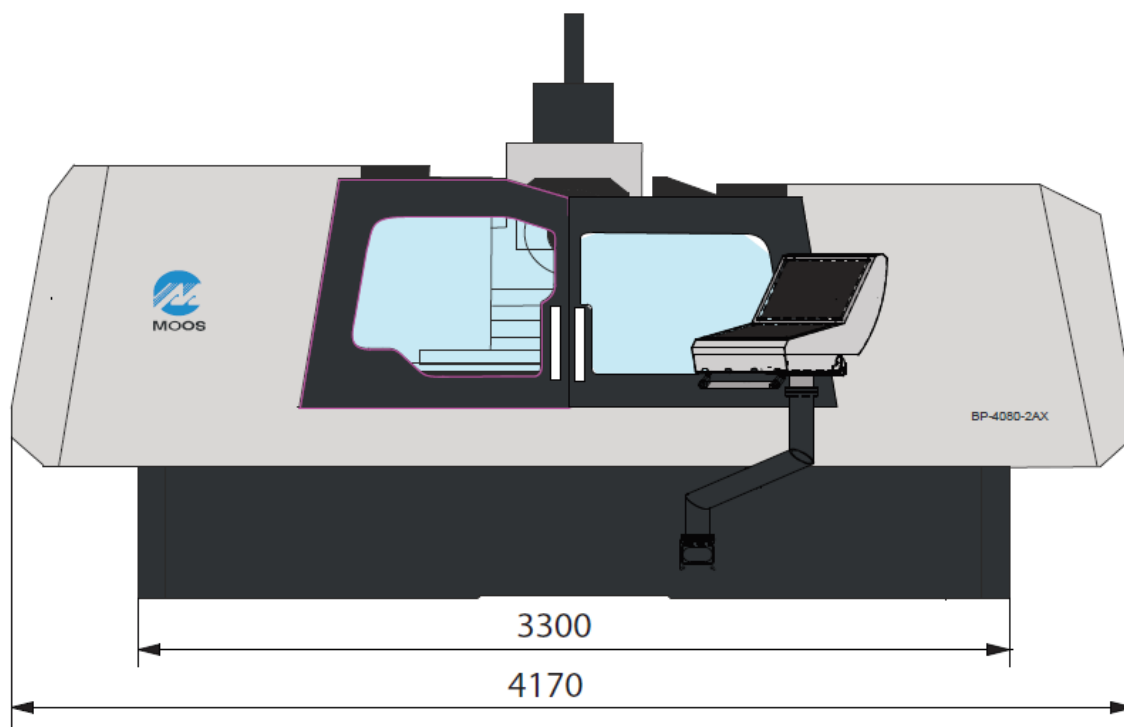
Main electric components

Type	Spindle motor	Hydraulic pump motor	Coolant pump motor	Servomotor cross axic	Servomotor Vertical axix	Oil tank lube motor (capacity 2l)
BP-2550	2,2 kW	1,5 kW	0,55 kW	3,9 kW	3,9 kW	0,013 kW
BP-3060 BP-4080	3,7 kW	1,5 kW	0,55 kW	3,9 kW	3,9 kW	0,013 kW

