



Training for electric Maintenance Staff on SAACKE
CNC GRINDING Machines with NUM Axium
Power CNC Controller

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1. The Cabinet

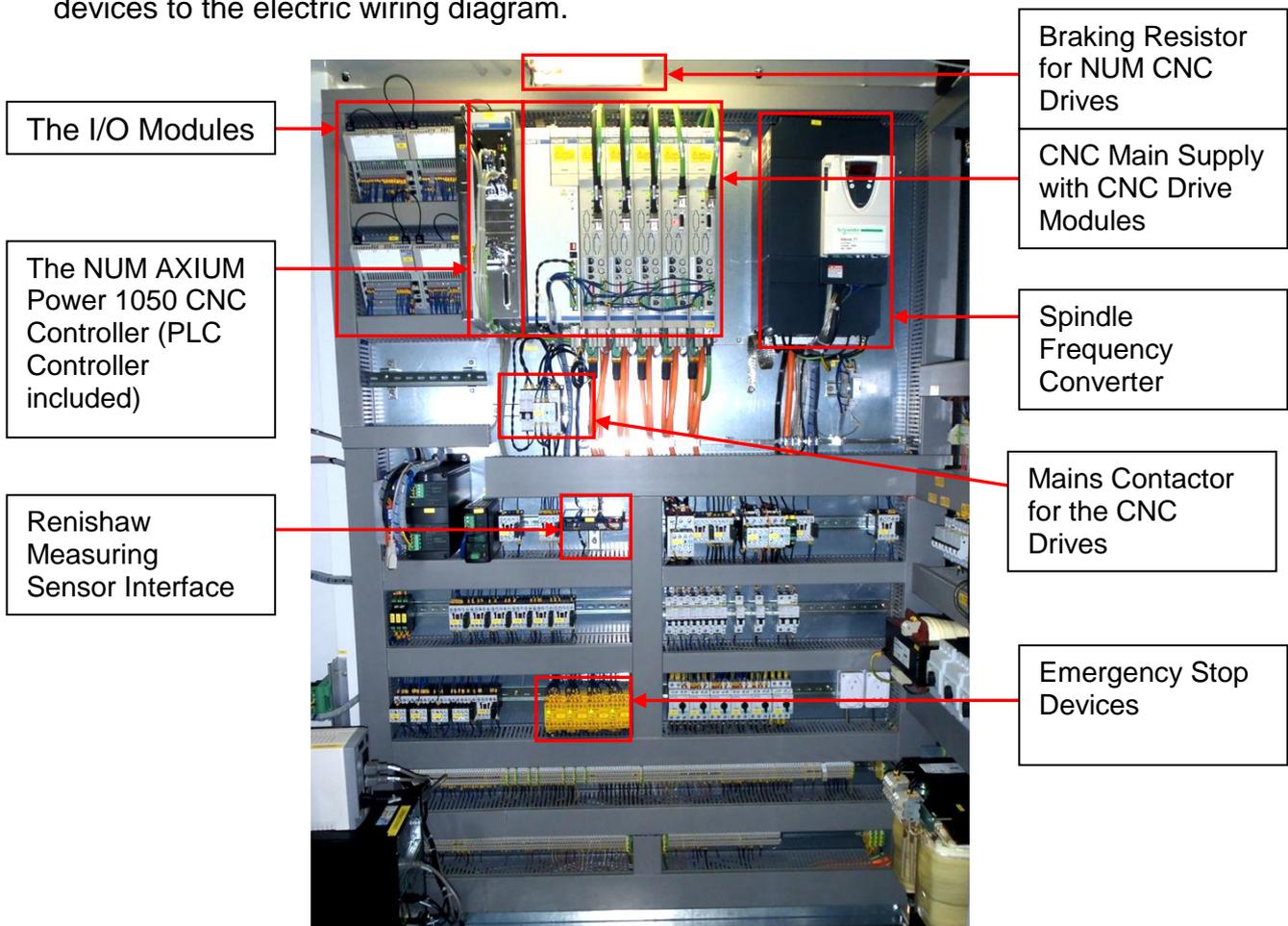
At first, we will see what we can find in the electric cabinet of the machine. We have a lot of possibilities to perform a visual check, if we know the devices, their duties and their interfaces. To perform such a check, we need a wiring diagram and the relation to the cabinet!

1.1. The Diagram

Due to the fact, that we have a lot of options and different machine types, we always need an actual wiring diagram of the present machine.

1.2. The Devices

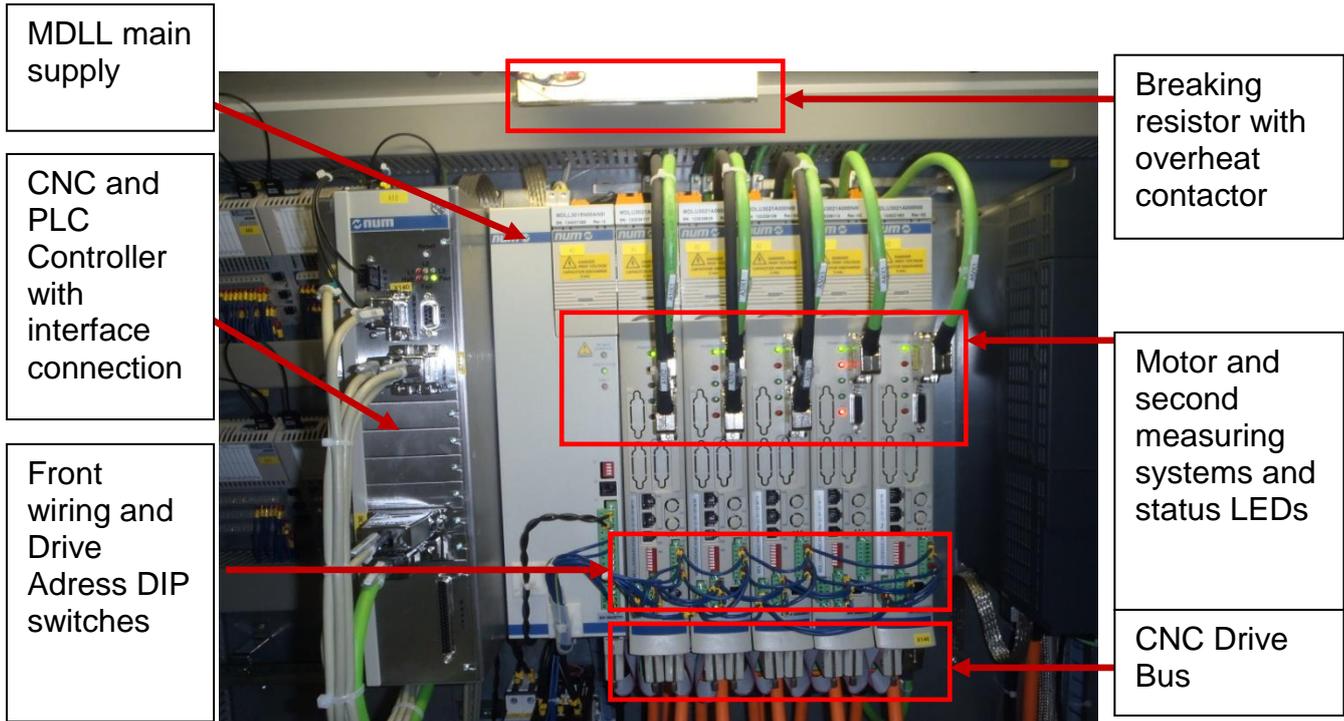
First we'll have an overlook of the cabinet and the single devices. Please refer all devices to the electric wiring diagram.



The NUM AXIUM POWER 1050 CNC Controller with included PLC Control has several interfaces connecting the peripherals of the machine. On the next picture we'll introduce the CNC drive system with CNC Controller, MDLL mains supply and MDLU Drives:

Electric Maintenance Training on Saacke Machines

Control: NUM Axiom Power 1050 CNC



The Emergency Stop devices disconnect the drive supply in case of emergency or opened doors. The status LEDs show, if the supply is disconnected or not. To reset the device, the emergency loop and the monitoring contacts need to be closed. Please refer to the wiring diagram.



On the left side of the cabinet are interfaces to external devices like the grinding oil filtration system, main connection and breaking resistor of the spindle converter installed. Please refer to the electric wiring diagram.



1.3. Visual cabinet Check

There are a lot of possibilities to perform a visual check, without using a PC – program. It is important that there is an electric wiring diagram present and you'll have a lot of opportunities to check the devices. In chapter 2.2 Status LED of the CNC Control, Chapter 3.3 Visual check of the MDLL and MDLU and chapter 4.2 I/O Module Diagnosis we provide information how to control these devices without a HMI Tool. But in this part of the Training we want to show how to check the standard electric of the cabinet.

Emergency Stop Relais N1:

If at any time the PLC or NC fails, the watchdog relays 400K0 will disconnect the Drive supply. If you cannot reset an emergency stop condition, even if the emergency stop switches are released, check the yellow relays N1. All fuses, all emergency stop contactors and the 400K0 relays need to be closed.

Safety Door Switch Relais N3/N4/N5:

The safety relays N3/N4/N5 monitor the safety door switches. If any switch fails, it will disconnect the drives. If every door is closed and locked the LEDs on these relays need to be on to supply the drives.

