isel ®

From Components to Systems

isel-CNC Compact Equipment
isel-CNC Machine

ICP 4030
ICP 3020
ICP 2015

Operating and Maintenance Instruction

Platz für Typenschild

On this Manual

Various symbols are used in this Manual to quickly provide you with brief information.

Danger	Caution	Note	Example	Additional Information

Despite all care, printing errors and mistakes cannot be ruled out completely.
Suggestions for improvement and notes on errors are always welcomed.

isel machines and controllers are CE compliant and are marked accordingly.
Any other machine parts and components subject to the CE safety guidelines may not be commissioned unless all relevent standards are fulfilled.

isel Germany shall not accept any liability for any modifications on the device by the customer.

The limit values specified in the Certificate of Conformity only apply to the original configuration from works.

Manufacturer: isel Germany AG
                Bürgermeister-Ebert-Str. 40
                D-36124 Eichenzell

                Fax: +49-6659-981-776
                E-Mail: automation@isel.com
                http://www.isel.com

This manual includes the instructions for all machines of the ICP type.
The ICP is provided in three different system configurations. However, this listing also specifies which part of the instructions is relevant for you. This applies also to the chapters.

1. **The ICP as a component, type 1**

   The case is supplied including the driving axes, without electronics, without software, without tooling machine. With this system configuration, you can employ and connect your own controller electronics. A tooling machine is also freely selectable.

2. **The ICP as a machine, type 2**

   In addition to type 1, this system configuration includes an *isel* controller for the linear axes. It contains a safety circuit and some optional inputs/outputs (24 V and/or 230 V). For this purpose, you receive the *isel* HPDOWN software and the I5DRV machine driver. The tooling machine is freely selectable.

3. **The ICP as a compact equipment, type 3**

   The complete installation (mechanics, electronics, tooling machine and software (ISY-CAM + REMOTE, I5DRV)) is immediately ready after commissioning.

At every expansion level, the ICP is a compact machine that offers an abundance of possibilities for processing work pieces.

As a prerequisite for your work with the ICP and depending on the implementation, you require basic knowledge in CNC engineering and PC application, a computer, a mains socket, and some creativity.

Please, consider these short instructions to

- properly commission the equipment,
- fast, safely, and effectively work,
- keep away dangers of persons,
- and thus exploit the full potential.

To get acquainted to work with this machine, we recommend that you carry out the processing example which is appended to these instructions (for the ICP with the HPDOWN, REMOTE, and/or ISY software).

We wish you a lot of success. Enjoy your future working with the ICP.

Contents

You find

- **Generally valid notes**   in chapters 1, 2, 7 and 8
- Description of the **mechanics**   in chapters 3, 4 and 7
- Description of the **electronics**   in chapters 5, 6 and 7
- Description of the **software**   in the processing example (appendix) and in separate manuals
- Description of the **accessory**   in the appendix

1   Intended purpose

The ICP is a machine tool with three linear axes that can electronically be controlled.
A further (rotary) axis is available in addition.

- The machine is planned for training and the small assembly line production.

- It is designed for the application in dry rooms, business rooms, living and training areas
  and in labs and small firms (maximal ambient temperature 40° C).

- The machine is suitable for milling, boring, cutting, engraving, proportioning, metering,
  positioning, and many similar applications.

- You can install the most different suitable tooling tools or mount instruments, appropriate
  for the above mentioned applications.

- Suitable tooling materials are light metal, plastics, wood, glass, printed circuit materials.
  For safety reasons, graphite is not permissible (danger of explosion) as material.
  Also not admissible are materials that produce health-endangering gases during
  processing.

- The machine is prepared for a suction apparatus. With preference, this suctioning is
  suitable for dry dust kinds (wood, printed circuit boards, etc.).

only for type 2 and 3

- The complete controller and power electronics of four axes are contained in the controller
  of this machine. The IMC4 controller (interpolation operation) is installed in the ICP.
  The machine can also be operated in the CNC mode using the integrated FLASH EPROM.

- Using any computer, you can actuate the machine with the IMC4 controller via the serial
  interface. In addition, you may execute an already internally stored processing program
  (in flash EPROM) without computers.

- Optionally, two 24 V outputs, two 24 V inputs, and a 230 V output are available for
  connecting further components (e.g. resistive loads).

only for type 3

- With the ISY CAD/CAM software, you can directly pass on the previously generated
  CNC data to the machine and initiate the processing of the work piece via a corresponding
  controller program.

2 Notes on safety

- The machine must not be operated in a blast capable atmosphere.

- The machine is completely encapsulated. The casing protects you against moving tools, decreases the operating noise level, and restrains the chips.

- While tooling, the hood is locked and can not be opened.
  You may neither remove nor modify this protection measure (only type 2 and 3).

- Hardware and software are included in the safety circuit i.e. the machine functions only with the appropriate and intact controller heart on the printed circuit board (only type 2 and 3).

- For emergency situations, you find an Emergency-Off switch on the front-panel of the machine.
  It interrupts the power supply to the power module and tooling machine.
  However, the software - machine communication remains possible for fault tracing (only type 2 and 3).

- Only experts and trained persons may handle the keyswitch since a higher risk exists in test mode (only type 2 and 3).
  Please, keep the alternative key under lock and key.

- All 230 V loads are only single-pole switched. You must assume that an interrupted load is not necessarily voltage-free (only type 2 and 3).

- Ensure sufficient ventilation at dust or gas development that is caused by processing the materials.

- Use only suitable devices (laser class 2) if you want to apply a laser for measuring applications. Consider the corresponding technical regulations.

- For cooling, no flowing water may be used but only a sprinkle/chilling appliance with which a spray causes the cooling effect (see accessories).
  No drops may form themselves and flow under the clamping plate.

- Do not use spirit as coolant (danger of explosion!).

- Clean the machine regularly and remove chips and dust deposits.

Aging of Safety Panes

Investigations, accomplished by the Association of German Machine Tool Factories (VDW) in connection with the responsible employer's liability insurance association have pointed out new aspects about the aging of polycarbonate as material for safety panes at machine tools. Although polycarbonate worked very good for this purpose, these panes sometimes substantially lose their ability to hold back flying around parts, especially under the influence of cooling lubricants. At longer term, polycarbonate panes that are double-sided protected against the effects of splinters, cooling lubricants, detergents, steams, etc. have hereby shown the highest resistance.

In order to set you in the position to carry out your care business, we would like to point out that safety panes made of polycarbonate are therefore to be examined regularly for their retaining abilities and to be changed if necessary. Additionally, such safety panes are to be classified as wearing parts in future. Beyond that, when you sale it, you are also obligated to inform the possible buyer of such a machine accordingly about that.