Hydraulic systém and lubrication system

Model	Capacity of hydraulic tank	Capacity of lubrication tank
BP-serie	60 L	2L

3 Machine instalation and layout

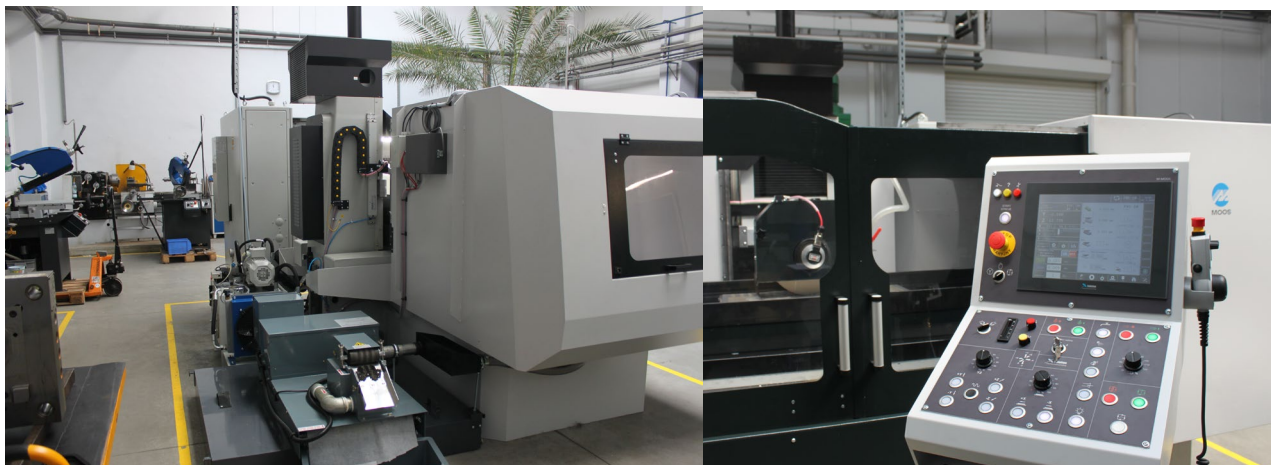


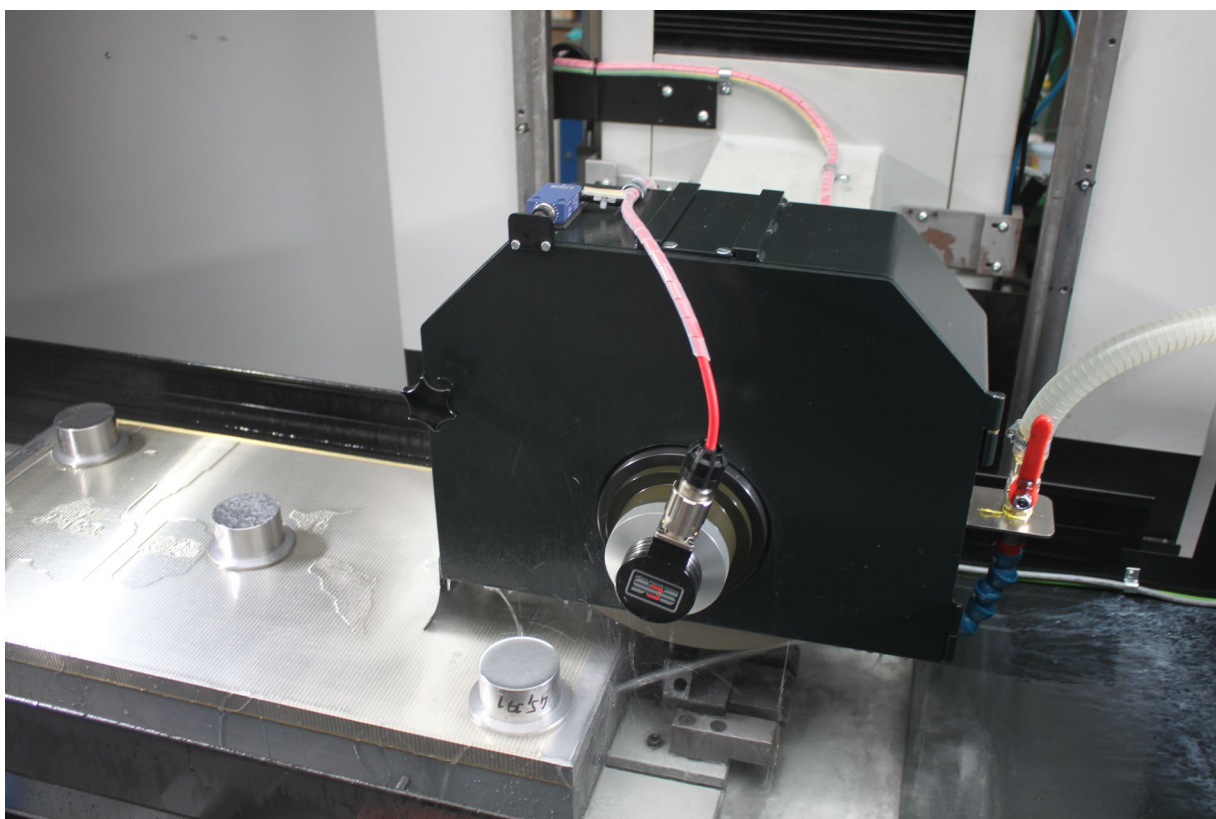
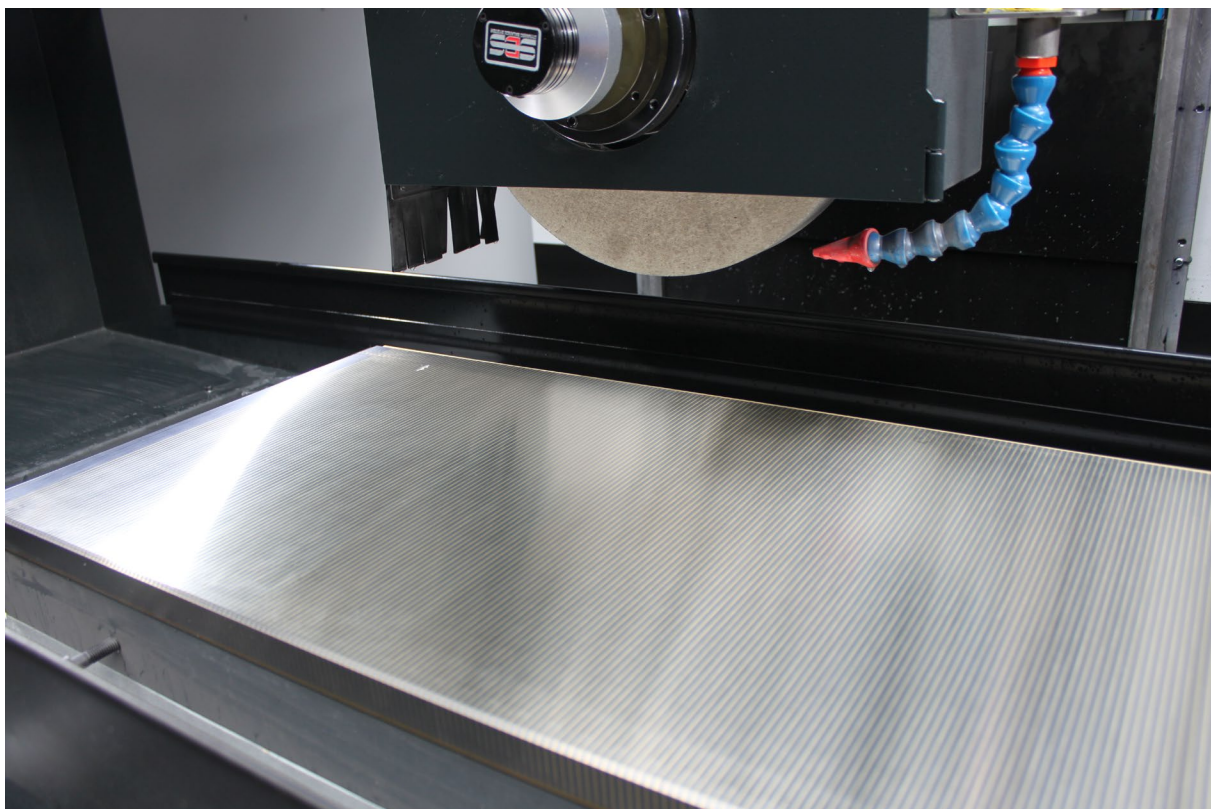
Machine placement

It is very important to install the grinder in the correct place to be able to achieve a high working accuracy. Best location:

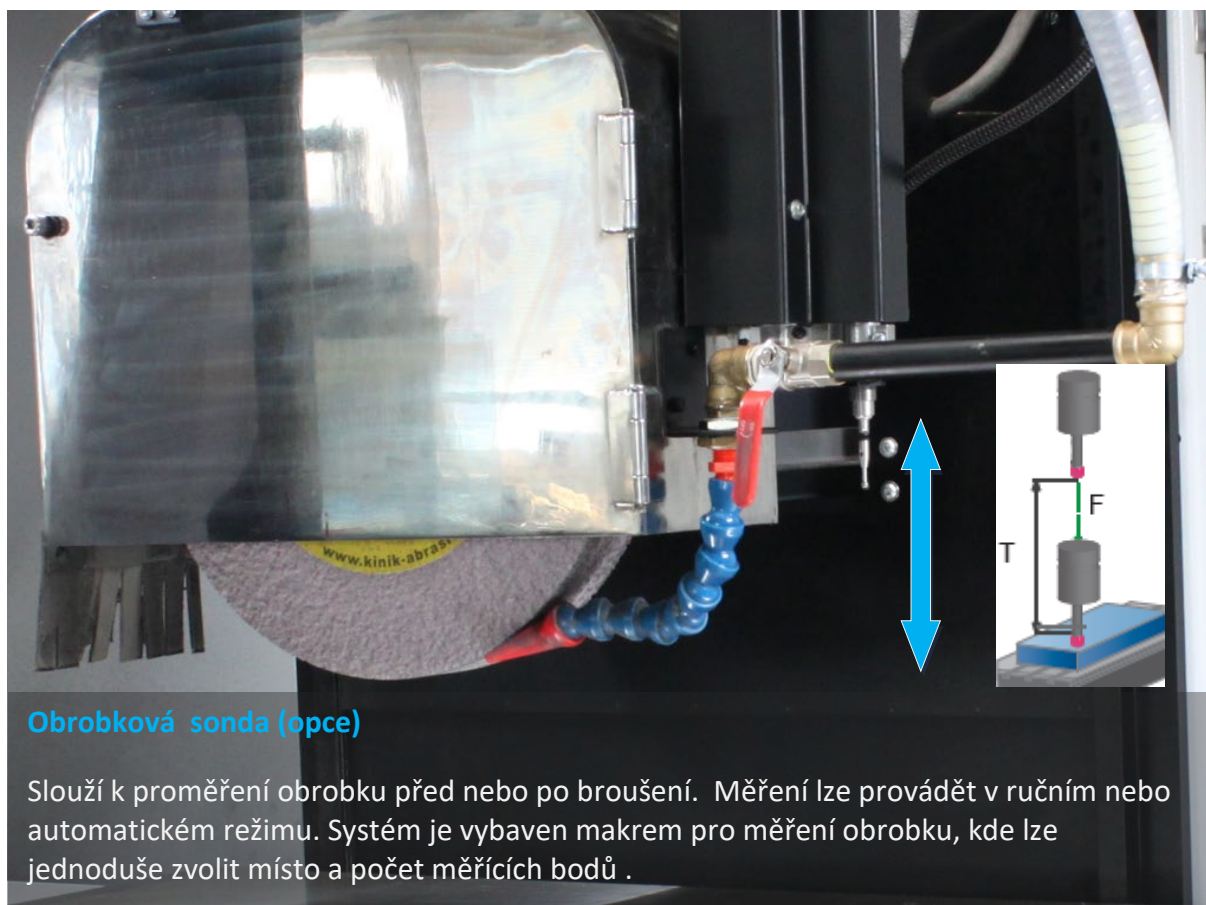
- A place with minimal fluctuations in temperature
- Do not install the machine where the surrounding machinery departs chips and dirt
- Install a place without vibration, away from compressors, presses, planers and other machines, which can cause vibration, unless sufficiently strong base or near the vibration source, than the new base should be done or install anti-vibration protection.

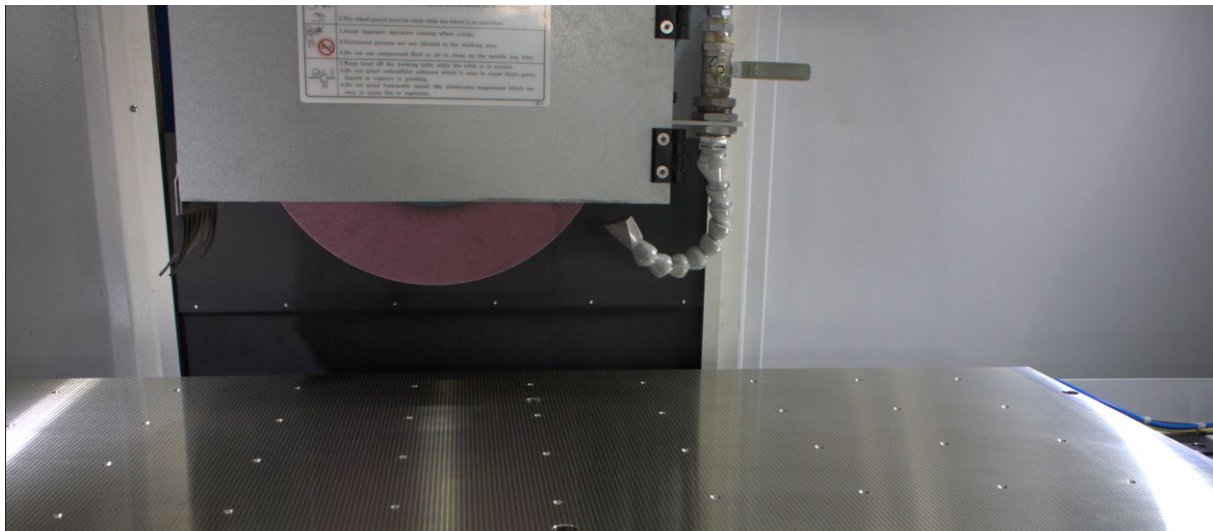
4 Standard configuration and optional accessories