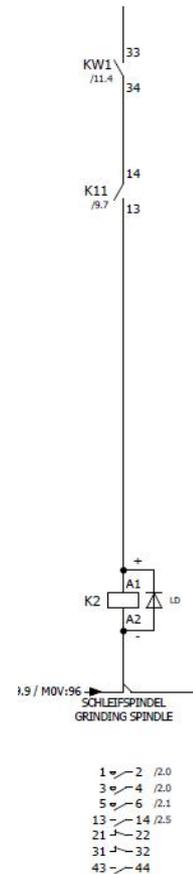


As shown in this picture, the drives have no power. Every circuit is disconnected!

CNC / Spindle and Accessory Drive System Power:

Every Drive System has a main connection relays, due to the fact that different machines have a lot of options please refer to the electric diagram. If at any time any drive is not supplied, check this central main relais and the control of this relais!

For an example the main spindle drive is connected via relais K2 and K2 is controlled by relais KW1 and K11. So it is possible to figure out why any device won't be supplied. Just go back in this line to figure out which contactor fails.



Braking Resistor of NUM CNC MDLU Drive System:

The NUM CNC Drive System braking resistor has a overheat contact, which is connected to the MDLL supply unit. If this contactor fails, we'll face an error of the drive system. It is very easy to check this connection with a simple measuring device.

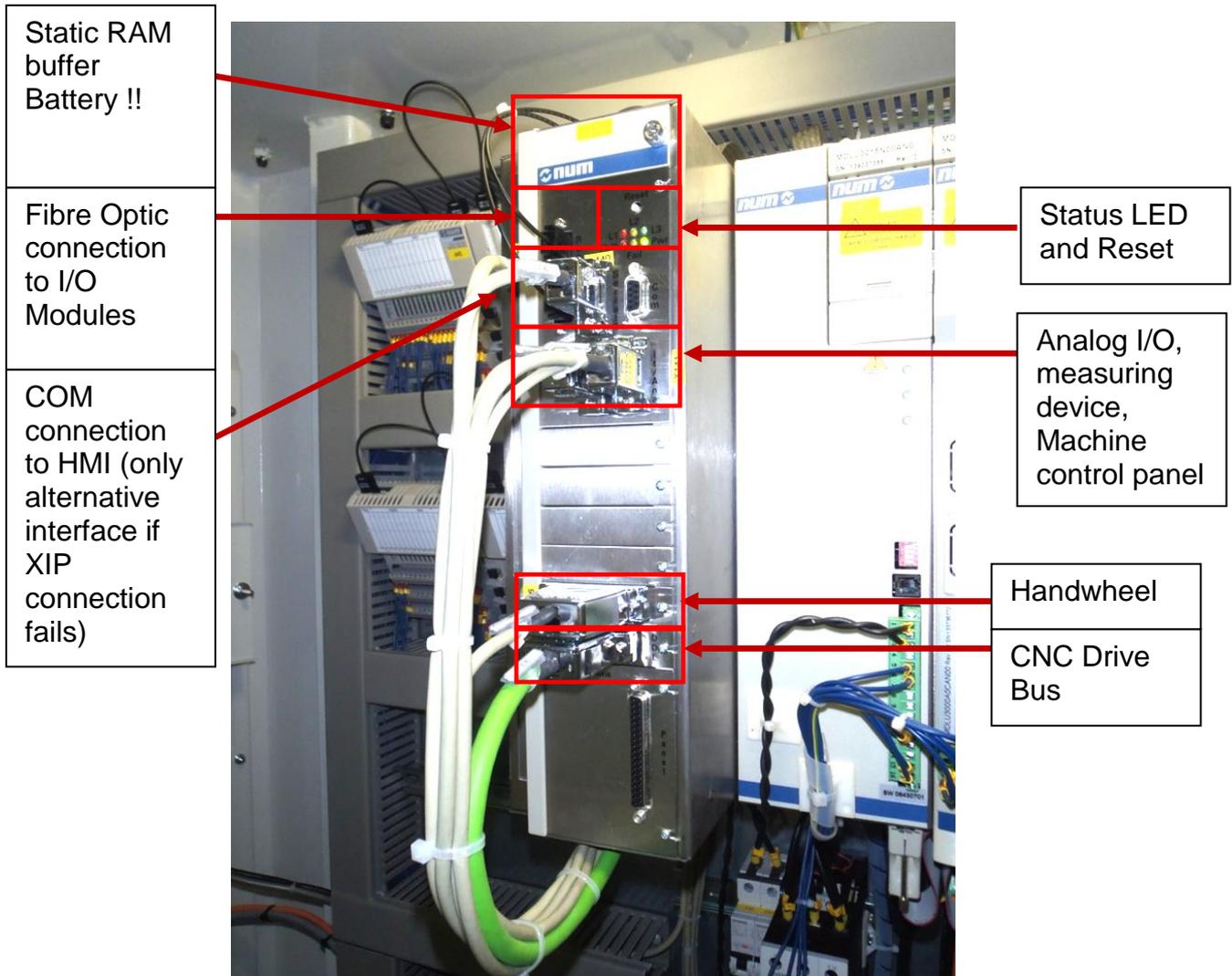


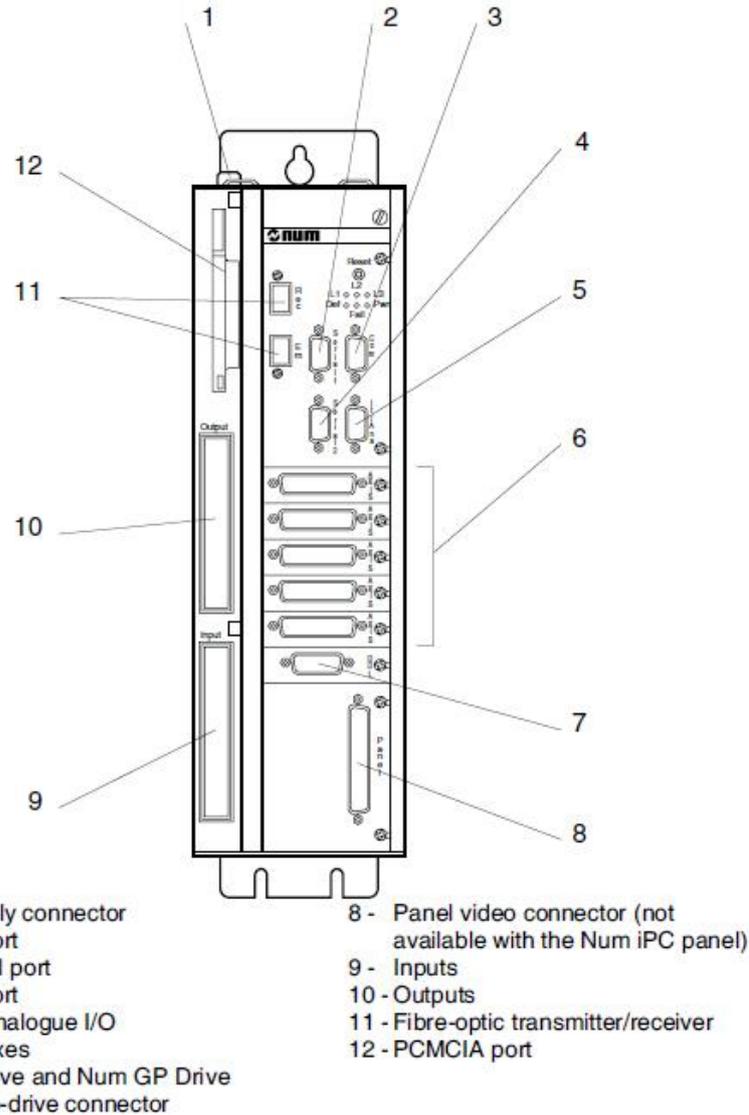
Breaking resistor and overheat contact, connected to the MDLL supply unit

2. The CNC Control

2.1. Connections

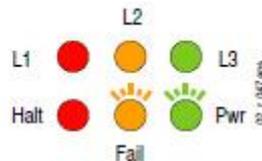
The NUM Axiom Power 1050 CNC System provides a lot of interfacing systems. In the picture below every connection will be explained. For detailed information refer to your electric wiring diagram.





2.2. Status LEDs

The Status LEDs show if the controller is faulty or not. When powering up is complete, the Fail LED (orange) goes out. The Pwr LED (green) remains on! And the watchdog relays 400K0 should be on. It is possible to perform an initial reset with the reset button above the status LEDs. If the controller ever shows an error condition, further diagnosis is needed! Maybe the SRAM battery, the fuse of the SRAM battery or the SRAM itself is faulty and the initial data are corrupt.



When powering up is complete, the Fail LED (orange) goes out. The Pwr LED (green) remains lit. If the HSL option is present, LED L3 (green) flashes when on standby for communication and remains lit steady when communication is established.

2.3. Battery Change

The battery in the CNC controller is needed to buffer the static RAM. It is the main storage of the controller, where every machine parameter and machine setting is saved. This SRAM needs to be refreshed continuously. If the machine is not connected to the grid for a longer time, the battery supplies the SRAM refresh circuit with power. Normally, the battery needs to be replaced every 5 years. The controller provides a message, shown in the HMI screen, if the battery needs to be replaced.