Even with consideration of these new realizations polycarbonate will be further used as material for safety panes in mechanical engineering due to its extremely high retaining ability. Spare panes ready to be installed can therefore be ordered from us at any time. In order to increase the necessary exchange intervals, we can also offer a retrofit kit for an additional protection on the operator side if desired.
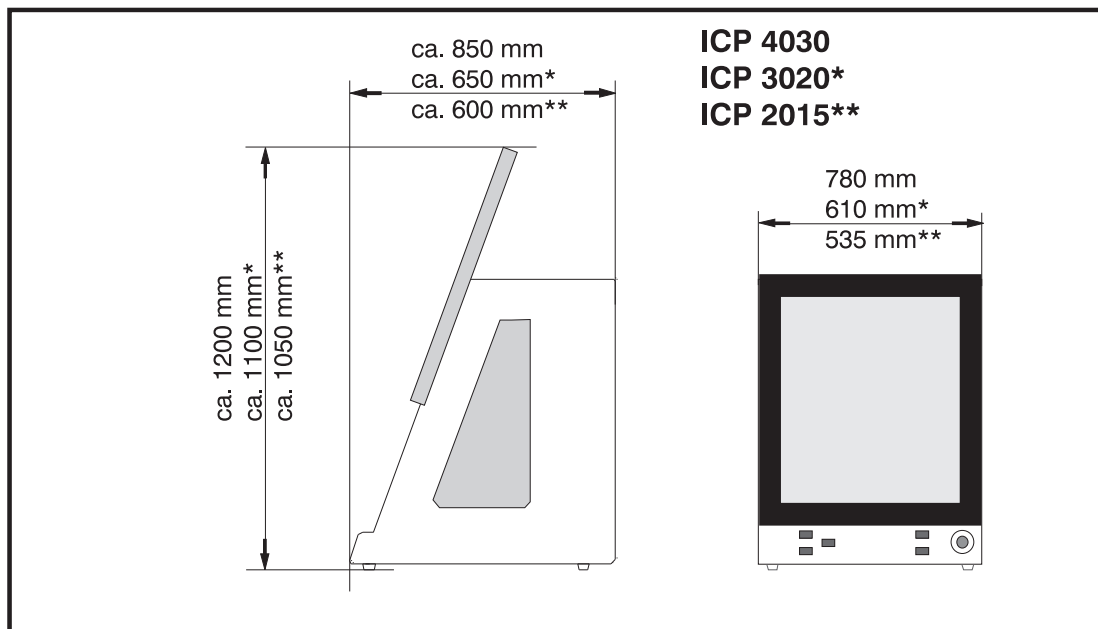
3   Set up and connecting

The machine is provided completely mounted on a palette.
Contained in **scope of delivery** of the ICP are:

- machine case with three linear axes included
    - complete controller electronics (only type 2 and 3)
    - drilling and milling machine with 3 mm split chuck - as a standard (only type 3)
- key for split chuck, SW 22 (only type 3)
- clamping set (hand lever, stop bars, 5 mm socket spanner)
- triangular wrench for unlocking the hood switch
- AC power cable, PC - machine data cable (only type2 and 3)
- 4-fold socket outlet with illuminated mains switch (only type 2 and 3)
- Driver software for DOS including setup program, 1 floppy disk, 1 manual (type 2 and 3)
- PRO-PAL program, 1 floppy disk, + processing example (only type 2)
- REMOTE program, 1 floppy disk, + processing example (only type 3)
- ISY-CAM CAD/CAM software (only type 3)
- and these service and maintenance instructions

The **space requirement** of the machine is limited to the external measurements and to
sufficient room in front of the machine in order to operate and arrange the processing, plus
approx. 10 cm behind the machine to allow for connectors. The hood of the housing opens
upwards. Thus, the required total height is approx. 1,2 meters.

ca. 850 mm
ca. 650 mm*
ca. 600 mm**

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780 mm
610 mm*
535 mm**

ca. 1200 mm
ca. 1100 mm*
ca. 1050 mm**

Dimensions and space requirement

Remove the sheet steels of the feet of the machine with which it is secured on the palette.
Then, set up the machine horizontally onto a flat, fixed face.
You can compensate for small unevenness of the base area at the feet.

During transportation, please pay attention to the supply and connection cables (remove if needed) so that they are not damaged. Use only suitable lifting devices.
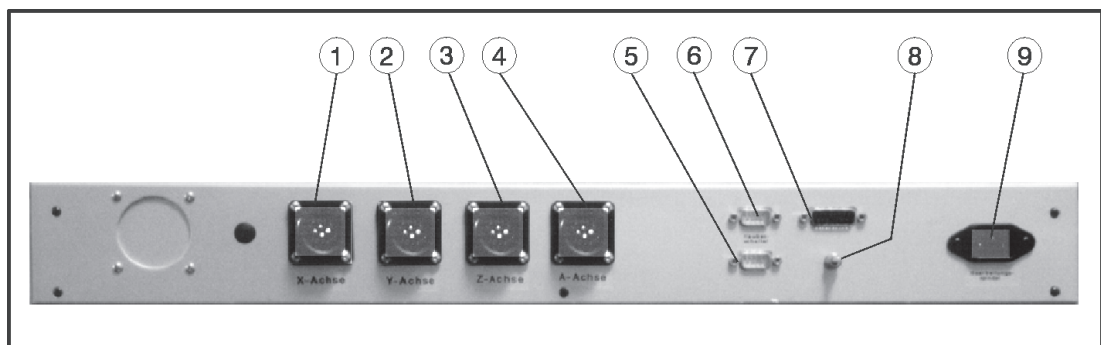
👉 **Above all, keep the triangular wrench always <u>outside of</u> the machine during transportation.**

The **clamping set** is made up by a hand lever clamping assembly and two stop bars with mounting hardware for the T-slot plate.
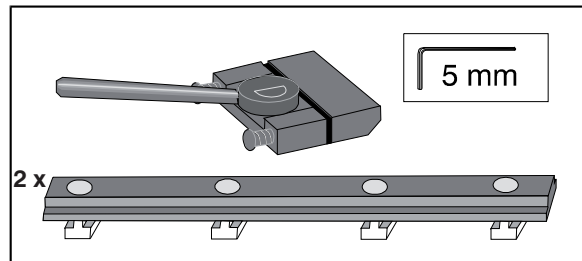
! **Always ensure that the workpieces are properly secured.**

Connections to the controller of the machine (type model 1):

① Z-axis (Amphenol connector)
② X-axis (Amphenol connector)
③ Y-axis (Amphenol connector)
④ A-axis (axis of rotation)(Amphenol connector)
⑤ START and STOP push-button (9-pin connector)
⑥ hood switch (9-pin Sub D connector)
⑦ POWER / emergency push-button (15-pin connector)
⑧ grounding point
⑨ tooling machine

The pin allocation of the connectors ① - ⑦ is located in the technical data

For the **accessories,** different parts are already pre-installed or prepared for mounting. For this purpose, also read the information in the appendix.

You can connect the cable of a tooling machine to the coupler terminal block in the branch box at the side of the Z-axis.
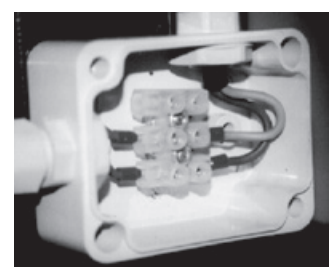
4   Cleaning / maintenance

☞ Open the hood <u>before switching off</u> the machine using the mains switch. After this, this is no more possible (only type 2 and 3).