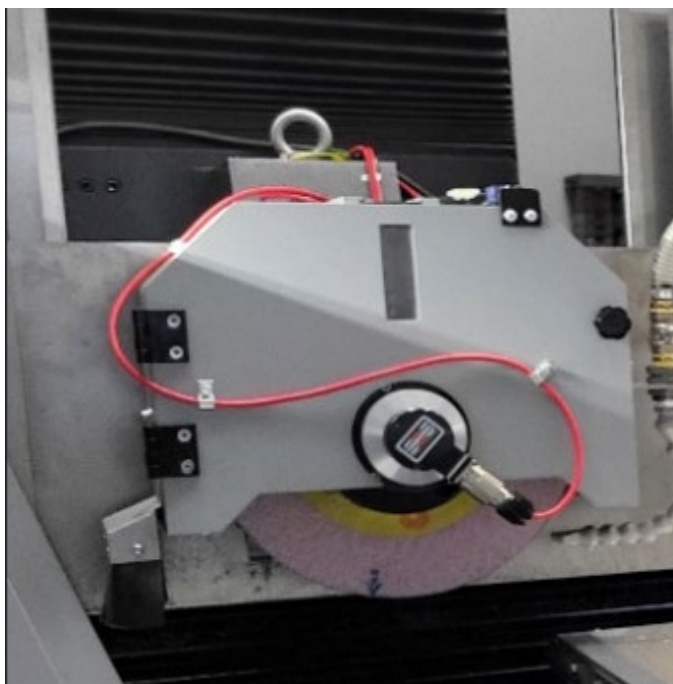
Item	Standard configuration
1	Working table
2	Electromagnetic chuck
3	Demagnetizer
4	Center height from working table 600 mm
5	Grinding wheel + flange
6	Spindle speed 2400 ot/min, frequency converter
7	Spindle motor 3,7 kW
8	Hydraulic longit. Table feed, proportional valve
9	Servomotor Schnider in axis Y a Z
10	controller. X-SOLUTION +12" color touch display
11	Cooling systém with paper and magnetic filtr, tank capacity 100 l
12	Operation manual in EN
13	Cross and V-V type
14	Liner scales in Y and Z, accurancy 0,001 mm
15	Dressing unit mounted on table
16	Ouput chaneels flushing + watter gun
17	Semi-closed guarding with 2 doors
18	Automatic lubrication system
19	Maintance tools and box
20	1 led working led lamp
21	MPG- Electric hand wheel
22	Balance stand + arbor





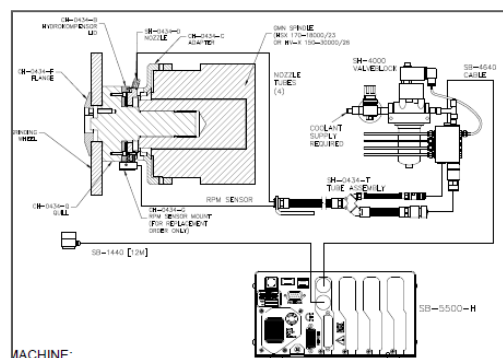
Elektromag. stůl s jemným dělením (opce 1) a pneumatickým nadlehčením (opce 2)

Pro naložení menších obrobků nebo pro obrobky, které nemají rovný povrch doporučujeme osadit brusku magnetickou deskou s jemným dělením. Tím je zaručeno bezpečné upnutí obrobku. Jako další opci lze zvolit pneum. odlehčení obrobku při demagnetizaci. Tento systém snižuje efekt „přilepení“ obrobku k mag. desce.



Aut. Wheel Balancing systém SBS (opt. 1)

Improves workpiece quality with automatic balancing down to 0.02 microns. Provides longer life for grinding wheels, dressing wheels and spindle bearings.



Aut. Wheel Balancing systém (opt. 2- type hydro)

Thanks to the direct-to-back mounting, it does not limit the stroke or the working space.

The Hydrokompenser system uses process coolant, water or other available liquids for balancing. The four-chamber balancing disc is integrated into the disc holder or the grinding disc flange so that the correction medium can be injected through the nozzles



Aut. Palet changing system– APC (option)

Automatic pallet changer in grinders replaces the fixed electromagnetic plate with a permanent one, but has the advantage of rapid workpiece change by allowing the preparation and positioning of another workpiece while one is being machined. This significantly speeds up the machining process.

Item	Optional accessories
A	Additinal price of electromagnetic table with fine pitch 1+1
B	Coolant tank capacity 250l
C	Coolant tank capacity 300l
D	Additional coolant jet
E	Spare paper role
F	Dust suction system Raven X-Cylone RJ-2; 250W,1000 m ³ /hour
G	Dust suction system Raven X-Cylone RJ-3; 500 W,1000 m ³ /hour
H	Dust suction system LOSMA DARWIN 1200; 1,5 kW, 1270 m ³ /hour
I	Dressing unit over the wheel - type EM (elektric cross feed, manual vertical feed)
J	Dressing unit - type Auto (elektric cross feed, servomotor in vertical axe)
K	Rotary type dressing unit DR-KAISER - for profile grinding
L	Svivel type dressing unit with height preseting
M	Economy version without proportional valve
N	Table movement control by timing belt and servomotr
O	Table movement control by servomotor and ball screw

Q	Measuring systém without linear scales
R	Full splash guarding with 2 doors
S	Stainless steel cover of grinding wheel
T	Portable electronic balance systém of grinding wheels
U	Linear guideways in cross axis
W	Automatic wheel balancing system
X	APC – Automatic pallet changer



According to the government decision, all machine placed on the market in the Czech Republic and Europe have to meet the following guidelines and government regulations:

- Law no. 22/1997 Coll. amended
- Government Decree no.176 / 2008 Coll., No. 616/2006 Coll.
- Directive 2006/42 / EC, 2004/108 / EC, 2006/95 / EC, 2009/105 / EC

If the grinding machine meets the above constitution, then from the standpoint of safety all perfect order. However, the above mentioned directive and regulation does not address the special regime grinders. We deal with this issue until the standard is directly related to the grinder

- Harmonized standard - EN 13218 + A1 / 2008

In order grinder meet standard EN 13218 + A1 / 2008 shall be selected following accessories:

- **Extraction systems for emulsion mist with dirt**

Grinding BP series to tap **extraction comply with standard EN 13218 + A1 / , 2008**. It's up to you to what level of security you choose. It is you who will invest in your own health or the health of your employees

5 Description of main parts

Main parts

Construction of machine is based on the classic concept of the table type surface grinding machines, the cross displacement (Z axis) is performed by table and also longitudinal feed is performed by working table (X-axis). Vertical displacement of the headstock (Y axis), is implemented on the sliding guide surfaces which are located on the front of the column

All main parts of the machine such as, bed, table, stand, sleds are made of high quality certified čast iron, column has a hexagonal ribs to ensure high rigidity. Castings are annealed twice with an emphasis on removing any metallurgical tensions. A characteristic feature of the casting base, which is made of one piece.