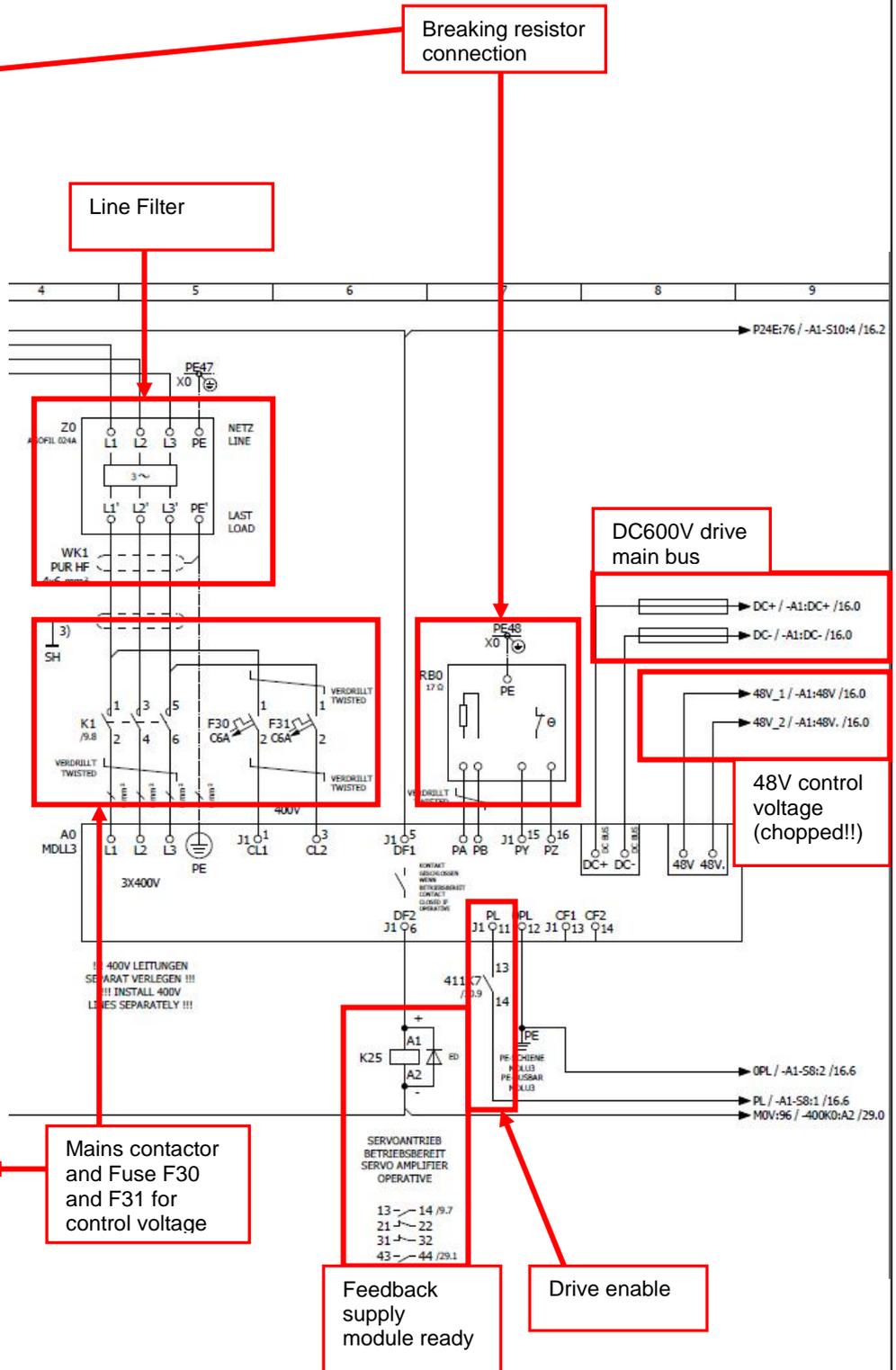
When replacing the battery, the controller has a special super capacitor inside, which will buffer the SRAM refresh circuit for up to 15 minutes. So it is enough time to change a battery without data loss! But if you ever change the battery, remember to make a backup before (see chapter 6 NUM Backup Tool)! If the battery change fails, you'll be able to restore your CNC.

Also remember, if you have changed the battery, you need to reset the battery warning message with the standard MMI (see chapter 7 standard MMI).

3. Supply Unit and the NUM MDLU CNC Drives

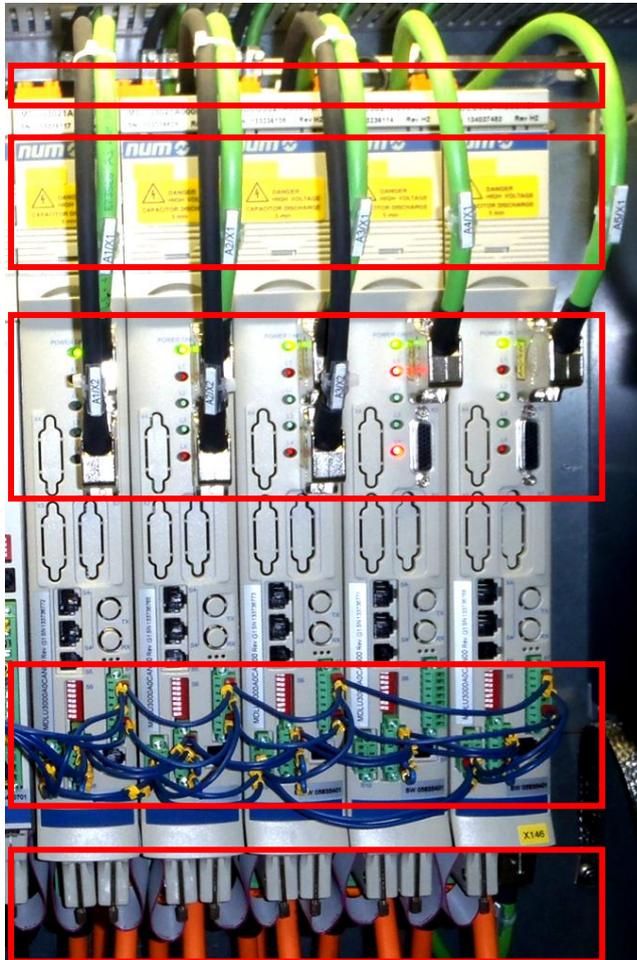
3.1. NUM MDLL CNC Drive Supply

The NUM MDLL CNC Drive supply device provides the 600V DC main bus for every CNC drive and generates also the 48V control voltage supply. The breaking resistor, the breaking resistors' overheat contact and the drive bus is connected to the MDLL.



3.2. The NUM MDLU CNC Drives

The CNC Drive System consists of single MDLU axis amplifiers, one for each CNC axis. Every amplifier has several connections for measuring systems, power output, DC main bus, control voltage and cnc bus. On the following picture the connections are explained:



48V control voltage
(attention, chopped
voltage)

600V DC bus
connection!

Measuring Systems,
Motor and external and
status LEDs

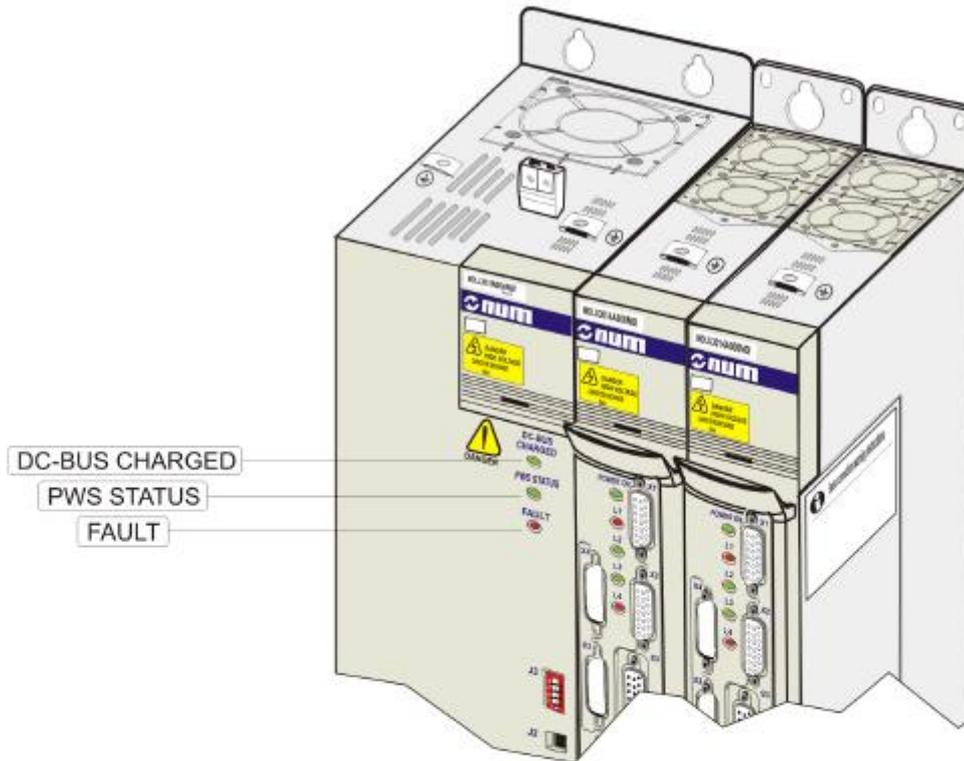
Front wiring for enable,
24V, 0V, GND and Axis
Adress switch.