⚠ **Switch off the mains switch before any cleaning and any maintenance. Also, pull the power plug in order to prevent an inadvertent starting.**

Clean the machine regularly with a broom or vacuum cleaner of all chips (no compressed air). That protects the mechanics against early wear.

- With frequent machining operations and very fine chips (dusts), you should regularly remove the cover plate of the Y-axis below the T-slot plate and remove possibly penetrated chips and/or dusts.

- The sealing lips include a Teflon component and require no special maintenance.

- Clean the perspex windows with a non-abrasive fluid cleaner.

- The shaft guides and drive shafts are provided with a long-term lubrication ex works. Depending on the load, you should grease the shaft guides and drive shafts approx. all 500-1000 operating hours. Use usual rolling bearing grease for that purpose.
  Ex works, the shaft guides and shafts are lubricated using GP00/000F-20 sodium soap grease according to DIN 51 502.
  Please, you lubricate all 100-200 operating hours if you use oil.
  At first, make a reference movement for lubricating the driving axis. Then, open the hood and only now switch off the machine.

In order to lubricate the Y-axis, you must completely push* the T-slot plate to the front. Next, unscrew (six screws) it from the Y-axis.
Remove the plastic plug lying under it and lubricate through the now visible lubricating nipple.
You reach the shaft guides through the sealing lips.

Loosen the all around holding-down screws in order to remove the cover sheet of the Y-axis.
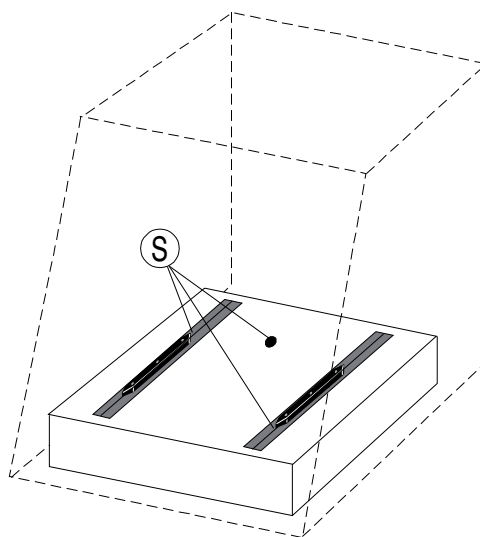
in all drawings is the characterize accesses to the greasing points.

To lubricate the X-axis, move the sledge to the left*. Remove the plastic plug on the left side of the machine and lubricate through the now visible lubricating nipple.
You access the shaft guides again through the sealing lips.
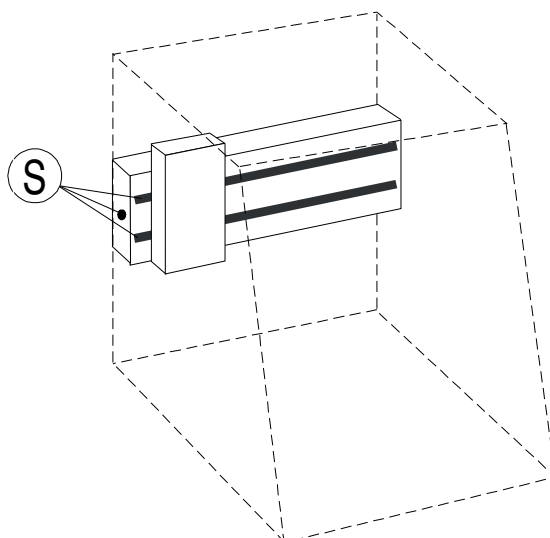
At the Z-axis, you must first take the tooling machine from its support. Remove the three plugs and push the sledge completely down*. You can apply some oil onto the shaft guides through the two side holes. The lubricating nipple for the drive is now behind the front opening.
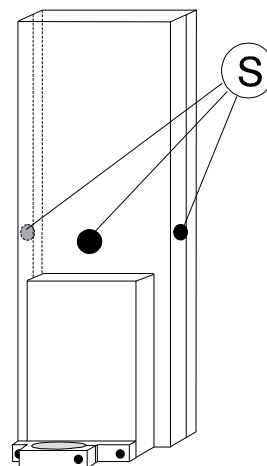
* You can displace the sledge using the hand if the machine is off.

The further descriptions of chapters 5 and 6 only apply to machine types 2 and 3.

5 Commissioning

5.1 Preparations

For controlling the CNC machine and/or the FLASH EPROMs, you require one IBM compatible computer with a free serial interface.

System request
- 486 SX, 40 MHz and higher
- 8 MB RAM
- 20 MB of free hard disk capacity
- VGA card
- MS-DOS 5.0 and higher

Connecting cables

The serial port is used as an interface of the machine to the computer using the enclosed cable (max. three meters in length, you find the pin assignment of the 9-pin Sub D connector in the Specification section).

Connect the red connector of this cable to the PC. This side of the cable is again marked with <<PC/AT<<. Connect the gray coupler on the reverse side of the ICP.

Use the multiple socket strip for connecting power to the computer and to the machine. Connect the power cable only if the machine is ready for commissioning.

>>**PC/AT**>>
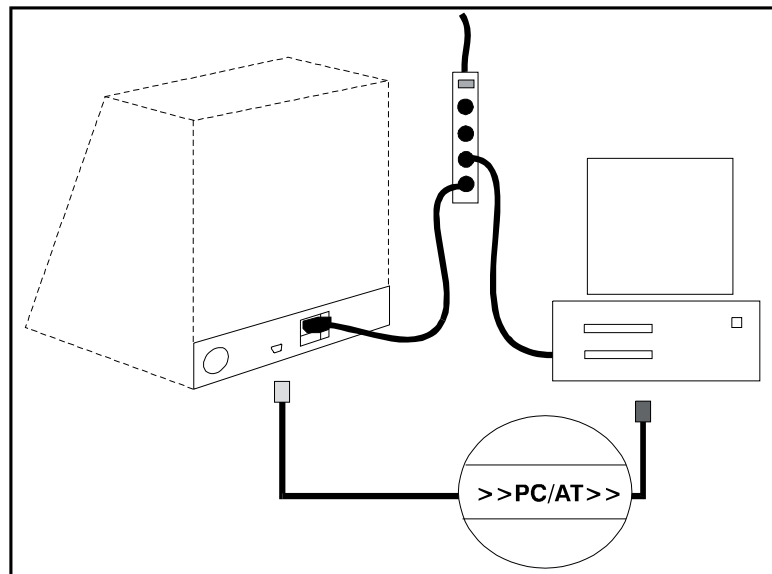
Mount the **axis of rotation** (optional) onto the T-slot plate in accordance with the assembly and operating instructions of the axis of rotation in the appendix. Connect the cable to the axis of rotation and the female Sub D-9 connector in the rear wall of the working space. How to precisely set up the axis of rotation is also described in the assembly and operating instructions in the appendix.

Installation of the software

In addition to the machine driver (I5DRV), the HPDOWN, REMOTE and ISY-CAM - both only in case of type 3 - software packages are provided for setting-up of the machine and processing the parts.