Bed



Undivided base made from one piece

The machine bed is made of one piece. This ensures maximum stiffness of the entire system of the machine and reduces unwanted twisting, which is typical for the bolted connections. Thanks to this concept can achieve high working accuracy.

Guideways



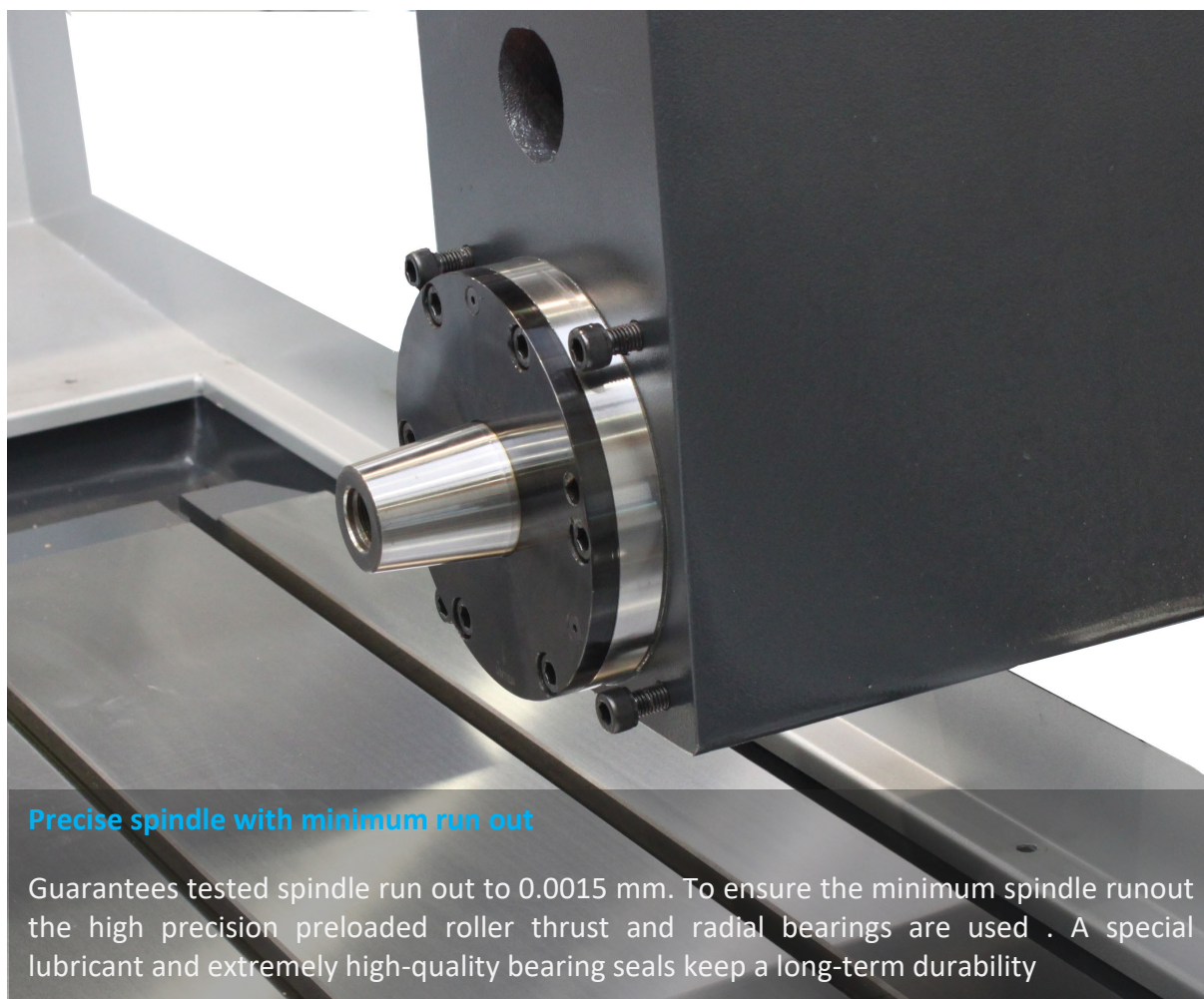
V-V guideways as a guaranteed perfect linear accuracy

Movement in the cross and the longitudinal axis is implemented on the sliding guide surfaces of the V-V type. This prismatic guideways ensures perfect linear accuracy. Moreover, this concept provides a much longer life and working accuracy than when grinding e.g. with roller guidance or with one V.

Excellent abilities for absolutely precise grinding.

The surface of the guide surfaces of the table and slide is hand-scraped, thus ensuring high accuracy and achieve a perfect seating pattern between the contact surfaces. High rigidity of moving system, large loading capacity of table and the lowest possible value for warping and twisting - it is a guarantee for maximum productivity with high quality grinde surface and constant accuracy.