Power Output and CNC
Bus cable

3.3. Visual Check

The status of the MDLL and MDLU modules can be checked directly with the help of the status LEDs.

There are 3 status LEDs on the MDLL supply module. On the next picture the signaling will be explained:



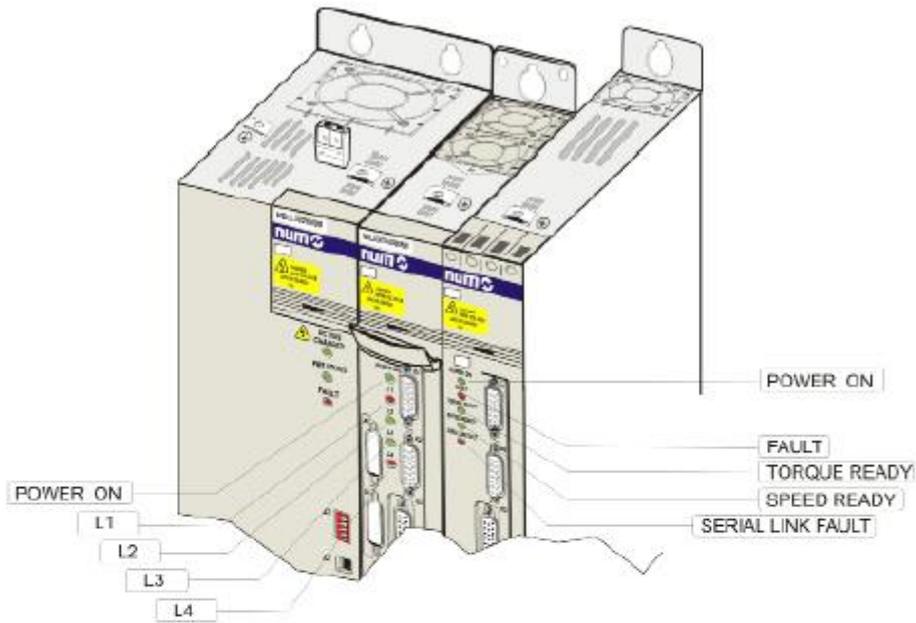
LED	Status signalling
	LED ON
DC-BUS CHARGED Green 	The green LED is ON when the module is correctly connected and supplied. (DC BUS voltage $\geq 60V$)
PWS STATUS Green 	The green LED is ON when the mains and the auxiliary power supply (CL1, CL2 terminal) is present. The green LED is ON flashing when only the auxiliary power supply (CL1, CL2 terminal) is connected.
FAULT Red 	The red LED is ON whenever a fault on the module occurs. See Fault description table on section 7.1.1.

Number of blinks	Fault type	Fault description	Possible cause	Possible remedy
0 (1)	External fault	Brake resistor overtemperature.	The working cycle is characterized with very heavy accelerations/decelerations and the external braking resistor has reached a too high temperature. Braking resistor wires wrong connections.	Use a less heavy working cycle by increasing the time between the accelerations or by increasing the braking resistor power. (See paragraph 3.7) Check the resistor thermo-contact wires connections. (See paragraph 4.5, 4.6)
1	Desaturation fault	Short circuit on the brake resistor.	Braking resistor wires wrong connections or the value of the used resistance is too low.	Check the resistor wires connections or connect a correct resistance value. (See paragraph 4.5, 4.6, 3.7)
2 (2)	Bridge fault	DC link doesn't rise. (i.e. Phase loss)	The input mains voltage is not correct (for example there isn't a phase).	Verify the correct values of the input mains voltages and the mains connections. (See paragraph 4.5)
3	PWS overtemperature fault	Module overtemperature	The power supply heatsink has reached a temperature >90°. Problem due to the fan system.	Use a less heavy working cycle or check the correct thermal exchange inside the enclosure of the electrical cabinet. Check the fan system functionality.
4	Brake resistor fault	Absence or broking of the brake resistor	Absence of the braking resistor or heavy working cycle of the resistor without thermal protection.	Verify the correct brake resistor wiring or use a less heavy working cycle. (See paragraph 4.5, 4.6, 3.7)
5	Overload fault	Overload out of specifications, not authorized	The working cycle used is out of specifications.	Use a working cycle comply with specifications. (See paragraph 3.5)
6	Short circuit fault	Short circuit fault of the output	Dispersion to ground.	Verify the presence of dispersion to ground in drives, motors and wires.
7 (2)	Mains overvoltage fault	Mains value too high	The mains voltage has repetitively exceeded 5% of the maximum value (510Vrms).	Check the mains voltage value. (See paragraph 4.5)

(1) Led continuously ON.

(2) This type of fault opens DF1 / DF2 contact. See J1 connector on section 4.6.4.

There are 5 status LEDs on the MDLU drive module. On the next picture the signaling will be explained:



Led POWER ON status

MDLU3 LED "POWER ON" status		
LED condition	LED status "ON"	- Module auxiliary voltage OK.
	LED status "OFF"	- Module auxiliary voltage not present. - Power board failure on auxiliary voltage regulator.
	LED status "Flashing"	- Overload on auxiliary voltage regulator. - A fault on the Power Unit or on the Control Unit causes the overload. One of these parts must be substituted.

MDLU3 LEDs		Led signalling status			
FAULT condition	Descriptions	L1 (SLF) 	L2 	L3 	L4 (Fault) 
FAULT condition	Drive in alarm status.	X	OFF	X	ON
	Local link in waiting status (tandem).	X	OFF	X	Flashing
	No Software in DSP.	ON	ON	ON	2 Flashing
	Kernel FPGA (KFPGA) Software storing fault	ON	ON	ON	3 Flashing
	No Software in Kernel FPGA and eventually no Software in DSP also.	ON	ON	ON	4 Flashing
	DPS Software incompatible with BOOT revision	ON	ON	ON	5 Flashing
	No Cyclical data from CNC.	ON	X	OFF	X
	Waiting condition	No HTR_VAR or broadcast from NC.	Flashing	OFF	OFF
Working conditions	No HTR_VAR or broadcast from NC.	Flashing	X	OFF	X
	Torque enabled (we could have torque enable request without torque enabled).	OFF	ON	X	OFF
	Speed enabled (we could have speed enable request without speed enabled).	OFF	X	ON	X
Software download status (1)	Flash memory erase before the download of the new Software.	OFF	OFF	Flashing	OFF
	Software download / update running.	OFF	Flashing	ON	OFF
	Software download / update ended.	OFF	Flashing	Flashing	OFF

LEGENDA.
 (1) - Available status only if there is a Software in the drive (previous Sw version)
 ON / OFF = Led status
 X = Status ON or OFF negligible condition.
 _ Flashing = "N" of led flash.

NUMDrive C Mono-Axis alarm possible causes/remedy

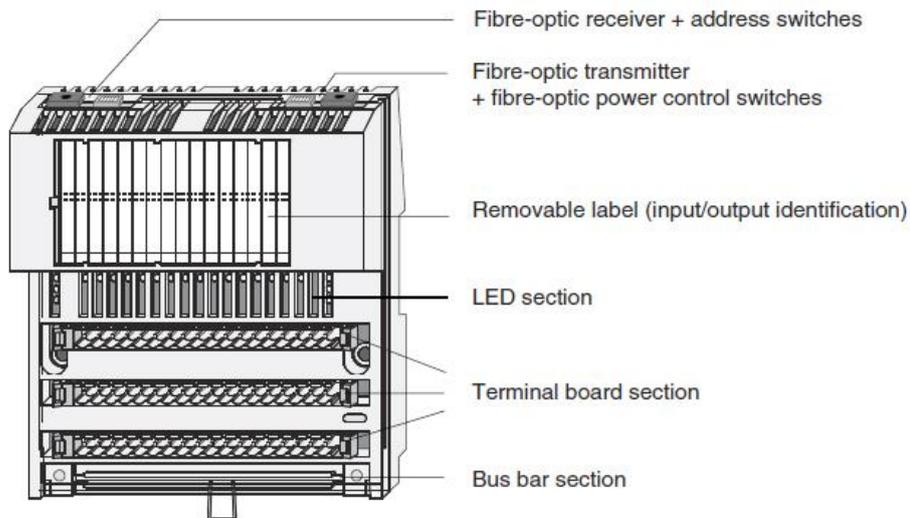
MDLU3 LEDs	Possible causes / remedy	
FAULT condition	Local link in waiting status (tandem)	- Check S4 Local link connections. - Check Master / Slave communication. - Check CNC synchronization. - Control board KO.
	No Software in DSP	- Check the presence of the software. - Load the software.
	Kernel FPGA (KFPGA) Software storing fault	
	No Software in Kernel FPGA and eventually no Software in DSP also	
	DPS Software incompatible with BOOT revision	- Inform NUM Technical Service.
Waiting condition	No HTR_VAR or broadcast from NC	- Check the functionality of the first drive installed on right side.

4. I/O Modules

These modules provide inputs and outputs to the PLC control. The 16 Input / 16 Output Modules are able to drive 0,5A at each output. The module is powered with 24V DC and has a consumption of 70mA. The inputs have an impedance of 4,1kOhm and logic high level at 11V to 30V.