At first, install the driver for the machine onto your computer (DOS-modus):

1. Insert the driver floppy disk (i5drv starting with type 2.1) into your disk drive for the ICP.

2. Access the disk drive by entering "A:◄▬I(return) and/or B:"◄▬I.

3. Start the installation program with "install"◄▬I and/or "install -e" (in English).
    The program installs the driver.

4. Add the following line to *autoexec.bat:*
    Set isel_i5=C:\i5\imc4.ini ("cd .."◄▬I "edit autoexec.bat"◄▬I)

5. Start the driver with "cdi5"◄▬I and "i5drv"◄▬I (to start, the machine must be connected and turned on).

Please refer to the notes in the corresponding manuals and/or in the Readme files on the floppy disks for the installation of the supplied device operating programs. You find all descriptions for using the software in the enclosed manuals.

Leadscrew pitch
By default, the I5DRV machine driver is set to a leadscrew pitch of 10 mm. You must change a setting in the I5DRV machine driver so that the traversing speeds and the measure of the axes agree with inputs during the operation if your machine has a pitch of 4 mm.

The machine driver must be installed. The machine must be connected and turned on.

1. Go to the I5 directory: "cd i5"◄▬I.

2. Select the machine driver: "i5drv"◄▬I.

3. Run the adjusting program: "i5ein"◄▬I (press 2x). On the screen, a window appears in which you can perform the necessary settings.

4. Open the *Parameters*/*Change* menu.

```
 File  Parameter  Option  IMC4-Option  Language  Help  Quit
                                                       ┌ Main Status ──
     ┌──── Change defaults and initialisations ──┐     │ errorcode:    58
     │              X-axis initialisation:        │     ├ Driver Status ──
     │  ┌─────────┐     axis activ: 1             │     │  move: 0   test: 0
     │  │ RS232   │                               │     │  stop: 0   hand: 0
     │  │ X-Axis  │        NegDir: 0              │     │  seg.: 0  teach: 0
     │  │ Y-Axis  │        NegRef: 0              │     ├ Errorstatus ──
     │  │ Z-Axis  │   axis of rot.: 0             │     │  ref.: 1   HWE: 0
     │  │ A-Axis  │      elevation: 10.00         │     │  break: 0  SWE: 0
     │  │ Speeds  │    steps/round: 400.00        │     ├ HWStat ─┬─ HWE ──
     │  │ Severals│     gear ratio: 1.00          │     │ cenabl: 1 │ Xmin: 0
     │  │ Inputports                              │     │  cover: 0 │ Ymin: 0
     │  │ Outputports                             │     │  keysw.: 0│ Zmin: 0
     │  │ HWStatusPorts                           │     │  emerg.: 0│ Amin: 0
     │  │ End     │                               │     │  power: 1 │ Xmax: 0
     │  └─────────┘                               │     │  spin.: 0 │ Ymax: 0
     └──────────────────────────────────────────┘     │  ____: 0  │ Zmax: 0
   ┌ PosX(mm) ─ PosY(mm) ─ PosZ(mm) ─ PosA(°) ─┐       │  ____: 0  │ Amax: 0
   │    0.00       0.00       0.00       0.00  │
      Speed:     0.00     Override:     100 %
 Change parameter
```

5. In the small window, set the lead screw pitch to 4 mm <u>for every axis.</u>

6. Change the traversing *speeds* to a maximum of 20 mm/s (only with a 4 mm pitch) to avoid resonances.

7. At the end of changes, move down to *End* using the scroll bar ◄▬▮.

8. Save the changes using: *Parameters/Save* ◄▬▮
You must initialize the driver again (*Parameter/Init drivers* item ◄▬▮) if you want to immediately carry out a test (e.g., move axes). Otherwise, this is automatically performed by running the program again.

9. Exit the setting program using: Quit ◄▬▮.

10. Deactivate the machine driver: "i5drv" ◄▬▮.

The new settings become valid on the next call of the driver.

Setting of the transfer rate (baud rate) and/or of the delay period.

With the H1jumper field, you can set the transfer rate (9 600 or 19 200 bauds) and/or the delay period of the hood switch (1 or 5 seconds).

- The baud rate is the transfer rate of the serial interface of the computer communicating with the controller (see the manual for further information).

- Delay is the time passing by between the switching-off of the tooling machine (or the end of tooling) and the releasing of the COVER button for opening the hood. Delay is used to wait for the running out of the tooling machine to avoid dangers. Especially with educational and training applications, 5 seconds of delay are reasonable and should also be set.

⚠ **Pull the power plug before you place jumpers or remove them.**

The jumper field is on the printed circuit board (in the figure on page 19, position 12).

- Ex works, all jumpers are open, i.e. the baud rate is set to 19 200 bauds and the delay to approx. 1 second.

- A jumper between pin 1 and pin 2 sets a baud rate of 9 600 bauds.

- A jumper pin 1 and 3 between extends the delay period to approx. 5 seconds.
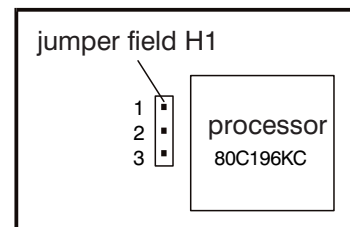
The new setting is taken over with the powering-up of the machine.
All other jumpers on the printed circuit board must not be modified!

Coordinate system

The coordinate system of the machine is determined as shown in the figure. However, you can select (displace) the P0 work piece zero point freely via software.

Ex works, the home position of the machine (machine origin) is defaulted to the back (Y), to the left (X), and to the top (Z).
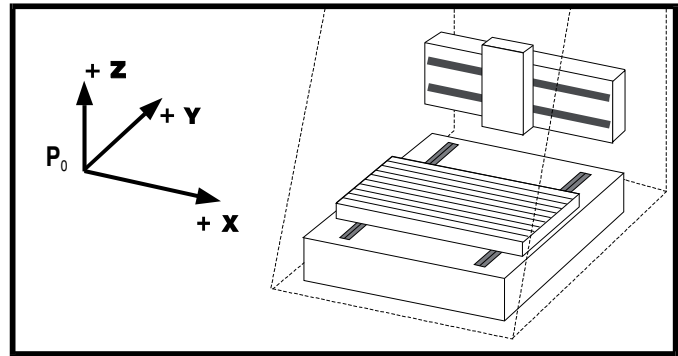
Labels on the machine mark the axes.

The order of the axial directions is freely selectable. Please, read the manual of the I5DRV driver for this purpose.

Tooling machine (only in the case of type 3)

In the collet ④, the standard tooling machine can take tools with a maximum shaft diameter of 6.35 mm (standatd 3 mm, other diameters see Accessory). Use two SW 22 open end wrenches for changing the collet.

The current for the tooling machine is only enabled by the software. You can manually adjust the rotation speed of the machine using the ① wheel.

Switch off the main switch of the ICP for dismantling the tooling machine. Remove the electricity cable from the coupler terminal block, loosen the clamping screw ② and take the tooling machine from the holder.
For dismantling the machine with the holder, remove the electricity cable, the two outside screws ③ (loosen only, do not screw very out) and remove the machine with holder and T-slot stones downwards.