Headstock



The spindle is connected with the motor via a flexible coupling to ensure the transmission of rotary motion without vibration. The integrated frequency converter enables you to change the spindle speed continuously, thereby guaranteeing a constant circumferential speed

Spindle speed	Spindle change	Spindle motor	Driven	Spindle taper
2400 ot/min	Steplees with frequency inverter	3 kW	Direct through clutch	6°1'38"

Grinding wheel (Standard)

Grinding wheel diameter: 355 mm / Max. 400 mm
 Width of grinding wheel: 25/38 mm
 Diameter of inner hole: 127 mm
 Marking: 32A 46J 11V 7NP1
 Use: *grinding of semi-hard steel, no better than 0,4/0,6 Ra*

Hydraulic system – Longitudinal travel of working table

Two separate hydraulic cylinders are anchored at specific positions of the piston rod, whereby improved rigidity and stability. This creates a very stable and smooth movement of the table and eliminates its swimming. The speed of movement while damping in each reversal points is controlled proportional valve. Reverse limits are set on the operation screen. Temperature stability is guaranteed independent oil cooling equipment.

Hydraulic unit and pump are separated from the main part of the machine, which provides the following benefits:

- a) Preventing superheated entry of oil into the machine, which causes stretching and distortion, which can affect the final accuracy of the workpiece.
- b) prevents any vibrations and oscillations, which are produced by hydraulic pump and transmitted to the base of the machine and causing a flatter track on the workpiece.

Hydraulic system filtration is necessary part, which keeps the oil without impurities and prolongs the life of the individual components of the hydraulic circuit.

Lubrication system of the machine.

The machine is equipped with an automatic pressure lubrication system, which through a dispenser with a filter supplying important machine components: the sliding surface of the column, ball screws in the vertical and cross axis, and a guideways surface cross axis. The time interval is controlled by the PLC of the machine. Longitudinal guides have their own unit and the circuit. For the spindle bearings used special grease with exactly the given amount, which does not need to be supplemented. The oil level is controlled by the device. At a low state signal is issued in the form of error message is stopped and the machine operation. Oil supply is also controlled by the pressure sensor.

lubrication tank:



Mazací agregát 2 – objem 2 litry
ztrátové mazání

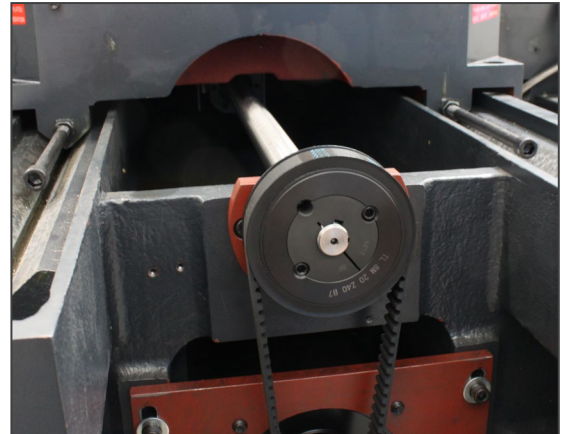
Vertical and cross travel

The machine is driven by servomotors in the cross and vertical axes. The individual axes are equipped with precision ball screws, which provide long-term working accuracy.

Cross and vertical axis is equipped with an optical linear scale with an accuracy of 0.0001 mm, which ensures high positioning accuracy. Perfect protection of rulers is ensured by supply of compressed air directly into the ruler. The air is filtered by a system Heidenhain DA 400 that ensures filter particles down to 0.01 microns

For the installation of the machine is required to supply clean compressed air with a pressure of 0.6 MPa. Supply is at the back of the machine

The machine is equipped with an electronic handwheel, which can perform a manual shift in each axis. Other Operations feed is via a button on the control panel in JOG



Elektromagnetic table (chuck)

There is an electromagnetic table with the control unit for regulating the clamping force and the demagnetizer in standard equipment. Controls are mounted on the control panel. This system allows choose optimal force for clamping, so as to avoid distortion during the clamping process. Adjusting of clamping force is in the range from 0 to 100% of the nominal magnetic performance.

Dressing attachment

3-point dressing attachment mounted on the table (standard)

Standard 3- point dressing device that is placed in the corner of the worktable. Adjustable stand allows you to change the height as needed. Dressing cycle can be activated automatically from the program without interrupting the grinding process. The wheel moves to the dressing device automatically and wheels dressing with subsequent compensation is executed.

Dressing attachment over the grinding wheel - type EM (option)

Cross travel (forward / reverse) of dresser is driven by a motor and controlled through the touch screen. Vertical displacement is controlled manually. Material removal is deducted on a scale with a resolution of 0.01 mm. After dressing, you can enter a compensation value actually removed from the wheel. It doesn't allowed to dress shapes

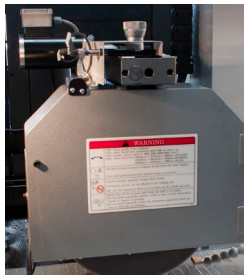
Dressing attachment over the grinding wheel - type AUTO (option)

Cross travel (forward / reverse) of dresser is driven by a motor and controlled through the touch screen. Vertical displacement is driven by a servomotor and ball screw. It enables efficient and

automatic wheel dressing as a part of the grinding cycle including automatic compensation. Suitable for grinding plane surfaces, which require frequent wheel dressing. It doesn't allowed to dress shapes.

Rotary disc Dr. Kaiser (option)

The device placed on a workbench. Dressing cycle can be activated automatically from the program without interrupting the grinding process. The wheel moves to the dressing device automatically and wheels dressing with subsequent compensation is executed. The main advantage is a long-term accurate and efficient form dressing wheel.



Type EM



Type AUTO



DR. KAISER

Example of dressing cycle D02-20.