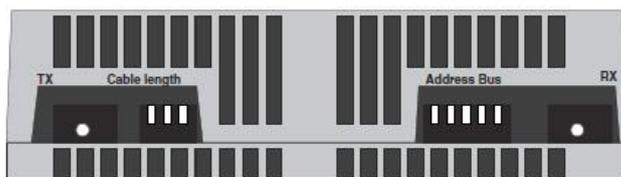
4.1. Connections / Settings

The IO module has a fibre optic communication link to the plc control. The fibre optic connection is a ring topology. Every module and the master has a fibre optic transmit and optic receive connector.



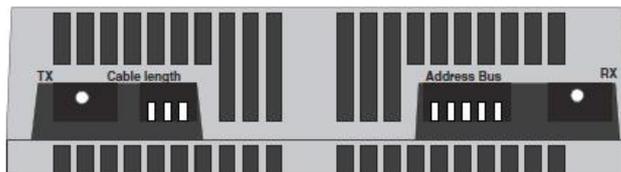
Rear View

- 24 VDC 16-input module
- 24 VDC 16-input/24 VDC 0.5 A 16-output module
- 8-input/2 A 8-output relay module



Rear view:

- 4-input/2-output analogue module



According to the length of the following bus segment it's needed to set the cable length with a DIP switch. This controls the signal strength of the fibre optic bus segment after the module (respective from the transmitter of the actual module to the next modules' receiver)!

Every module needs an Address, so that the plc controller is able to establish connection with a specific IO module. The address is set with the address-DIP switch. The plc controller works with these addresses to reach the station and a specific physical output or input.

If any module is replaced by maintenance staff at any time, set-up the cable length according to the previous installed module or following table:

Optical fibre cable length	Switch setting
L < 15 m	ON 
15 m < L < 30 m	ON 
L > 30 m	ON 

And setup the address DIP switch. It has also to be set according to the previous installed module, or according to the address given in the electric wiring diagram. See the address coding in following table:

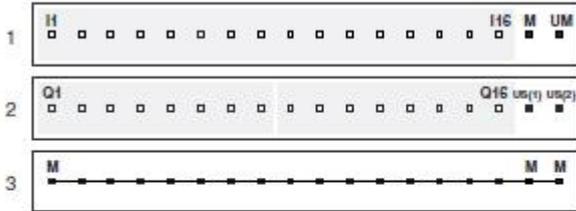
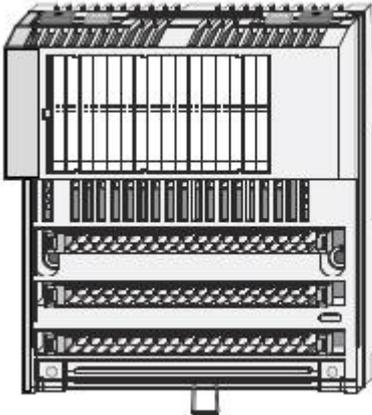
Module Address Table

Switches					Module address
Switch 1	Switch 2	Switch 3	Switch 4	Switch 5	
OFF	OFF	OFF	OFF	OFF	\$40
OFF	OFF	OFF	OFF	ON	\$41
OFF	OFF	OFF	ON	OFF	\$42
OFF	OFF	OFF	ON	ON	\$43
OFF	OFF	ON	OFF	OFF	\$44
OFF	OFF	ON	OFF	ON	\$45
OFF	OFF	ON	ON	OFF	\$46
OFF	OFF	ON	ON	ON	\$47
OFF	ON	OFF	OFF	OFF	\$48
OFF	ON	OFF	OFF	ON	\$49
OFF	ON	OFF	ON	OFF	\$4A
OFF	ON	OFF	ON	ON	\$4B
OFF	ON	ON	OFF	OFF	\$4C
OFF	ON	ON	OFF	ON	\$4D
OFF	ON	ON	ON	OFF	\$4E
OFF	ON	ON	ON	ON	\$4F
ON	OFF	OFF	OFF	OFF	\$50
ON	OFF	OFF	OFF	ON	\$51
ON	OFF	OFF	ON	OFF	\$52
ON	OFF	OFF	ON	ON	\$53
ON	OFF	ON	OFF	OFF	\$54
ON	OFF	ON	OFF	ON	\$55
ON	OFF	ON	ON	OFF	\$56
ON	OFF	ON	ON	ON	\$57
ON	ON	OFF	OFF	OFF	\$58
ON	ON	OFF	OFF	ON	\$59
ON	ON	OFF	ON	OFF	\$5A
ON	ON	OFF	ON	ON	\$5B
ON	ON	ON	OFF	OFF	\$5C
ON	ON	ON	OFF	ON	\$5D
ON	ON	ON	ON	OFF	\$5E
ON	ON	ON	ON	ON	\$5F

The module has several connections for power supply, 16 inputs, 16 outputs, please refer to the following picture to see the electric wiring of an IO module.

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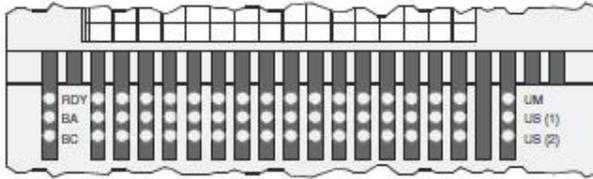
Control: NUM Axium Power 1050 CNC



- Internal wiring
- M,UM 24 VDC module power supply
- M,US(1) Output group 1 24 VDC power supply
- M,US(2) Output group 2 24 VDC power supply
- I1 to I16 Inputs
- Q1 to Q16 Outputs

4.2. Diagnosis / Visual check

The fastest way to check the state of an output or input signal is, to check if the LED which belongs to this signal is illuminated or not. There are also status LEDs on these modules, which tell the state of the module.



Communication LEDs

Green LED **RDY**: Ready

ON: Module ready for communication
OFF: Module faulty (initialisation impossible)

Green LED **BA**: Bus Activity

ON: The module is receiving frames
OFF: No frames

Red LED **BC**: Bus Connection

ON: Fibre-optic cable cut or connection fault with the previous module
OFF: Connection OK

(see Chapter 12, Diagnostics and Maintenance)

Power-On LEDs

Green LED **UM**: Module power supply

ON: Module power on
OFF: Module not supplied

Green LED **US(1)**: Group 1 power supply

ON: Group 1 power on
OFF: Group 1 not supplied

Green LED **US(2)**: Group 2 power supply

ON: Group 2 power on
OFF: Group 2 not supplied

16-Input and 16-output LEDs

Green LED **x**: Status of input x (1 to 16)

ON: Input high
OFF: Input low

Green LED **x**: Status of output x (1 to 16)

ON: Output high
OFF: Output low

Red LED **x**: Output x (1 to 16) faulty

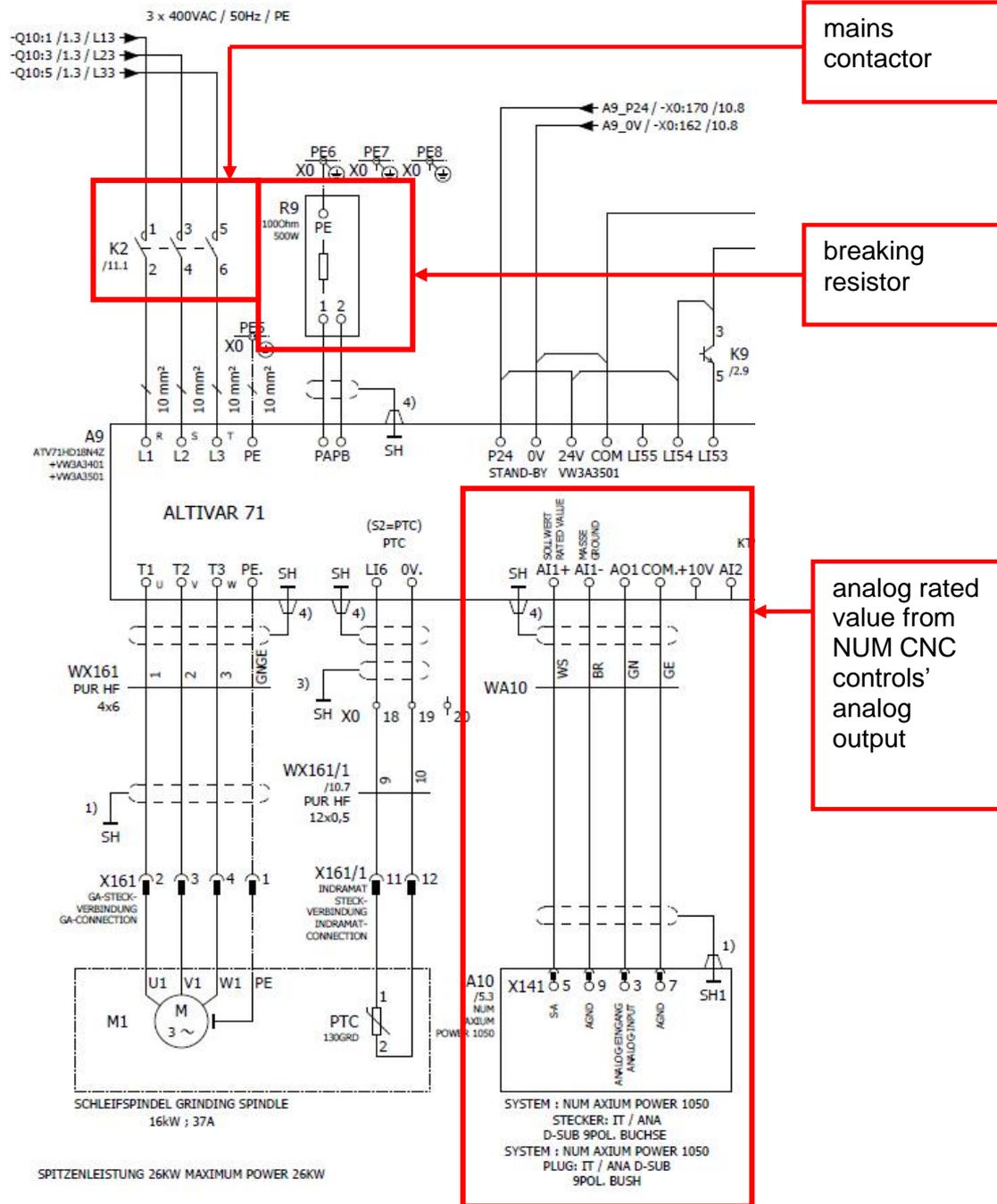
ON: Output shorted
OFF: No short-circuit

5. Spindle Drive

The type of the frequency converter for the spindle drive depends on the machine. There are different types of spindle frequency converters in use. All frequency converters are connected to plc I/O modules.

