

isel – Portal – und Flachbettanlagen

EuroMod F / EuroMod P / FlatCom / OverHead / GFV / GFS

isel - Gantry and Flat-Bed Machines

EuroMod F / EuroMod P / FlatCom / OverHead / GFV / GFS



EuroMod F



EuroMod P



OverHead



FlatCom

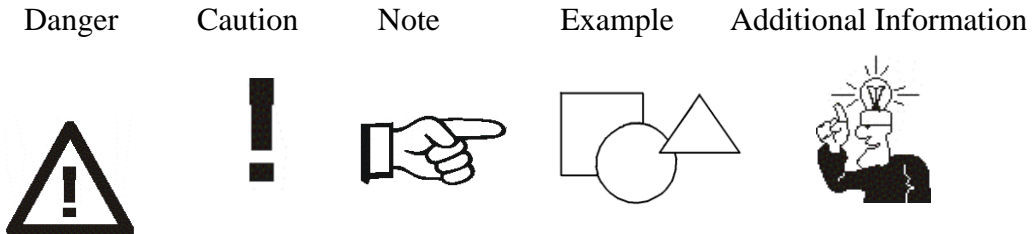


GFV

Betriebsanleitung / Instruction Manual

About this Manual

Various symbols are to be found in this Manual to indicate quickly important information.



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In spite of all care, typographical errors and mistakes cannot be ruled out.
Suggestions for improvement and notes with reference to errors are always welcome.

isel machines and controllers are CE conform and are marked accordingly.
Any other machine parts and components to which the CE safety guidelines are to be applied must only be commissioned if all relevant requirements are fulfilled.

isel-automation KG will not assume any liability if you have made any modifications to the machine.

The EMC test shall only be valid for the original configuration of the machine as delivered from works.

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1 Introduction

The *isel* gantry and flat-bed machines EuroMod P, EuroMod F, OverHead, FlatCom, GFV and GFS are tried and tested CNC machines, offering a broad variety of possibilities for the three-dimensional machining of workpieces.

The machines are built and equipped in various sizes and designs. They are based on standard profiles which are cut to size and can be assembled in different ways, together with drive elements which are configured according to the particular requirements; the final appearance of the machine can thus be very different.

All machines have the same interior components, i.e. there is no difference in their general mechanical design nor in the electrical control system. Each individual machine is tested for many hours prior to delivery.

To work with the machines described herein, it is imperative to possess basic knowledge in the CNC technology and in PC applications, as well as a necessary portion of creativity.

Please read these brief instructions now so that you can

- install the machine properly;
- work safely, quickly and efficiently;
- avoid possible hazards to other persons;
- and thus utilise the full performance of the machine.

The instructions given in this Manual refer to the standard scope of supply with which the machine is ready for operation. You may therefore simply ignore any variants (e.g. accessories and software) which do not pertain to your machine.

Before installing and commissioning any software or the accessories, please refer also to the additional manuals and instructions specified in the list of references.

2 Use as Prescribed

Our gantry and flat-bed machines are CNC-controlled machine tools with several linear axes and one or two optional rotary axes. The motor output stages are controlled by a PC-based control system. The control and power electronics for all axes are accommodated ^{*} in a control cubicle by default.

- The CNC machine is designed for use in dry rooms (workshops, laboratories or the like) and industrial enterprises (max. ambient temperature 40°C).
- The machine is suitable for milling, drilling, cutting, engraving, proportioning, measuring, positioning and many similar applications.
- You may mount the most varied suitable machining tools or measuring systems for the applications mentioned above.
- Suitable machining materials are light metal, plastics, wood, glass, p.c. board materials or the like.
- Materials which produce hazardous gases when processed are deemed to be impermissible materials.
- The machine is prepared for mounting of an extraction system. This extraction system is intended for use with dry dust (wood, p.c. boards, etc.).

^{*} The control cubicle is an integral part of the complete systems (but can also be delivered separately as part of the accessories) and is usually mounted on the right-hand side of the machine frame by default. The number of motor output stages is configured according to the specific customer requirements. For systems without control cubicle, only the sections pertaining to the master machine shall apply.

3 Safety Notes

- Do not run the machine in an atmosphere subject to the hazard of explosion!
- The machine is enclosed on all sides. The enclosure protects you from moving tools, reduces the noise level and retains the swarf. The cover is locked and cannot be opened during machining. This safety device must neither be removed, nor be modified.
- Always ensure that the workpieces are mounted securely.
- The CNC operator panel possesses an EMERGENCY STOP switch for emergency cases, interrupting the power supply to the power electronics (motor output stages) and to the frequency converter for the main spindle drive. The shutdown is performed according to Stop category 1 (controlled shutdown and subsequent interruption of the power supply to the drives).
- Only qualified and instructed persons are allowed to use the keyswitch on the CNC operator panel, since the test mode involves an increased injury hazard.
- The spare key must be kept under lock and key.
- Provide for sufficient ventilation in case of dust or gas formation from the machining of the materials.
- Do not use running water for cooling, but only a cooling system (see "Accessories") which produces its cooling effect with water mist or air. Make sure that no drips are formed and able to flow under the clamping plate.

4 Scope of Supply

The standard scope of supply of our gantry and flat-bed machines includes:

- Aluminium base frame with
 - o panelling
 - o suction hose and fittings
- Drive axes including limit switches
- Operator panel including a 17" monitor, a keyboard and a mouse
- Control cubicle including
 - o Mains power cable / line filter
 - o Main switch
 - o Cable tubing with interconnecting cables 'control cubicle < --> machine' and 'control cubicle < --> operator panel'
 - o Motor output stages / servo amplifier
 - o CNC controller
 - o Safety circuit module (further referred to as "SC module")

The control software ProNC / Remote including MotionControl software is supplied as an option.