Dressing cycle is consists of rough and fine dressing + travels to clean wheel

C = total removal of the wheel when dressing. Enters the removal mm in radius value. E.g. 0.040 mm - diameter of the wheel is thus reduced by 0.080 mm

B = The removal of the wheel for fine dressing. Enters the removal mm in radius value. E.g. 0.005 mm - diameter of the wheel is thus reduced by 0.01 mm

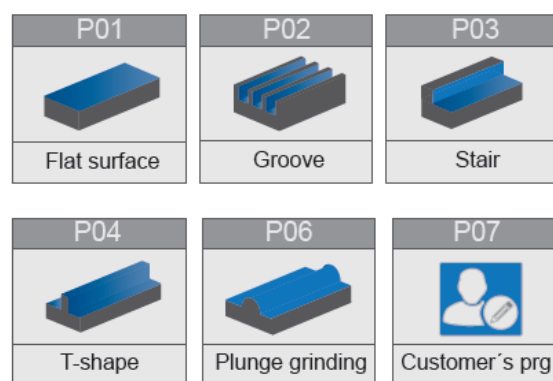
Removal during roughing = $C - B = 0.040 - 0.005 = 0.035$. It is automatically calculated by the system

6 Control system

6.1 Control system X-Solution

This 3rd generation of our own control system comes from the previous systems developed for the purpose of modernization of grinding machines for automatic production. X-Solution means a lot of new options, which is reflected in the standard equipment of the whole system. It is based on a touch screen, intuitive interface and dialog type program making sophisticated grinding cycles for different workpieces

- + Intuitive and easy operation
- + Reduction of the time delays
- + Faster program creation in a few steps
- + Possibility to add a new customer's cycles
- + Reliable system with on-line diagnostic
- + Sophisticated system management



Standard functions

Dialog type program making
 12" touch screen
 2 base grinding cycles for surface
 4 base cycles for grooves grinding
 3 cycles for grinding of stairs type workpieces
 3 grinding cycles for T - shapes
 Rough grinding
 Fine grinding
 Wheel spark-out
 Re-grinding function to final precise dimension
 Cycles for grinding wheel dressing
 Automatic compensation after dressing
 Tabular visualization during grinding
 Displaying of speed, feed rate and cutting speed
 Tool table with a direct selection and edit
 3 operating modes: Jog, Manual, Auto
 2 higher-level modes: operation and adjustment
 Time and Date
 Alarms and user reports
 Technological information
 Program control buttons CYKL START, HOLD, RESET

Program screen menu




Informative screen about grinding process


6.2 Basic information about operation

The main element of communication between the operator and the machine is 10 " touch screen that is displayed when the machine is turned on. Below mentioned screen and procedures introduce you the procedure for programming elements and possibilities of the system.




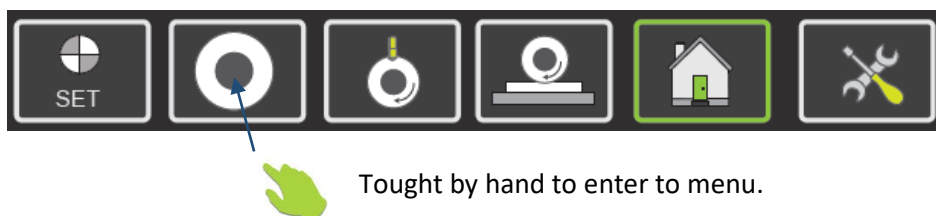
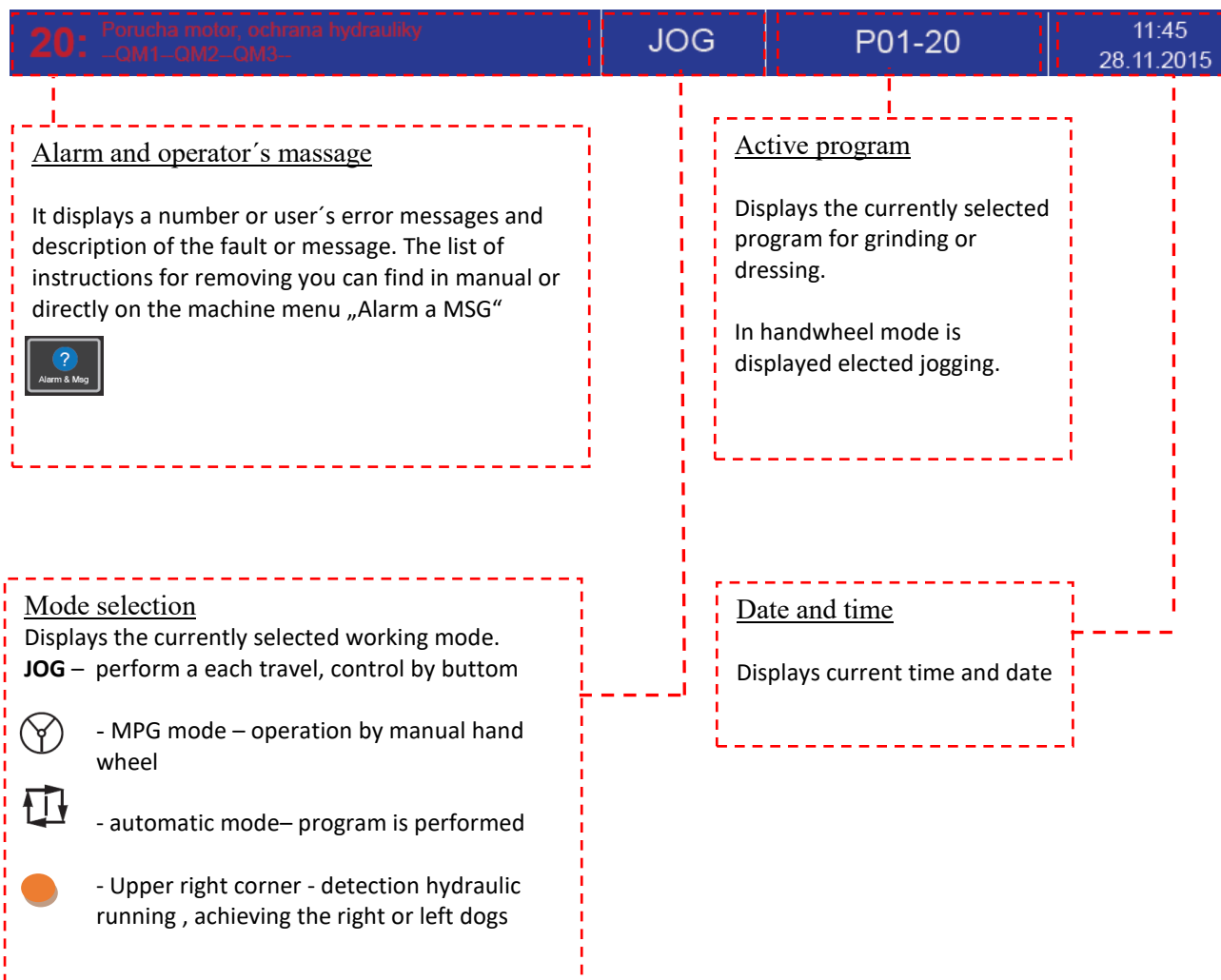
Icon Color meaning

Example of **active** menu and icon  = green frame;

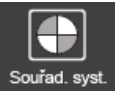


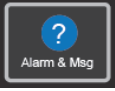



Example of **inactive** menu and icon  = gray frame

Some icons and menu are blocked when machine is running in automatic mode.