Using corresponding holders, you can also attach many other tools, measuring instruments (laser), or other suitable equipment to the T-slot plate of the Z-axis.
Use the branch box at the Z-axis for the electrical connection.
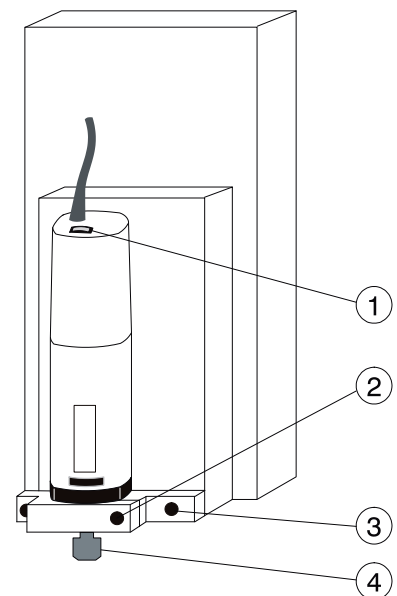
If you want to mount the tooling machine or other tools again, you must realign the holder parallel to the XY-plane.

5.2 Important operating information

Push-buttons and switches

The black **mains switch** is located on the rear side of the machine directly beside the mains connection.

Using the switches and/or push-buttons on the front side, you can switch the machine on and off and start and stop the processing in a purposeful manner.

① **Emergency-off**

Abort of all functions; the error status remains testable using the software; after a delay, the hood can be opened using the ⑥ push-button. Releasing Emergency-Off by turning to the right.
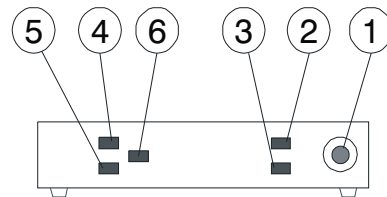

② **POWER**

You can only turn on the power stage if Emergency-Off is released.

③ **Keyswitch**

Using the key, you can switch between test and automatic operation.

AUTO = processing mode

In the automatic mode, the machine either works stand-alone based on the program that is stored in the FLASH EPROM (CNC mode) or via the connected supervisory computer (DNC mode). You can interrupt tooling using STOP and continue to work using START.

TEST = test mode

In this operating mode, you can open the hood at any time if the tooling machine is switched off. You can continue to process the programs. However, the tooling machine is switched off if the hood is opened and can not be switched on again. The sledge remains freely moveable also with manual traversing (teaching).

Take care of the mobile sledge: Danger of bruising!
Pay attention to the moving-in depth: Collision danger with the work piece!

④ **START**

- If a program is stored on the FLASH EPROM then the program is started by pressing this button independently of whether a computer is connected or not.

- After a hold using the button ⑤, the machine restarts the stopped movement exactly at the location where it was interrupted provided that tooling has not being terminated via the man-machine interface.

⑤ **STOP**

Execution of the current program is immediately stopped and remains at the (program) location. The tooling machine is switched off. In the DNC mode, you can issue further commands via software. This is not possible in the CNC mode.
After a time delay of 1 or 5 seconds, the COVER button lights up and you can open the hood. With a closed hood, you can continue the program by pressing the START button.

⑥ **COVER**

Only if the button is lit, you can open the hood by pressing this button (first, press the button, then pull simultaneously at the grip!). In the unfavorable case if you set only a delay period of one second, the spindle can continue to rotate for a few seconds.

Do not reach into the still revolving tool.

5.3 The FLASH EPROM (use only for free programming)

You can permanently store a processing program for the machine on the FLASH EPROM. You can erase it again and store a new program. The machine can thus be started independently of the controller and process a work piece (CNC mode).
This operating feature is especially suitable for small series productions.

You must erase the FLASH EPROM before you can write to it again.

Erasing the FLASH EPROM:

1. Turn on the mains switch (Emergency-Off released, POWER not pressed)

2. Activate the TEST mode

3. Keep the STOP button pressed and press the POWER button once shortly

Please, read the corresponding manual for the coding of programs and saving these onto FLASH EPROM (programmer's guide of the IMC4 2.xx).

5.4 First commissioning

During the first commissioning, you should carry out the following steps:

- For the first opening of the hood, connect the power cable and turn on the mains switch.
  The COVER button ⑥ should light up now; you can open the hood if this button is lit.

- Emergency-Off must be released for all following functions.

- Close the hood and turn on the power stage using the POWER push-button ②;
  the push-button must light up.

- You can execute the software at any time. However, an error message is displayed if the
  machine is not operational (power stage turned on).

- You can start a program stored on FLASH-EPROM by pressing the START button.
  Of course, the machine must first be set up correspondingly.

- The hood is locked while tooling. You can only open the hood after the machine stands
  still, the tooling machine is off, and the software enables the opening of the hood
  (the COVER button lights up).

- You must press the COVER button for opening the hood. The hood is automatically locked
  after closing. To start the machine, you must press the START button again.

Please, refer to the corresponding software manual for all further information on working
with the software.

Keyswitch

For debugging the program, you can nevertheless open the hood during the operation if
you turn the keyswitch to TEST (test operation). In this case, the tooling machine must be
switched off but the work program is continued.
Take care to retract the tool from the work piece!

⚠️ **This key may only be used by expert and authorized personnel since no protection
against moving machine parts is available anymore after opening the hood.**

Tooling machine (only in the case of type 3)

The tooling machine is directly wired and switchable using the software.
The same applies to the three other switchable outputs (optional) that you can use to switch
optional devices (refer to the technical data).
☞ The tooling machine can only be turned on if the POWER button is lit, the hood is locked
close, the rotary switch at the machine is set to ON, and the software controls the machine.

6 Troubleshooting

Fault	Cause	Remedy
Equipment can not be turned on	No mains power is available	check the mains circuit, power plug, multiple socket outlet
	Mains switch is not turned on	turn on the mains switch
	Fuse is defective	**Pull the power plug** replace the fuse (see below)
POWER button does not function	Hood not closed	close the hood
	Emergency-Off not released	release Emergency-Off
	Fuse is defective	**Pull the power plug** replace the fuse (see below)
Software does not work correctly	Equipment not turned on	turn on the equipment (mains switch)
	Power stage not turned on	activate power stage (POWER button)
	Driver not loaded	install the driver
	Connection is not correct	check the cable connectors
Tooling machine (spindle) does not function	Not released by the software	reset the equipment and perform a reference movement
	Rotary switch at the tooling machine is off	turn on the tooling machine
	Fuse is defective	**Pull the power plug** replace the fuse (see below)
Scaling of the axes is not correct	Leadscrew pitch does not correspond to the setting in the software	Change the leadscrew pitch in the driver program to 4 or 10 mm
First movements do not correspond to the programm	EPROM contents a program	Delete the EPROM (s. page 16)

Fuse replacement

**Pull the power plug before changing any fuse!**
The main fuses of the machine ① are amenable from the outside. They are located directly beside the power plug.