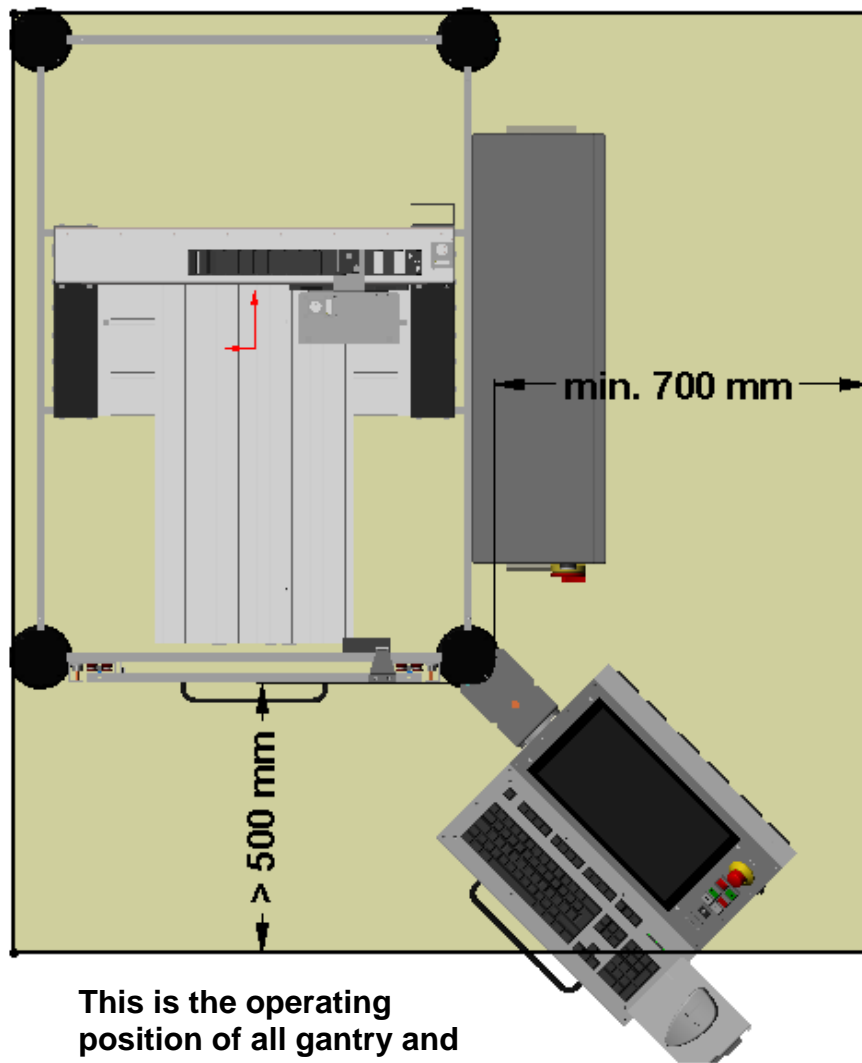


For the exact scope of delivery of your particular machine, please refer to your delivery note.