5.1. Connections

For example we'll have a view on a Schneider ATV71 interface given in the following picture:



5.2. Diagnosis

In case of a fault, the machine will display an error in the HMI. To perform further diagnosis, we can use the display of the frequency converter and read out the error code.

With this error code, SAACKE service staff will be able to localize the problem. If there is no possibility to provide remedy, a team viewer connection will help to localize the problem.

5.3. Team Viewer / Restore Data

On some frequency converters, it is possible to establish a connection between the machines' PC and the converter itself. Due to that fact, SAACKE is able to provide help via remote diagnosis.

SAACKE needs a connection with the internet and the team viewer ID and code.

Necessary data for a Team Viewer connection:

- The error needs to be present
- A member of the maintenance staff at the phone
- Machines' PC must be hooked up to internet line
- Team Viewer must be opened
- Team Viewer ID and password

How to establish Team Viewer connection will be explained in chapter 9

6. NUM Backup Tool

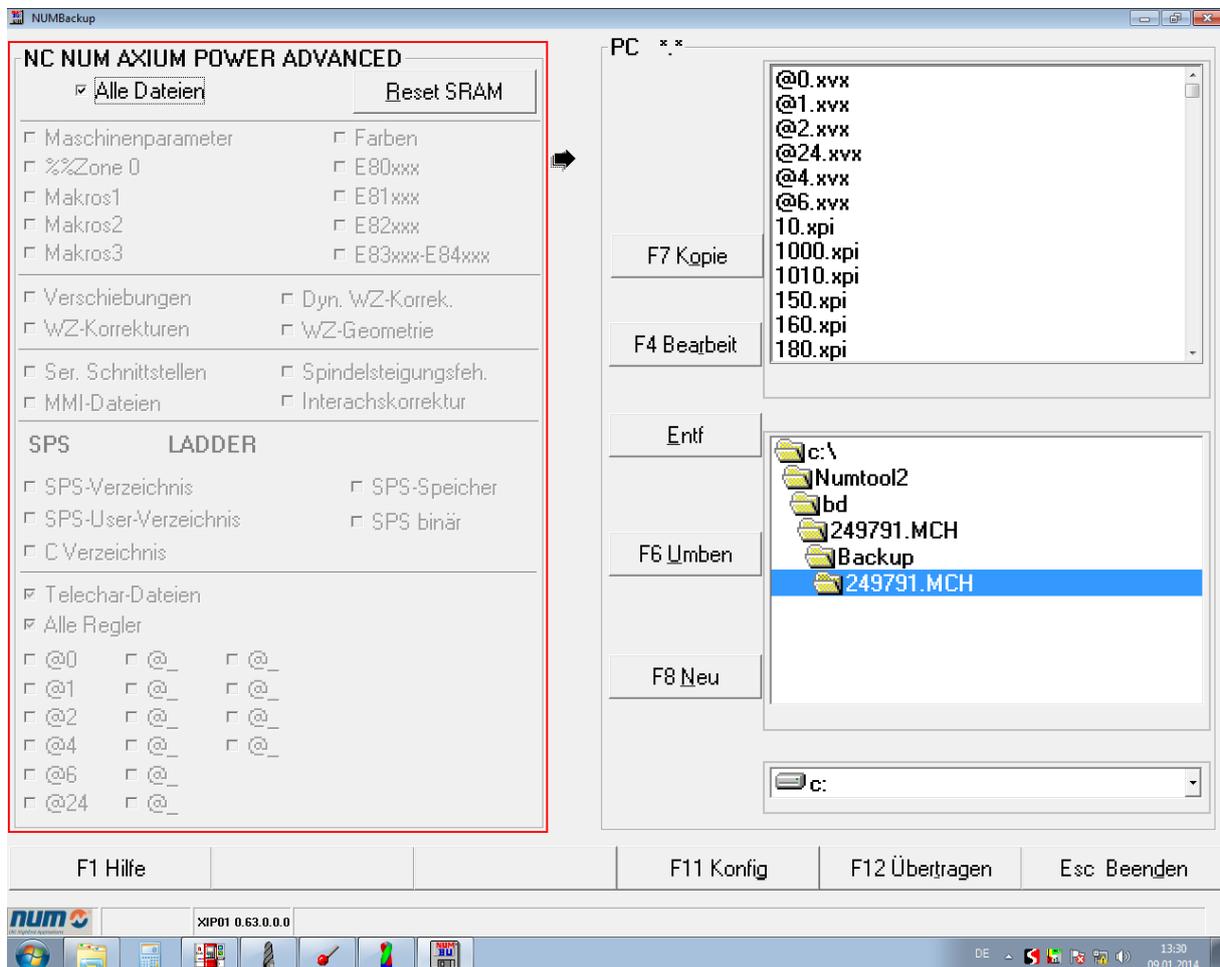
The NUM Backup Tool provides functions to restore data from a backup or to save the controls data into a backup folder.

The program is installed under Start → Programs → NUMTools → NUMBackup

6.1. Main Screen

On the main screen of the NUM Backup Tool, you can choose the data, which will be saved or restored to the control, on the left window. On the right window, you can choose the backup folder and the file, which should be restored.

The arrow in the middle of the window shows the direction of the data. When the arrow shows to the folders, data will be saved from the control to the file. When the arrow shows towards the control, data will be restored from file into the cnc control.



6.2. The Functions

F12 Übertragen

F12 - start data transfer

F7 Kopie

F7 – copy

F4 Bearbeit

F4 – change file

Entf

delete

F6 Umben

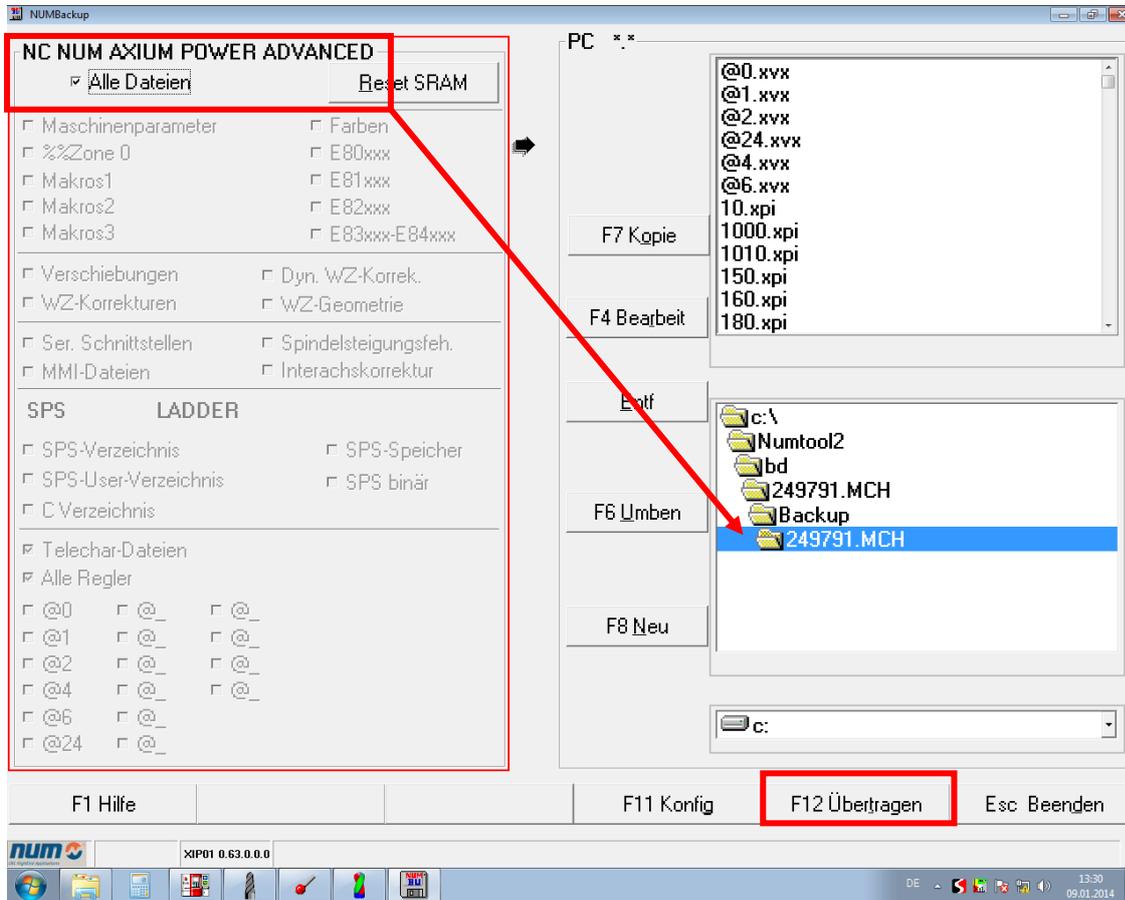
rename file

F8 Neu

create new file

6.3. Make a machine Backup

If you want to make a machine backup, mark "alle Dateien" (all Data) and choose the folder where you want to save these files. Now you have a complete backup of the control.