Remove the large rear-panel for changing the other fuses. You find the main fuse for the motor voltage ② in front of the transformer in the black plastic holder (① + ②: 6.3 A each). The remaining fuses are located on the controller printed circuit board.
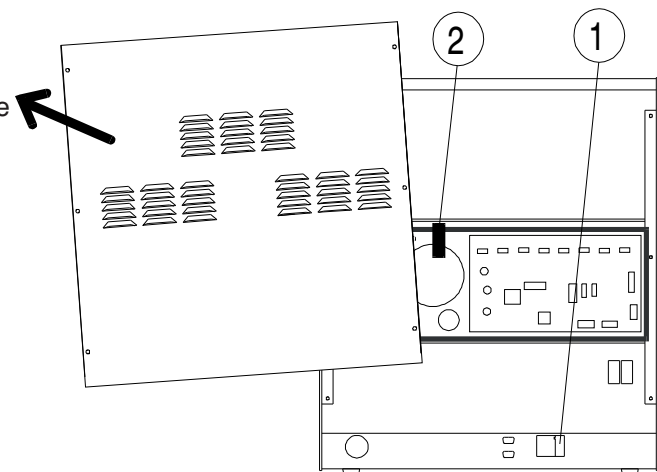
Please refer to the following drawing for the positions of fuses (②, ④, ⑥, ⑦, ⑨) and LED's (①, ③, ⑤).
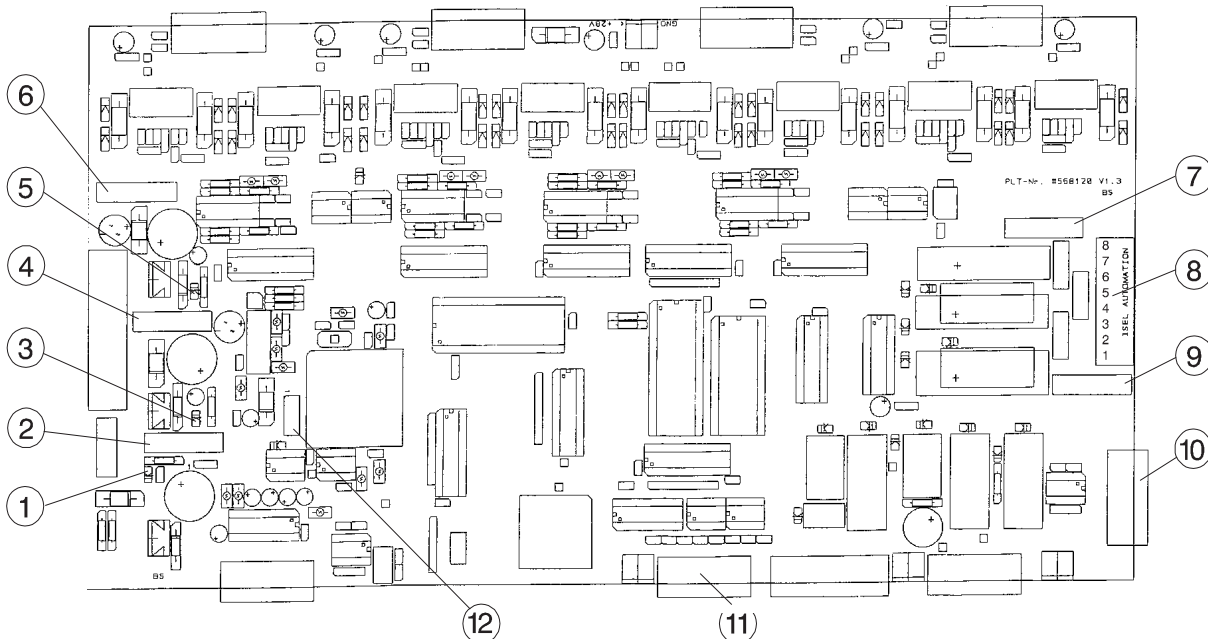
Controller printed circuit board behind the rear-panel

①	Controller LED	Processor supply voltage 10 V/5 V
②	Input fuse	1,25 Amp, slow ones
③	Controller LED	24 V I/O voltage
④	Input fuse	1,25 Amp, slow-blow
⑤	Controller LED	24 V safety circuit voltage
⑥	Input fuse	1,25 Amp, slow-blow
⑦	Supplementary output fuse	230 V, 1,25 Amp, slow-blow HBD
⑧	Supplementary output connector	230 V
⑨	Tooling machine fuse	230 V, 5 Amp, slow-blow HBD
⑩	suppl. outp. 9-pin Sub-D f. con.	15 mA max.
⑪	suppl. inp. 9-pin Sub-D fem. con.	
⑫	H1 jumper field	

For special cases (if a switch is defective or in case of power failure etc.), you can manually open the hood interlock using the triangular wrench.

1. Switch off the machine.

2. Remove the four screws of the sheet metal lid of the chassis, then remove the lid.

3. Insert the triangular wrench into the interlock from the back and turn it around half a turn to the left without applying excessive force.

You may not operate the machine in this state.
The tooling machine remains de-energized.

7   Technical data / accessory

	ICP 2015	ICP 3020	ICP 4030
Measurements w x d x h [mm]	535 x 600 x 690	610 x 650 x 715	780 x 850 x 810
Movement areas X/Y/Z [mm]	200/150/90	300/200/90	400/300/140
maximum axis speeds [mm/s]	50	50	50
(without a load)	all axes with 10 mm leadscrew pitch		
Pass-through height [mm]	100	115	170
Clamping table [mm]	250 x 400	250 x 500	375 x 600
T-slot raster [mm]	25	25	25
Type 2 and 3			
Approx. weight [kg]	78	85	89
Sound pressure level	78 decibel (A)	78 decibel (A)	78 decibel (A)
Mains rating	230 V, 50 Hz, 16 Amp		
Max. power consumption	1150 W		
Fusing	power input 2 x 6.3 Amps, slow-blow HBD		
Earthing	corresponds to protection class I.		
Electric connections	2 x 24 V, optional, switchable, 20 mA via optical isolator		
	1 x 230 V, optional, switchable, 100 W		
	1 x 230 V, switchable for the tooling machine		
Tooling machine (model 3)	500 W, 11.000 - 25.000 r.p.m., firmly wired		
EMC test according to	EN 55011-B and EN 50082-1		

 In order to improve our products, we reserve the right to make engineering changes.