5 Erecting and Connecting the Machine

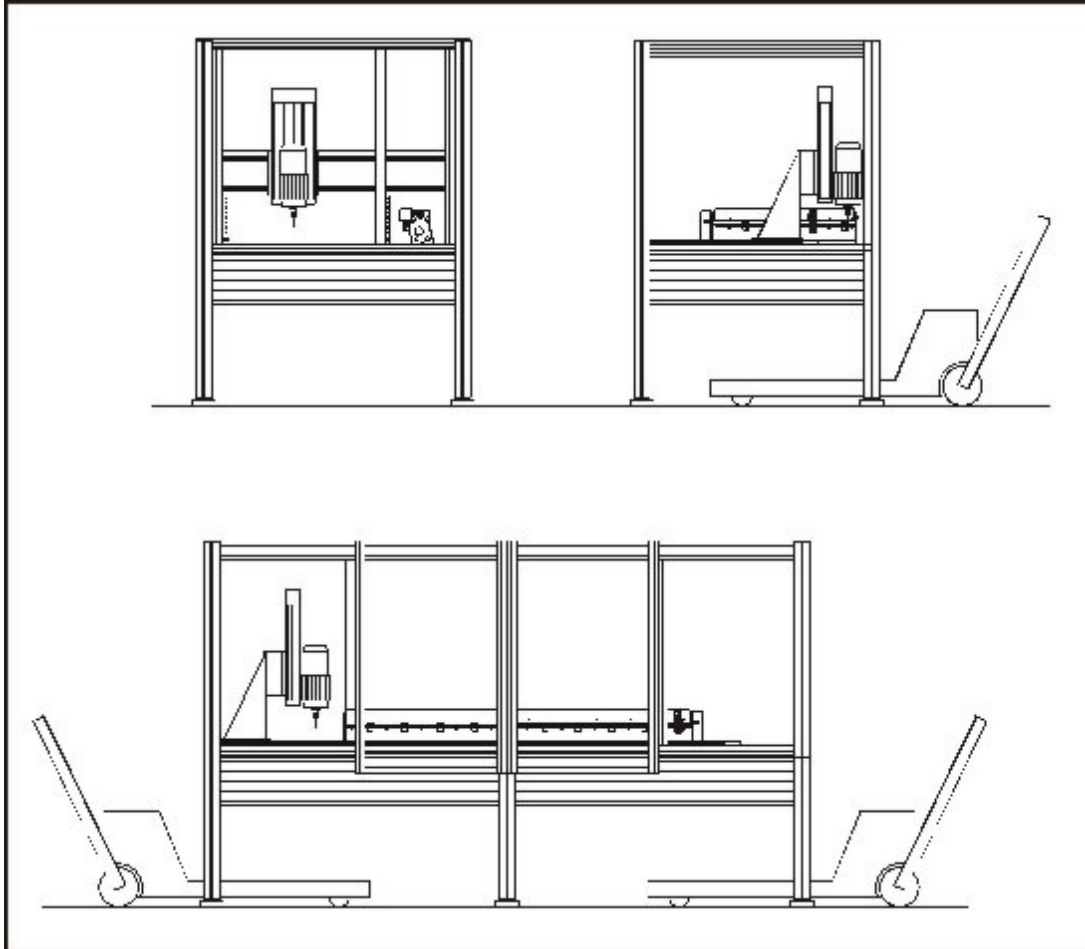
5.1 Space requirements

The space required by the machine is limited to its actual footprint and a sufficiently large area in front of the machine to be able to operate and set up the machine. The cover of the panelling usually opens upwards and so you must additionally ensure a clearance of approx. 50 to 60 cm above the machine.



5.2 Transport

Remove the shipping braces from the frame feet. Use only suitable lifting tackle (forklifts, lifting trolleys - see illustration), lift the machine only from below, and do not pull on the cover.



When transporting the machine any time later, make absolutely sure that the mains power and interconnecting cables are not damaged. Always pull out the mains plug first before transporting the machine.



When transporting the machine, make sure that the machine is not subjected to strong vibrations.

Always keep the triangular key for manual unlocking of the cover outside the machine.

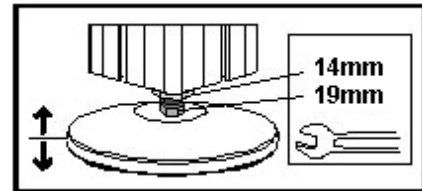
5.3 Erecting the machine

The clamping area and all axes are aligned at right angles at the factory.

Never loosen the fastenings of the axes or the angles; otherwise, the machine must be realigned by a technician of *isel*automation.

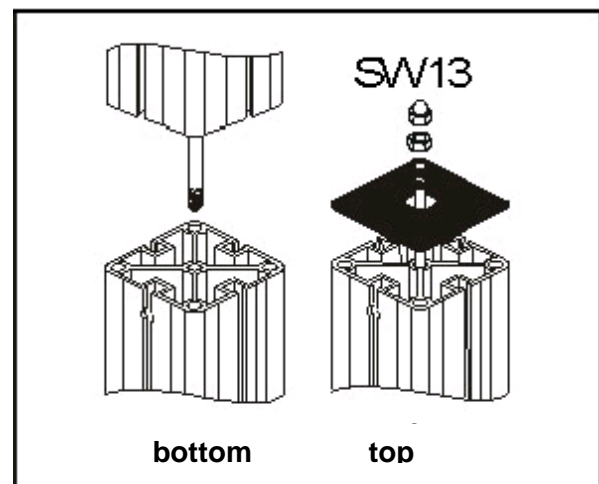
Place the machine on an even and solid surface. Any unevenness of the floor can be compensated using the feet.

To level the machine exactly, you will need a spirit level with an accuracy of at least 0.5 mm/m. Secure the height of the machine feet with a locknut.



5.4 Panelling

The panelling can be removed separately for repairs or comprehensive maintenance and cleaning work. Each column is fixed in the base frame via a threaded bar. Loosen the two top nuts and the threaded bar. Pull out the bar; subsequently, the cover can be removed as a whole. The cover of larger machines consists of several parts.



Never start the machine with the cover removed!

5.5 Wiring

The CNC machine is controlled by an IBM-compatible personal computer (PC) and via power electronics for the motors. The complete control system is integrated into a control cubicle and fully wired to the machine.

For a detailed overview of the wiring of the electronic components, please refer to the documentation. [3.1] [3.2]

Connect the mains cable of the control cubicle only if the machine is ready for start-up.

Note regarding the compressed-air connection:

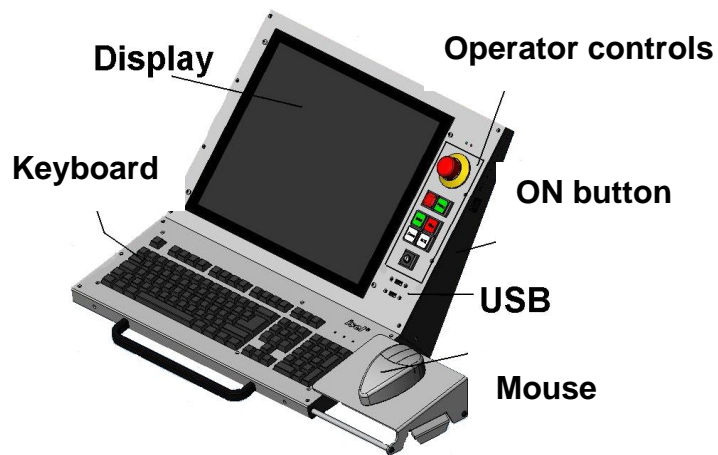
To be able to use the optional vacuum clamping system, the cold-air nozzle or the tool changer and the collet chuck of the machining spindle, a compressed-air connection must be provided at the site of installation of the machine.