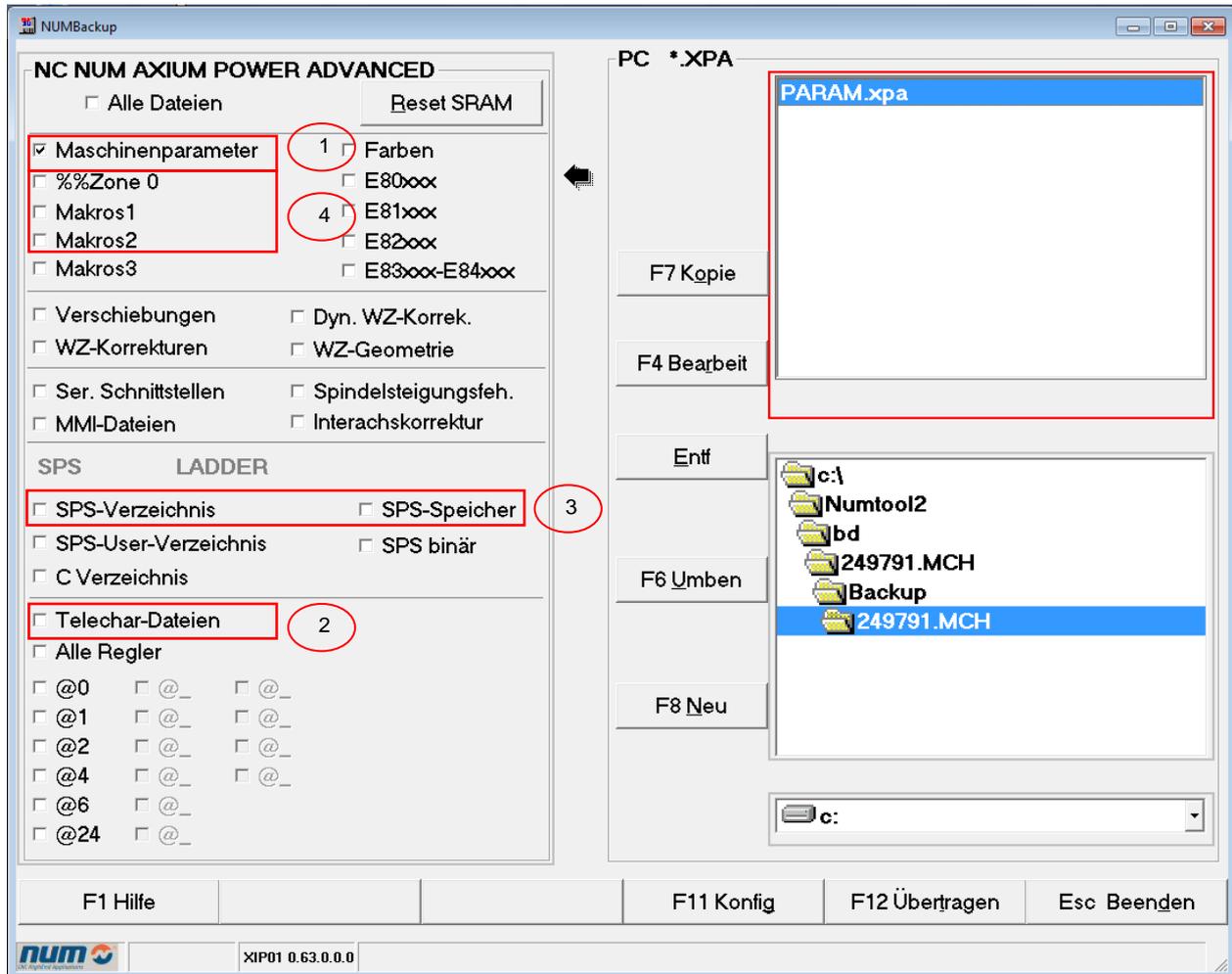


6.4. Restore a CNC control

In case that the CNC Control is defective and you need a new control, you have the possibility to order the control with the correct personalization and the correct affaire number.

With the help of NUM Backup Tool you can restore your complete control by carrying out following steps:

First step is to transfer every machine parameter to the control:



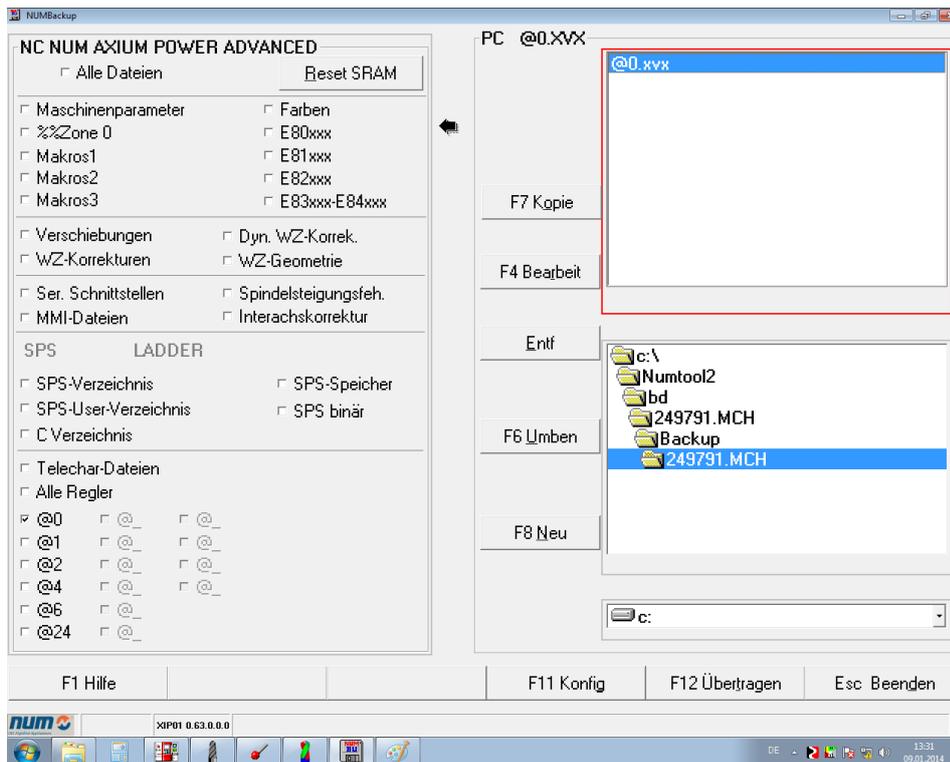
Now the cnc control needs a reset.

The next step is to transfer the Telechar files and then the “SPS-Verzeichnis” and the “SPS-Speicher”. After that you can reload your cnc programs by transmitting the “%%Zone0” and “Makros1” and “Makros2”

6.5. Restore a Drive

If at any time, a drive needs to be restored, because of malfunction, or replacement. You can choose the drive on the left side. After that, only the drive files will be displayed on the right side, if you have chosen a valid backup folder on the right bottom side. The parameter file will be transferred with F12 and the data in the drive is restored.

Attention: This works only with a drive, which has the right firmware version!
See next chapter how to flash a drive.