7.1   Accessory

You can order the following accessories that matches the ICP: **Order no.:**
  - additional collets for the spindle: e. g. 239 110 3000
      1 to 5 mm in 0,5 mm steps, 6 mm and 1/8"
  - additional mounting hardware for the T-slot plate   e. g. 290 001
  - drill and milling cutter set, shaft 3 mm / 3,175 mm   400 100/400 200
      7 drills (0,5 - 3 mm), 8 milling cutters (1 - 3 mm and/or 1/8"), 2 burins
  - working area light (not for type 1)   280 1XX 9004
  - suction apparatus   280 1XX 9001
  - vacuum cleaner   425 005
  - engraving spindle (25 000 r.p.m. and/or 20 000 r.p.m.)   421520/421503 0001
  - engraving pad   280 1XX 9003
  - sprinkle/chilling appliance   280 1XX 9002
  - axis of rotation   e. g. 263 003 0001
  - grease gun   931 170

With every accessory, pay attention to an expert assembly and consider the valid standards and safety regulations.
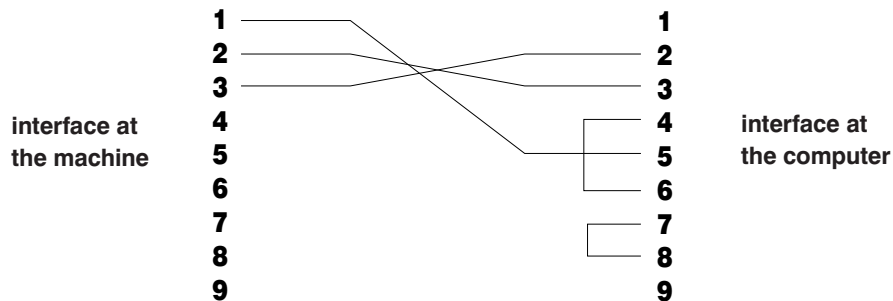
In the appendix, you find the assembly and operating instructions for the accessories.

For further information and/or purchase orders, please contact our
technical consulting +49-6659-981-744

7.2   Pin assignment

7.2.1   For the ICP with electronik

The pin assignment of the connection cable for the serial interface:

Please, consider the following notes if you want to custom-specifically setup the optional supplementary inputs/outputs:

⚠ **Let only specialists carrying out the work since otherwise danger exists for your life!**

The numbers in the circles refer to the figure of the controller printed circuit board (page 19).

To the 24 V outputs:

You can tap the voltage at the 9-pin Sub D connector ⑩.

The switching outputs OPTO-5 and OPTO-6 are carried out with optical isolators with emitters led outwards. They are available for signaling. These outputs are not disconnected in case of Emergency-Off.

You must connect your loads against GND 24 V I/O (pins 6 to 9).

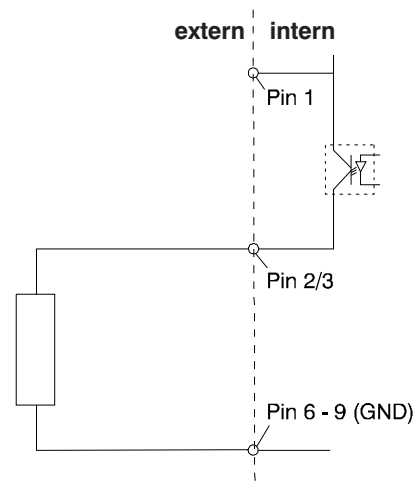The maximum switching current should not exceed 15 mA!

☞ The switching outputs are not short-circuit-protected.

Connection example:

| Pin	Description
1	+ 24 V I/O voltage
2	out OPTO-5 (bit 5) open emitters
3	out OPTO-6 (bit 6) open emitters
4	free
5	+ 24 V I/O voltage
6	GND 24 V
7	GND 24 V
8	GND 24 V
9	GND 24 V

To the 24 V inputs:

Use the 9-pin Sub D connector ⑪ (see image page 19). The input is carried out using an optical isolator with the anode led outwards. The necessary series resistor is available on the printed circuit board.

Connection example:

Pin	Description
1	user input 2
2	user input 1
3	occupied
4	occupied
5	GND 24 V
6	+ 24 V I/O voltage
7	occupied
8	occupied
9	GND 24 V

extern ┆ **intern**

Pin 6 (+ 24 V)

Pin 1

Pin 9 (GND)
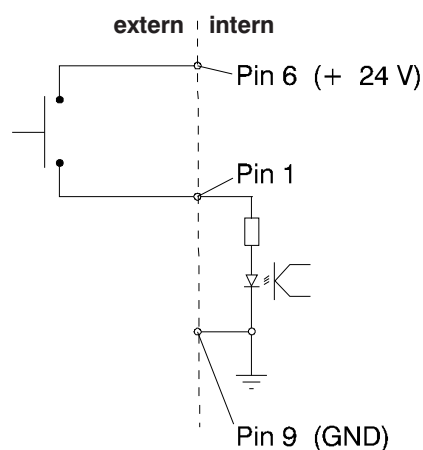
Use pin 6 for the 24 V control voltage of both inputs.
Pins already used by isel Germany must not be modified. Otherwise, the machine can not function properly.

230 V output:

Use the ⑧ connector (see image page 19). **The connector carries 230 V potential!**

Terminal	Description
1	230 V, live supply
2	switching output tooling machine
3	switching output 230 V OUT 3 (bit 3)
4	null tooling machine
5	null supply
6	null OUT 3
7	null OUT 4
8	-

You can replace the pre-installed tooling machine on terminals 2 and 4 by another machine (max. power approx. 900 W).
Additional 230 V loads must be connected to terminals 3 and 5 and/or terminals 6 and 8.
A maximum of 1 Amp (200 W) can be drawn from output 3.

⚠ **All 230 V loads are only single-pole switched. You must assume that an interrupted load is not necessarily voltage-free.**

In addition to the fusing ⑦ and ⑨, all 230 V switching outputs (terminals 2, 3 and 8) are protected by a common fuse at the power input.

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7.2.2   For ICP without electronic

Amphenol connector for X-, Y-, Z- and A-axis   (see page 8 items ① - ④)
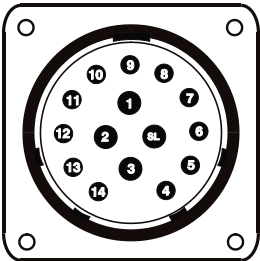
Signal				
1	=	phase 2B	green	
			white/yellow	
2	=	phase 2A	yellow	
			white/green	
3	=	phase 1B	black	
			white/red	
SL	=	phase 1A	red	
			white/black	
4	=	+ 24 V brake (option)	black	(brake)
5	=	GND	black	(circuit board)
6	=	GND brake (option)	black	(brake)
7	=	PE shielding, frame	blue	(frame)
9	=	reference switch	yellow	(circuit board)

Sub D 9-pin connector, START- and STOP-switch   (see page 8 item ⑤)

Signal	Pin	Pin	Signal
-	1	6	-
-	2	7	start
start	3	8	stop
stop	4	9	-
-	5		
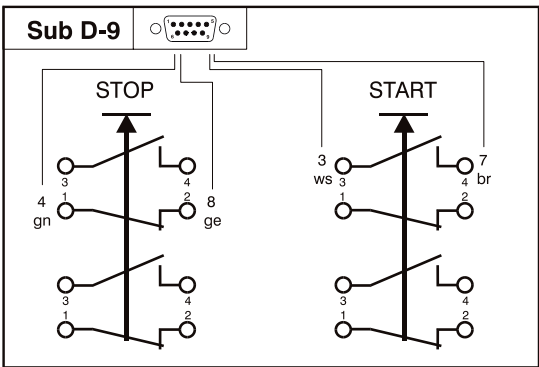
Sub D 9-pin connector, hood switch (COVER) (see page 8 item ⑥)

COVER-Taster (COVER switch) Schmersal

Pin 3 = "1" Sub-D
Pin 4 = "1" Schmersal
Pin a = "6" Schmersal
Pin b = Drahtbrücke (wire bridge)