Accessories	Air pressure	Air consumption
Vacuum clamping system	4 ... 6 bar	100 ... 150 l/min (1 nozzle)
Cold-air nozzle	6 ... 7 bar	100 ... 150 l/min
Tool changer	8 bar	Not specified
Collet chuck	8 bar	Not specified

6 Commissioning

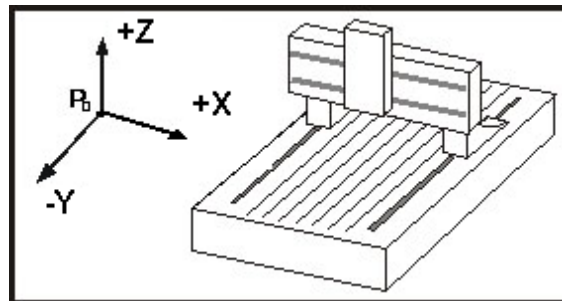
6.1 Preliminary remarks

The drawing below provides an overview of the operator controls on the panel:



6.1.1 Coordinate system

The coordinate system of the machine is defined as a right-handed system, as shown in the diagram, whereby the workpiece zero P0 can be selected (moved) freely via the software.



The axes are marked by appropriate labels on the machine.



If you need to change the arrangements of the coordinates, please refer to the manual of your CNC controller. If you have any questions, please do not hesitate to contact our technical consulting department (see p. 23).

6.1.2 Assignment of the axes of motion

With reference to the operating position, the axes of motion are assigned as follows:

- With flat-bed machines:

X axis = transversal axis (+X to right; -X to the left)

Y axis = longitudinal axis (+Y away from the operator; -Y towards the operator)

Z axis = vertical axis (+Z upwards; -Z downwards)

- With gantry machines:

X axis = transversal axis (+X to right; -X to the left)

Y axis = longitudinal axis (+Y towards the operator; -Y away from the operator)

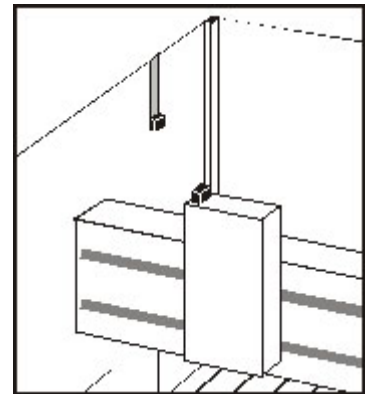
Z axis = vertical axis (+Z upwards; -Z downwards)

6.1.3 Reference point and home position

The reference point of the machine (machine zero) and the home position are specified by default as the top (Z) left (X) rear (Y) corner by default.

The reference point is defined by way of hardware limit switches; the home position is reported to the control system by way of an electromagnetic switching contact.

The signalling magnet is fixed on the panelling; the reading contact on the Z axis recognises the position by proximity when it detects the magnet.



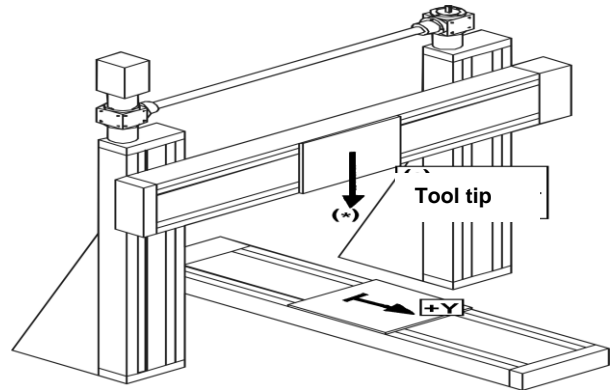
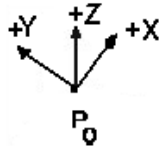
6.1.4 Clamping the workpiece

! When setting up the machine, use only suitable, safe clamping tools (see "Accessories").

Always ensure that the workpieces are clamped securely.

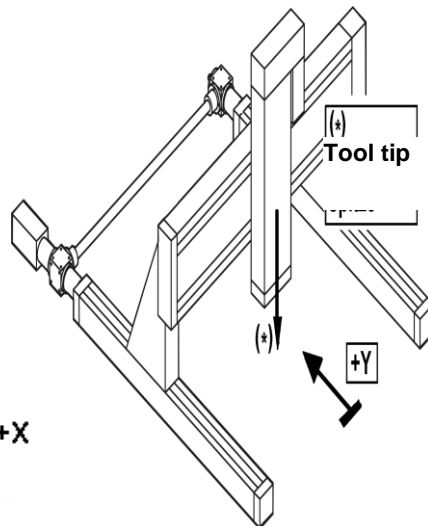
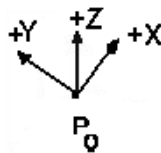
6.1.5 Gantry machines

With gantry machines, the machine table (Y axis) bears the clamping plate for the workpiece and moves in the positive Y direction with reference to the tool tip when performing a movement towards the operator.



6.1.6 Flat-bed machines

With flat-bed machines, the workpiece clamping face is fixed on the machine frame. Y movements of the tool in the positive direction (+Y) are performed away from the operator.



The axis direction always refers to the tool tip so that the coordinate system provides a right-handed system (right-hand rule).

6.2 Cover lock

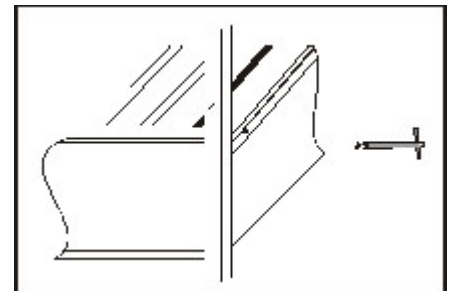
- Generally, the machine must stand in its home position (reference point) - as when delivered - for the cover to be opened, unless the machine is in the test mode or you have disabled the safety function using the triangular key.
- The machining spindle can only rotate with the cover closed.
- In special situations (if the switch is defective or in case of power failure, etc.), you can open the cover lock manually using the triangular key.