Example of **blocked** menu and icon  dný rámeček

How to enter to menu – operation of touch displayInformation panel

Example of additional menu in home screen

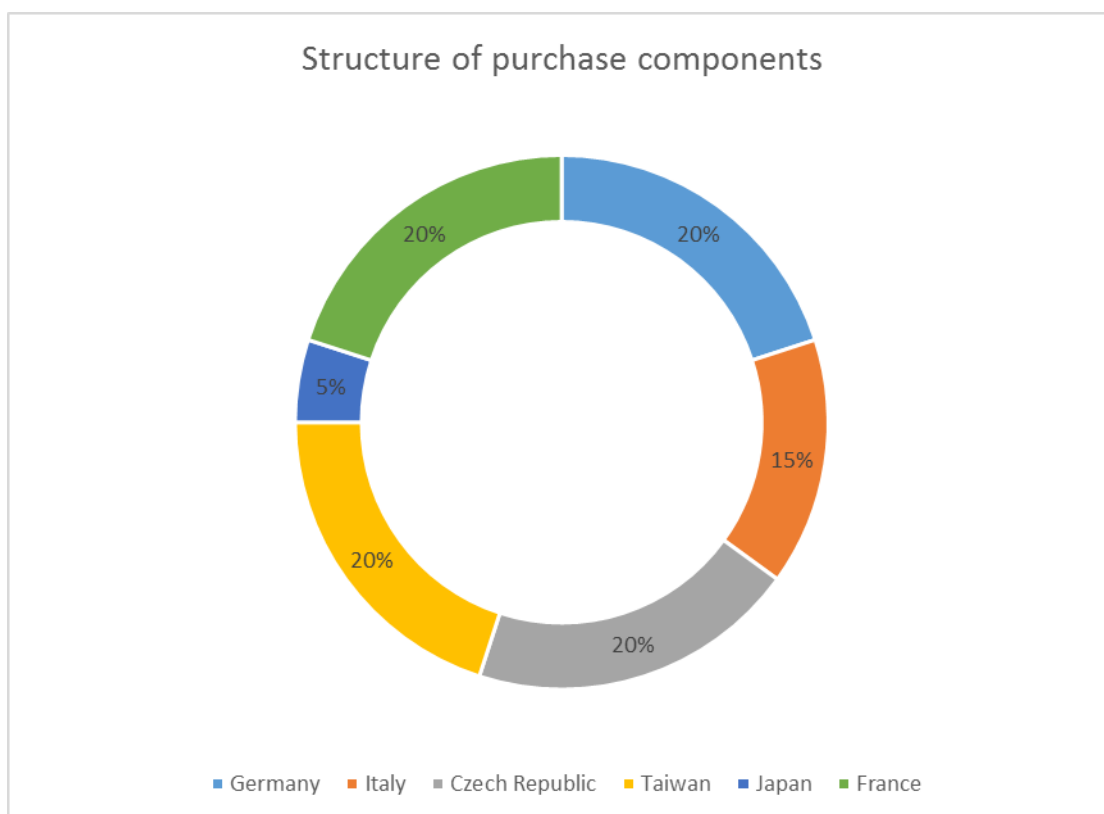
Software key	Function
 Souřad. syst.	Viewing all three coordinate systems - the screen is only for a better view, there can not be adjusted coordinates
 Tech info	Displays screen with technical data for grinding
 Calculator	Calculator
 Alarm & Msg	Displays history of alarms and error messages for the operator
	Displays the screen describing lube hubs
	Displays service intervals
	Displays contact and service information

6.3 Optional functions

- remote diagnostics tools
- 12" tough display
- production management
- customer's macro
- tough probe and measuring cycles
- 4-th axis – totary table

7 Machine components

Our business and trade policy is based on honest work and fair dealing. We like the things, which are absolutely clear and tidy. Suppliers play an important role in the whole process and have a major impact on reliability. Therefore, as the only manufacturer understandable by openly declaring the production process machines and origin of the individual components of the first contact with the customer.



Item	Supplie
Ball screws	KSK Precise Motion, a.s, Czech Republic
Drivers and servomotors	Schneider Electric, France
Belt and pulley	Bea Ingranaggi S.P.A. , Italy
Linear Scales	ESSA Praha, Czech Republic
Clutch of vertical gear	Japan
DA 400 air filtration	HEIDENHAIN, Germany
Elektric components	Schneider Electric, France
Main motor	Siemens, Germany
Hydraulic pump	Berarma - Italy
Propotional valve	ATOS - Italy
Control system	Schneider Electric, France, PLC and displays : M-MOOS, Czech Republic
Bearings for vertical and cross axis	FAG, Germany
MPG panel	EUCHNER, Germany
Část iron parts and sceleton	PROTH INDUSTRIAL, Taiwan
Elektromagnetic table	Guang Dar Magnet Industrial, Taiwan
Spindle	Zakázková výroba, Taiwan
Coolant tank	Zakázková výroba, Taiwan
Lubrication tank	Chen YING, Taiwan
Oil Pressure gauge	TRIBOTEC, Czech Republic
Safety switches off end stops	Schneider Electric, France
Safety door lock	Pizzato, Italy

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