Lampe 48 Volt = Drahtbrücke
(Light 48 Volt = wire bridge)
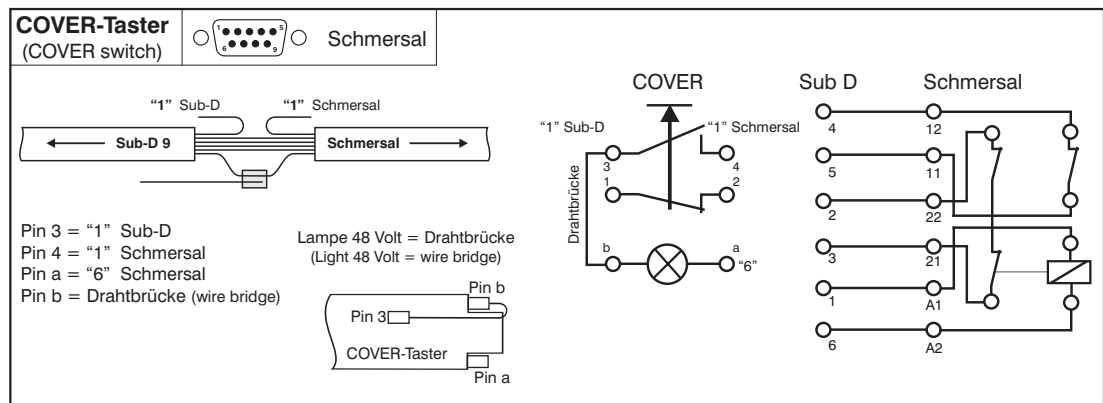
Sub D 15-pin connector, POWER/Emergency-off   (see page 8 items ⑦)

Signal	Pin	Pin	Signal
ON (N.O., 1. layer)	1	9	ON (N.O., 1. layer)
emergency-off (N.C., 1. layer)	2	10	lamp (in the ON-switch)
-	3	11	lamp (in the ON-switch)
-	4	12	-
emergency-off (N.C., 1. layer)	5	13	key-switch
key-switch	6	14	ON (N.O., 2. layer)
ON (N.O., 2. layer)	7	15	emergency-off (N.C., 2. layer)
emergency-off (N.C., 2. layer)	8		

Sub D-15

POWER

SCHLÜSSEL
Key switch

NOT-AUS
Emergency stop button
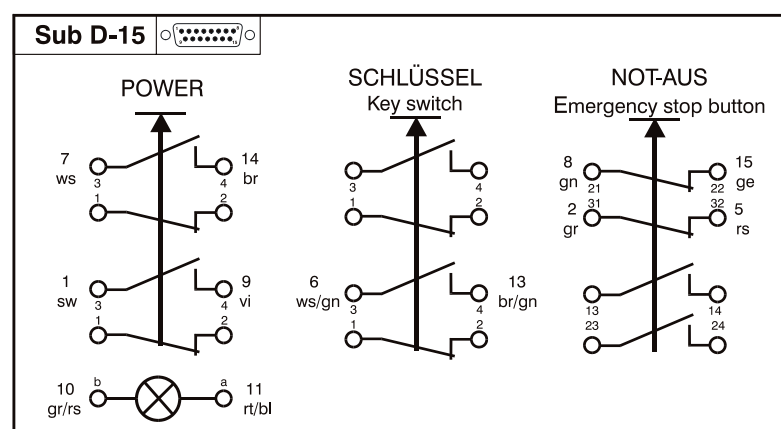
8   Appendix

Certificate of conformity

We   isel Germany AG
              Bürgermeister-Ebert-Str. 40
              D-36124 Eichenzell

hereby certify on our own and sole responsibility that the machines

Article Designation: **CNC compact equipment ICP**
Article Numbers:

2015	**ICP 3020**	**ICP 4030**
	280 211 8417	

to which this Certificate refers have been developed, designed and manufactured to comply with the

EC Directive 73/23/EEC   ~ 93/68/EEC
EC Directive 89/336/EEC   ~ 93/68/EEC
EC Directive 89/392/EEC   ~ 93/68/EEC

The following harmonised standards have been applied:

1. **EN 292 parts 1 and 2**
   Safety of machines, generic terms, general design directives

2. **EN 294**
   Safety distances against reaching dangerous locations with the upper limbs

3. **EN 349**
   Safety of machines:
   - Minimum distances to avoid bruising of parts of the body

4. **EN 418**
   Safety of machines:
   - Emergency stop device, functional aspects, design guidelines

5. **prEN 953**
   General demands on the design and of disconnecting protective devices

6. **prEN 954-1**
   Safety-related parts of control systems

7. **EN 60 204 part 1**
   Electrical equipment of industrial machines, General requirements

8. **EN 55011 (VDE 0875)**
   Limit values and measuring methods for radio interference suppression of industrial, scientific and medical HF devices (limit class B)

9. **EN 50082-1**
   Electromagnetic compatibility
   Basic Specification for noise emission
   Part 1: Living areas, business and trade-areas and small firms

10. **IEC 1000-4 (parts 2-5)**
    Testing and measuring methods for noise immunity

Eichenzell, 3rd August 2009

Hugo Isert, General Partner

isel ®
From Components to Systems

Service waybill (please, also consider the notes to the next page)

Sender

Company _____

Customer No. _____

Contact person/Dept. _____

Phone _____ Fax _____

Postal address _____

_____

Return to _____

Qty.	Item number	Designation	Invoice No./ Delivery Note No (please add copy)	Serial number

Cause of the complaint

a) Financial complaint   ❍ wrong delivery   ❍ variance of quantity

❍ _____

b) Technical complaint

Error description   _____

_____

_____

_____

_____

When does the fault occur?

❍ permanently   ❍ temperature dependent

❍ sporadic   ❍ after ___ minutes of operation

Was the item already in use?

❍ has not yet been used

❍ defect during commissioning

been in use for __ months

Date _____ Signature _____

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Please, take note in case of returning the product!

1. **Warrantee proof**
   For the examination of your warranty claim, a copy of the purchase bill or of the receipt is required. We return the product unprocessed against a charge if this proof is missing.

2. **Error description**
   In case of products arriving without precise error description at our facilities ("Defective" or "For Repair" is not sufficient), we have the right to select between carrying out of a liable to pay the costs fault diagnosis or the non-repaired returning against a service charge.

3. **Inadmissible complaints**
   In case of inadmissible complaints (no fault is detectable, probable operator error), the product is self-consciously returned against a service charge.

4. **Wrapping**
   We can only accept returned products in original *isel* packing or equivalent wrapping. The warranty claim is endangered by missing original or inappropriate wrapping. Resulting transport damages cause the expiration of the warranty claim.

5. **OEM products**
   Products which were not delivered by us are returned in a non-repaired manner against a service charge.

6. **Transport charges**
   isel Germany carries the transportation charge for returns from warranty claims. The sender bears all other haulage. Product sent in without paid transportation charges can not be accepted for organizational reasons.

7. **Sales conditions, delivery conditions, and terms of payment**
   As for the rest, the sales conditions, delivery conditions, and terms of payment of isel Germany are valid without change.