1. Turn off the machine.
2. Turn the triangular key a half turn in the anti-clockwise direction without applying any particular force and open the cover.

Under no circumstances must the machine be started in this condition!

The motors of the machine tools are not powered in this condition.

3. Turn the triangular key back in the clockwise direction.

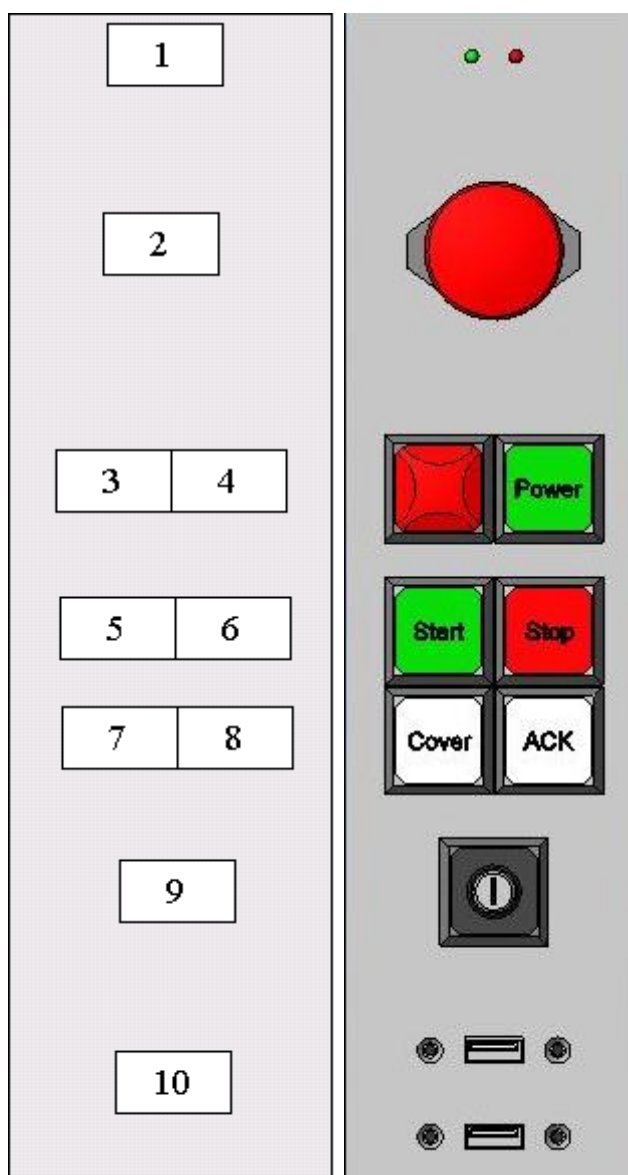


6.3 Operator panel

6.3.1 Front side operator panel

The machine is operated using the operator controls on the operator panel, as well as by way of the keyboard and mouse. They help you to set up and operate the machine according to your requirements.

- 1 Status LEDs of the PC
- 2 **EMERGENCY STOP** button
... turns off the drive control.
Unlocked by turning
CW.
- 3 **Fault** indicator
... signals a fault
in the drive control. The
motor output stages are not
powered.
- 4 **Power** button
... turns on the power electronics.
You can only turn on the operating
voltage of the output stages if the
EMERGENCY STOP button is
unlocked and the cover
(if installed) is closed.
- 5 **Start** button
... starts the user program



or resumes a stopped motion. The machine motion is continued from the exact point at which it was interrupted by pressing the Stop button, unless the machining was has been ended via the software.

...Front side operator panel, cont'd

6 Stop button

... immediately halts the program currently running immediately and stops at the current (program) point. The machine tool remains turned on, and the cover (if installed) remains locked.

7 Cover button

... deactivates the safety lock when actuated, thus allowing the cover to be opened provided that all relevant requirements for the SC module are fulfilled. This button is only operative when the button is lit.

8 Ack button

To traverse the axes in the TEST mode, the "Acknowledgement" button (enable button)

... must be held down in the TEST mode when the cover is open. If you release the button with the cover open, the SC module will turn off the drive control (power section).

9 Keyswitch

Use the keyswitch to switch between the AUTO and TEST modes.

AUTO = machining mode (it is possible to turn on the machining spindle)

TEST = test mode (it is not possible to turn on the machining spindle)

In the TEST mode, you can open the cover at any time.

Switching AUTO —► TEST while machining a workpiece decelerates the machining spindle. After switching back to the AUTO mode, the machining spindle restarts. This may cause damage to the machining spindle or to the workpiece if the mode change is not performed while the axes of motion are stopped.

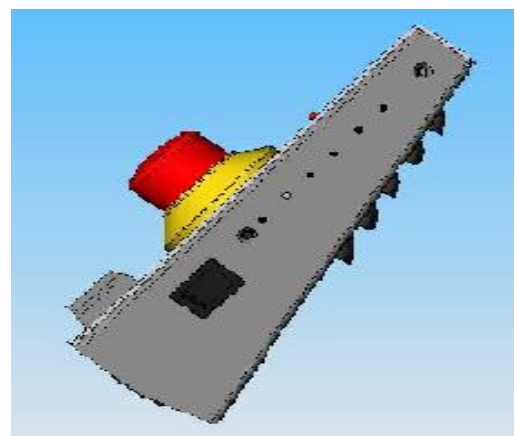
10 USB ports

The USB port is the interface via which the data exchange between user and PC takes place. You can use the USB ports to transfer programs or drawings created on another computer to be able to machine a workpiece. To be able to execute the user program ProNC, the enable dongle (Wibu) must be connected to a USB hub.

6.3.2 Side operator controls

After you have turned on the main switch on the control cubicle, you can start the PC. To this end, actuate the button which is located on the side of the operator panel.

The operator controls for the monitor are situated above the button. Here you can make colour and contrast settings using a sharp-pointed object (ball-point pen or the like).



6.4 Starting the program

You can choose between the user programs REMOTE and ProNC.

The software included in the scope of supply is included on the appropriate set-up CD together with manuals in the PDF format.

For further information on how to install REMOTE, please refer to the REMOTE Instruction Manual, Section 2.8.3.1 "Configuring".

For further information on how to install ProNC, please refer to the ProNC Instruction Manual, Section 3.4.4 "Configuration dialog".

For further information regarding the software, please refer to the appropriate manuals or to the readme files on the set-up CD.



Alternatively, you can also start the set-up wizard.
It will guide you through the set-up.

6.5 Operating modes

- Auto

In the AUTO mode, you can run a selected (i.e. open) user program*, thus machining your workpieces. The cover (where installed) is locked during machining. You will only be able to open the cover if all axes of the machine have reached their HOME position and the machine tool, in particular, the milling spindle motor, for example, is turned off.

To open the cover, press the COVER key. The cover is relocked automatically after closing.

* ISO / PAL / NCP or CNC files

- Test

For testing and checking purposes, you can run the (selected) user program with the cover open if you turn the key in the keyswitch clockwise (test mode). The program is now only continued until the "Ack" button (enable button) is released.

The Test mode has no influence on the feedrate / rapid traverse rate of the axes; the current velocity is not changed. Releasing the "Ack" button (with the cover still open) will turn off the power output stages. In the Test mode, the machining spindle (e.g. milling spindle motor) is disabled by the SC module.

Injury hazard!



This key must only be used by qualified and authorised personnel, since no protection from moving machine parts is provided in the Test mode if the cover is open.

7 Accessories

You can order the following accessories in variants for your particular machine:

- Clamping set (clamping lever, 2 stop rails, hexagon key)
- Additional mounting accessories for the T-slot plate
- Additional collet chucks for the spindle:
1 ... 5 mm in steps of 0.5 mm, 6 mm and 1/8"
- Tool set
- Three different tool changers (linear or rotary changers) with high-frequency spindle (MA 2.11), option: linear probe
- Rotary axes
- Main spindle drives MA, collet chucks up to 6.35 mm
- Spindle motor MA 2.05 + frequency converter, 650 W, 0 ... 20,000 rpm
- Spindle motor MA 4.05 + frequency converter, 450 W, 0 ... 6,000 rpm
- Main spindle drives MA, collet chucks up to 10 mm
- Spindle motor MA 2.11 + frequency converter, 1,100 W, 0 ... 15,000 rpm
- Spindle motor MA 4.11 + frequency converter, 1,100 W, 0 ... 6,000 rpm
- Kress machine tool, 900 W, 8,000 ... 20,000 rpm
- Vacuum clamping system "Vakufit"
- Extraction system
- Industrial vacuum cleaner
- Engraving spindle / engraving underlay
- Spraying/cooling system, coolant
- Cooling system with cold-air nozzle (up to -20°C)
- Grease pump
- CAD/CAM software isy 2.5, ProNC, Remote



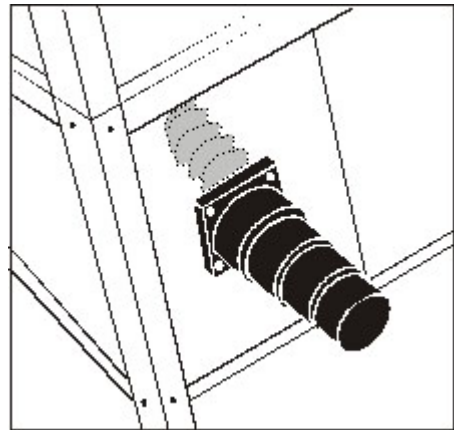
The software required for tool changing and tool length gauging is part of the ProNC / Remote software.

Make sure that all accessories are installed properly and always observe the relevant standards and safety regulations.

7.1 Extraction system (optional)

A suction hose with fittings for the standard diameters 32, 25 and 38 mm is already preinstalled for an extraction system. Connect a vacuum cleaner here. The other end of the suction hose ends at the Z axis. Here you can connect an extraction device.

An extraction device is available for the Kress machine tool (900 W).



7.2 Cooling / spraying system

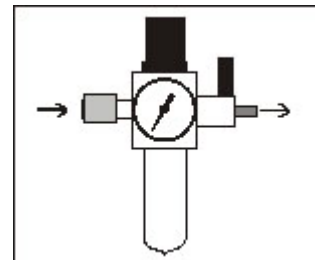
The cooling/spraying system is preinstalled at the factory. You only need to fill in the coolant. The compressed air is provided by the service machine. The input air pressure of the service machine may be 4 ... 10 bar. The maximum permissible pressure of the spraying system is 7 bar; the operating pressure is often significantly lower.

7.3 Tool changer

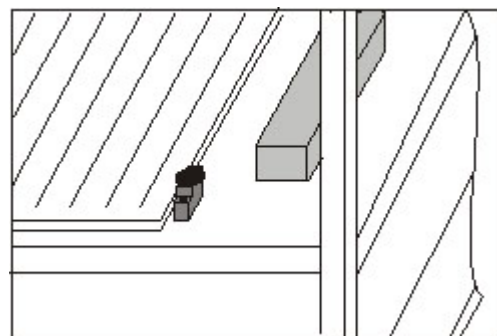
The machine is delivered with the tool changer connected ready for use.

The operating pressure is approx. 8 bar. The compressed air must be supplied via the service machine.

The linear probe (option) for the tool changer is fixed on the front right-hand side alongside the clamping plate.



For start-up, please observe the manuals for ProNC and Remote. These are to be found as PDF files on the relevant set-up CD.



8 Technical Consulting and Sales

For further information or for ordering, please contact our

Technical Consulting and Sales Dept.

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You are also kindly invited to visit our homepage : <http://www.isel.com>
or simply request our recent catalogue.

Our newsletter will inform you about new products and innovations via e-mail.

A permanent exhibition in our production facility Eichenzell, which is situated centrally in Germany offers you opportunities for visits on all working days in addition to the exhibitions of our products at all important trade shows.

An overview of our range of products is presented in our showroom where we would be pleased to arrange practical demonstrations.



9 Cleaning and Maintenance

Turn off the main switch each time before cleaning and servicing and pull off the mains plug to prevent accidental restarting.

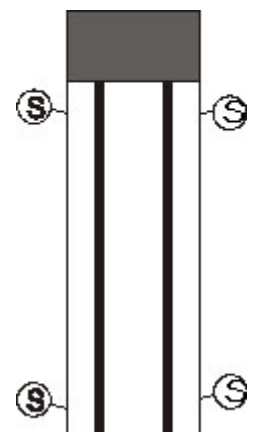
- Clean the machine from all swarf using at regular intervals using a hand brush or a vacuum cleaner (not compressed air). This protects the mechanical elements from early wear.
- The sealing lips incorporate a Teflon component and do not require any special maintenance.
- To clean the plastic windows, use non-abrasive fluid cleaner.
- The guide rails and drive shafts are provided with long-time lubrication at the factory. Depending on the use, you should relubricate the guides and drive shafts approx. every 500 ... 1,000 operating hours. To do so, use standard roller bearing grease. If you use oil, you should lubricate every 100 ... 200 operating hours. When the machine is delivered, the guides and shafts are lubricated with sodium soap grease GP00/000F-20 to DIN 51 502. Do not apply too much lubrication at once; the shafts and steel rails do need not to be swimming in grease. Before lubricating, first start referencing, subsequently open the cover and only then turn off the machine. To make comprehensive maintenance work easier, you can remove the panelling.


Do not misuse this option for normal operation; this would violate all safety rules!

Two black plastic plugs each are to be found on each side of the Z axis. The lubricating nipples are located beneath when the slide stands at the upper or lower limit switch.

For lubrication, remove the plugs, traverse or move the slide against the limit switches and lubricate through the now visible lubricating nipples (S) * (top: 2, bottom: 2).

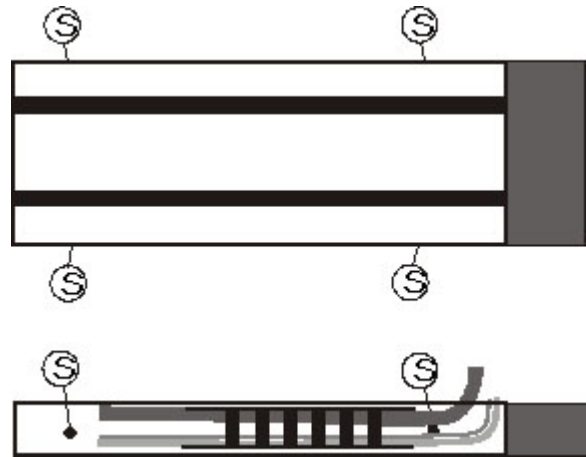
When the machine is turned off, you may move the slides of the Y and Z axes into the limit switches manually.



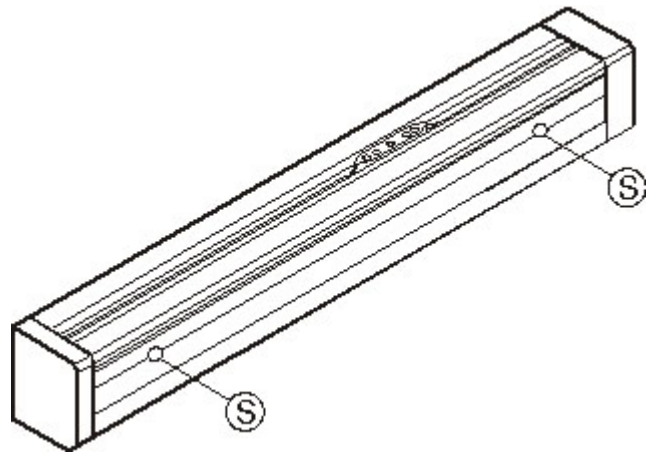
*  marks a lubricating nipple or the access to the lubrication points in all drawings.

The Y axis is designed exactly like the Z axis. Lubricate on the right and on the left via the lubricating nipples.

If you loosen the supply cables in the cable duct on the right to obtain better access to the lubricating nipple, attach the cables securely again afterwards.



The linear drive for the X axis is installed on the working plate. Remove the plastic plugs on the inside and lubricate in the same way as the other axes (once each at front and rear).



The right-angle gears installed beneath the working plate (if installed) are maintenance-free.

10 Faults

Fault	Cause	Remedy
The system cannot be started.	No mains power	Check the current circuit Insert the mains plug
	Main switch not turned on	Turn on the main switch
POWER button does not function	Cover not closed	Close the cover
	EMERGENCY STOP not unlocked	Unlock the EMERGENCY STOP button
Drive motor of one axis does not react	No power supply for the output stage; fuse defective	Check the fuses in the control cubicle or in the power output stage
	Temperature protection of output stage active (only for servo systems: Temp. LED is lit)	- Check the fan in the control cubicle - Check / clean the filter in the fan
	Output stage defective	Change the output stage (send in for replacement)
	The connector has become loose	Check the connector – both at the control system output and on the motor
	Cable break	Replace the cable
Machine tool (spindle) does not function	Not enabled by the SC module	Check the spindle enable signal
The red LED on the frequency converter is flashing	Mains switch on the Kress machining spindle turned off	Turn on the main switch on the Kress machining spindle
	Incorrect driver installed	Use the correct driver
	Machine stands at home position	Traverse the machine into the working range
	Cover lock open	Set the cover switch to automatic unlocking
	<ul style="list-style-type: none"> - Fault on the speed-variable frequency converter - Overcurrent - Undervoltage 	<ul style="list-style-type: none"> - Check the settings of the frequency converter - Check the enable signal issued by the SC module

11 Technical Specifications

11.1 EuroMod P, EuroMod F

Dimensions in mm

Model		W	D	H	Clamping area (W x D)	Travel (X/Y/Z)	Z passage
EuroMod P	with base frame and cover	920	1,270	2,330	375 / 700	350/400/300	345
	with base frame, without cover	920	1,270	2,035	375 / 700	350/400/300	345
	without base frame and cover	920	1,270	1,454	375 / 700	350/400/300	345
EuroMod F	with base frame and cover	770	1,140	2,330	310 / 796	300/400/150	180
	with base frame, without cover	770	1,140	1517	310 / 796	300/400/150	180
	without base frame and cover	770	1,140	936	310 / 796	300/400/150	180

11.2 GFS/GFV 4433/4473

Dimensions in mm

Model	W	H	D	Clamping area (W x D)	Traversing range (X/Y/Z)	Z passage
GFS 4433 (stepper motor)	780	1,815	1,010	375 / 900	440/330/160	210
GFS 4473 (stepper motor)	1,160	1,815	1,010	750 / 900	440/730/160	210
GFV 4433 (d.c. servo)	780	1,815	1,010	375 / 900	440/330/160	210
GFV 4473 (d.c. servo)	1,160	1,815	1,010	750 / 900	440/730/160	210

11.3 FlatCom

Dimensions in mm

Model		W	H	D	Clamping area (W x D)	Travels (X / Y)	Z passage
FlatCom 20	with base frame and cover	1,150	2,330	1,200	700 / 550	700 / 550	200
	with base frame, without cover		1,750				
	without base frame, without cover		1,215				
FlatCom 30	with base frame and cover	1,150	2,330	1,700	1,200 / 750	1,200 / 550	200
	with base frame, without cover		1,750				
	without base frame, without cover		1,215				
FlatCom 40	with base frame and cover	1,450	2,330	1,700	1,200 / 1,000	1,200 / 800	200
	with base frame, without cover		1,750				
	without base frame, without cover		1,215				
FlatCom 50	with base frame and cover	1,950	2,330	1,700	1,200 / 1,500	1,200/1,300	200
	with base frame, without cover		1,750				
	without base frame, without cover		1,215				

11.4 OverHead

Dimensions in mm

Model		W	H	D	Clamping area (W x D)	Travels (X / Y)	Z passage
OverHead 20	with cover frame	1,150	0	1,200	700 / 550	700 / 550	200
OverHead 30	with cover frame	1,150	0	1,700	1,200 / 750	1,200 / 550	200
OverHead 40	with cover frame	1,450	0	1,700	1,200 / 1,000	1,200 / 800	200
OverHead 50	with cover frame	1,950	0	1,700	1,200 / 1,500	1,200/1,300	200

11.5 GFV

Dimensions in mm

Model (with protective cover)	W	D	H	Clamping area (W x D)	Travels (X / Y)	Z passage
GFV 48/52	1,440	1,320	1,890	625/1,100	480/520	235
GFV 102/72	2,084	1,584	1,890	1,125/1300	1,020/720	235
GFV 102/112	2,084	1,984	1,890	1,125/1,700	1,020/1,120	235
GFV 142/112	2,459	1,984	1,890	1,500/1,700	1,420/1,120	235
GFV 142/162	2,459	2,484	1,890	1,500/2,200	1,420/1,620	235
GFV 142/252	2,459	2,484	1,890	1,500/3,050	1,420/2,520	235

11.6 Sound pressure level

The sound pressure level varies depending on the particular application and on the tool set you are using. Without machine tool < 75 dB (A)

EMC test to EN 60204, EN 50022 and EN 50082

Subject to change without prior notice

12 References

- [1] *isel*-PSPCI
Handbuch zur Schrittmotorsteuerung PSPCI (Controlling PSPCI Stepper Motors. Manual)
- [2] *isel*-IMC4-M
Handbuch zur Steuerung IMC4-M (The IMC4-M Controller. Manual)
- [3.1] *isel*-Steuerschrank ICU-SD_multi (*isel* Control Cubicle ICU-SD_multi)
Operator's Guide
- [3.2] *isel*-Schaltschrank ICU-SD_multi (*isel* Control Cubicle ICU-SD_multi)
Circuit Diagrams
- [4] Betriebsanleitung Modulares Sicherheitssystem PNOZ-Multi (Modular Safety System PNOZ-Multi. Instruction Manual)
Basic Unit PNOZ m1p