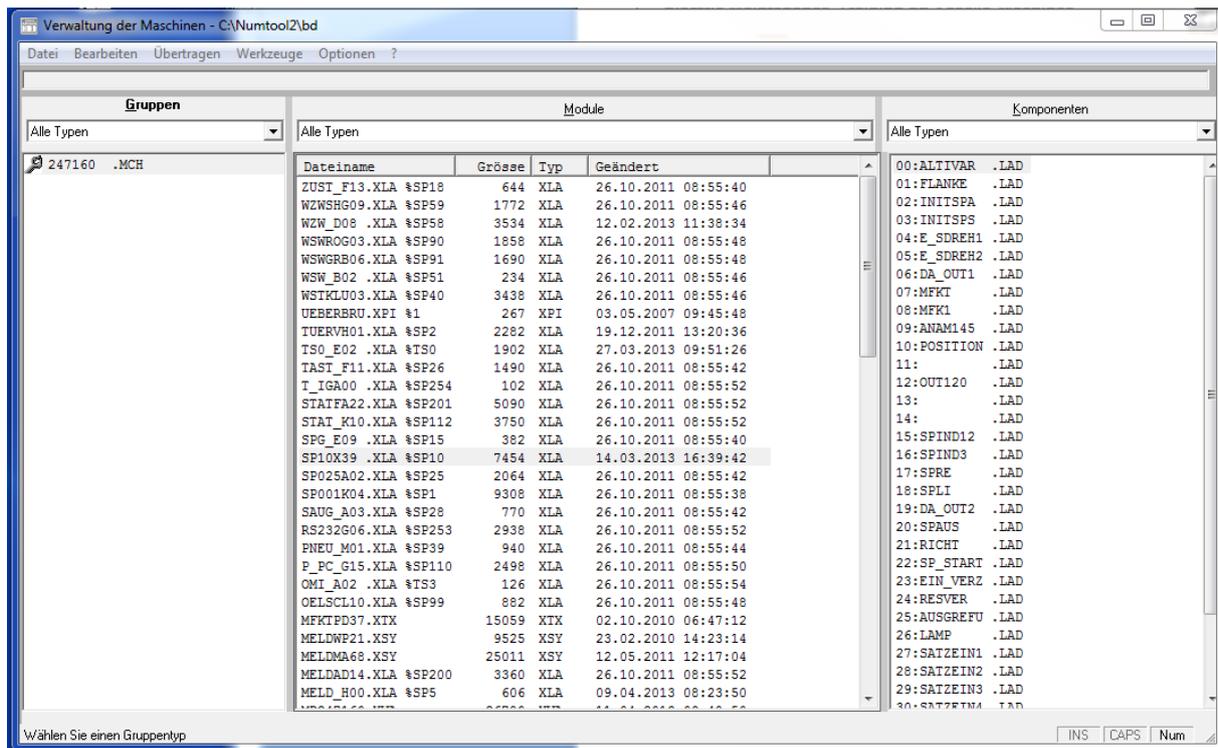
7. PLCTool

7.1. How to Flash a Drive

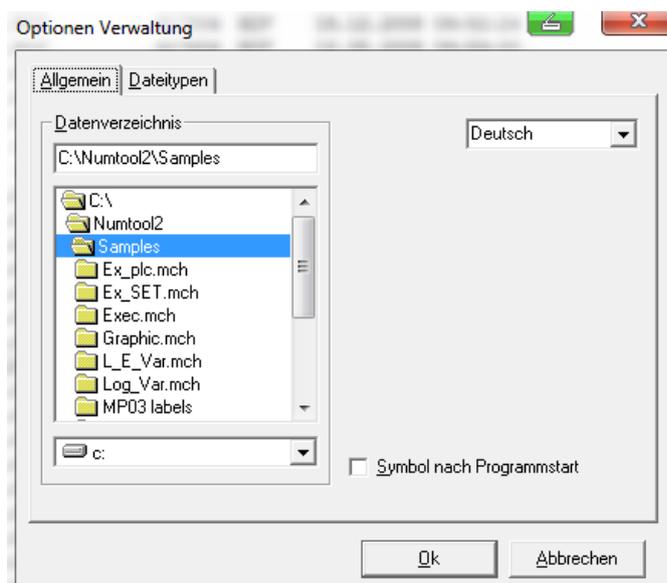
In case of a drive change, it's needed to set the correct firmware version. It is only possible to load the drive parameter set with the correct firmware version.

To flash a drive we need to start the "PLC Tool" with "Start → Num Tools → PLC Tool".

The following window will open up:



Now go to "Optionen" → "Verwaltung" the following dialog will come up:



Choose C:\Numtool2\Samples → OK

Verwaltung der Maschinen - C:\Numtool2\Samples

Datei Bearbeiten Übertragen Werkzeuge Optionen ?

Gruppen	Module			
Alle Typen	Dateiname	Grösse	Typ	Geändert
Ex_plc .MCH	06145301.XLV	917504	XLV	02.03.2012 10:42:28
Ex_SET .MCH	06145201.XLV	917504	XLV	27.04.2011 16:44:58
Exec .MCH	06145101.XLV	917504	XLV	15.11.2010 12:28:52
Graphic .MCH	06145001.XLV	917504	XLV	07.05.2010 09:23:10
L_E_Var .MCH	06144301.XLV	917504	XLV	15.12.2008 09:52:24
Log_Var .MCH	06144201.XLV	917504	XLV	12.05.2008 09:59:00
PM4 .MCH	06144001.XLV	917504	XLV	14.01.2008 09:47:24
Pupitre .MCH	06141401.XLV	917504	XLV	15.12.2008 10:28:08
Pupitrep.MCH	06141201.XLV	917504	XLV	23.10.2007 10:38:22
PupMP03 .MCH	06141001.XLV	917504	XLV	07.03.2007 08:43:06
Qtool .MCH	06140301.XLV	917504	XLV	22.09.2006 14:57:16
Telebin .MCH	05835301.XLV	917504	XLV	02.03.2012 11:20:28
Telechar.MCH	05835201.XLV	917504	XLV	27.04.2011 16:37:28
	05835101.XLV	917504	XLV	15.11.2010 12:13:16
	05835001.XLV	917504	XLV	07.05.2010 09:16:20
	05834301.XLV	917504	XLV	15.12.2008 10:13:10
	05834201.XLV	917504	XLV	12.05.2008 09:34:46
	05834001.XLV	917504	XLV	14.01.2008 10:02:18
	05832501.XLV	917504	XLV	06.05.2008 11:22:26
	05832401.XLV	917504	XLV	23.10.2007 11:09:04
	05832201.XLV	917504	XLV	22.06.2007 10:52:06
	05832101.XLV	917504	XLV	24.05.2007 14:42:38
	05831401.XLV	917504	XLV	22.06.2007 15:35:38
	05831101.XLV	917504	XLV	05.12.2006 09:06:26
	05830401.XLV	917504	XLV	22.09.2006 14:53:18
	05830301.XLV	917504	XLV	12.01.2006 11:57:12
	01225018.XLV	262144	XLV	23.05.2005 16:29:30
	01224118.XLV	262144	XLV	23.07.2004 12:58:32
	01223118.XLV	262144	XLV	02.10.2002 11:02:24
	01222018.XLV	262144	XLV	23.04.2002 08:03:58
	01215218.XLV	262144	XLV	09.10.2002 10:44:28
	01212618.XLV	262144	XLV	25.07.2002 19:37:18
	01212518.XLV	262144	XLV	12.03.2001 16:55:58

Choose Log_Var.MCH on the left side of the window and the drive firmware 05834301.XLV.

To transmit go to "Übertragen" → "PC-CNC". A Window will come up, choose OK and select the drive you want to flash.

8. Standard MMI

The Standard MMI is the old CNC screen, but suitable for different things like diagnosis, reset battery timer, set time and date of the control or axis diagnosis.

8.1. Open / Close

The start file of the program is on top of the PCs' desktop.



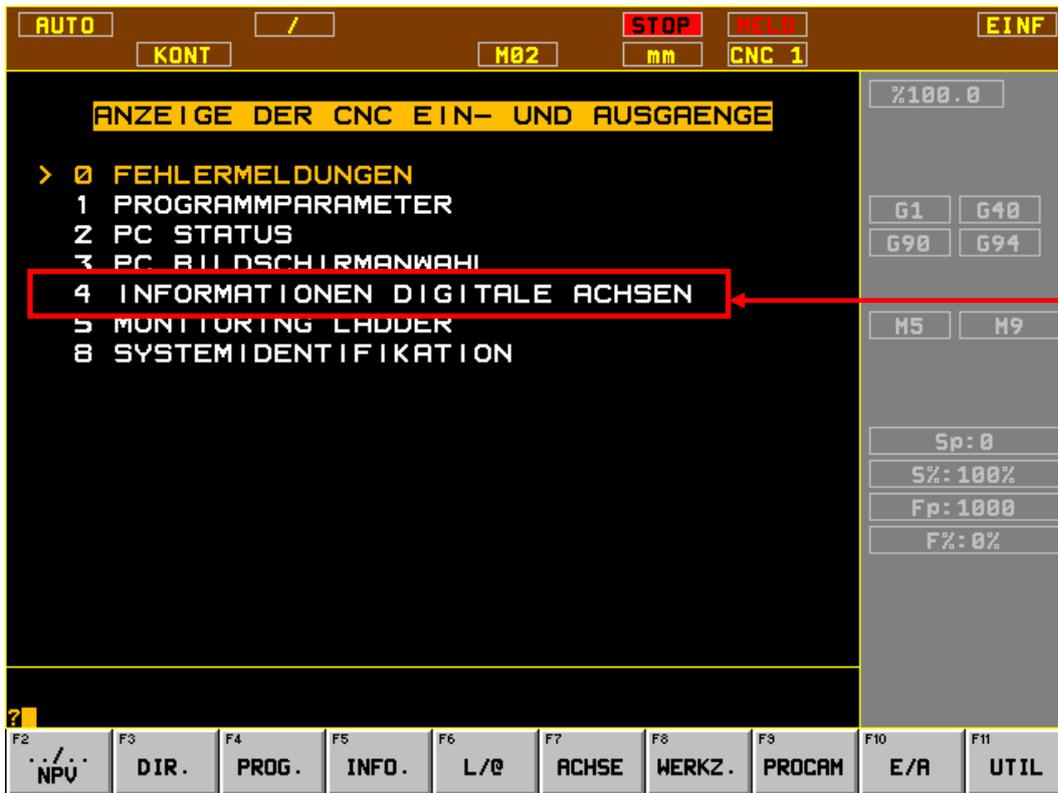
There is one important thing, if you want to close the program you need to be in the axis view with F7. After the MMI is in the axis view, you need to hit "END" at the keyboard of your PC and then "ALT+F4". Quit the next message with OK.

8.2. Axis Diagnosis

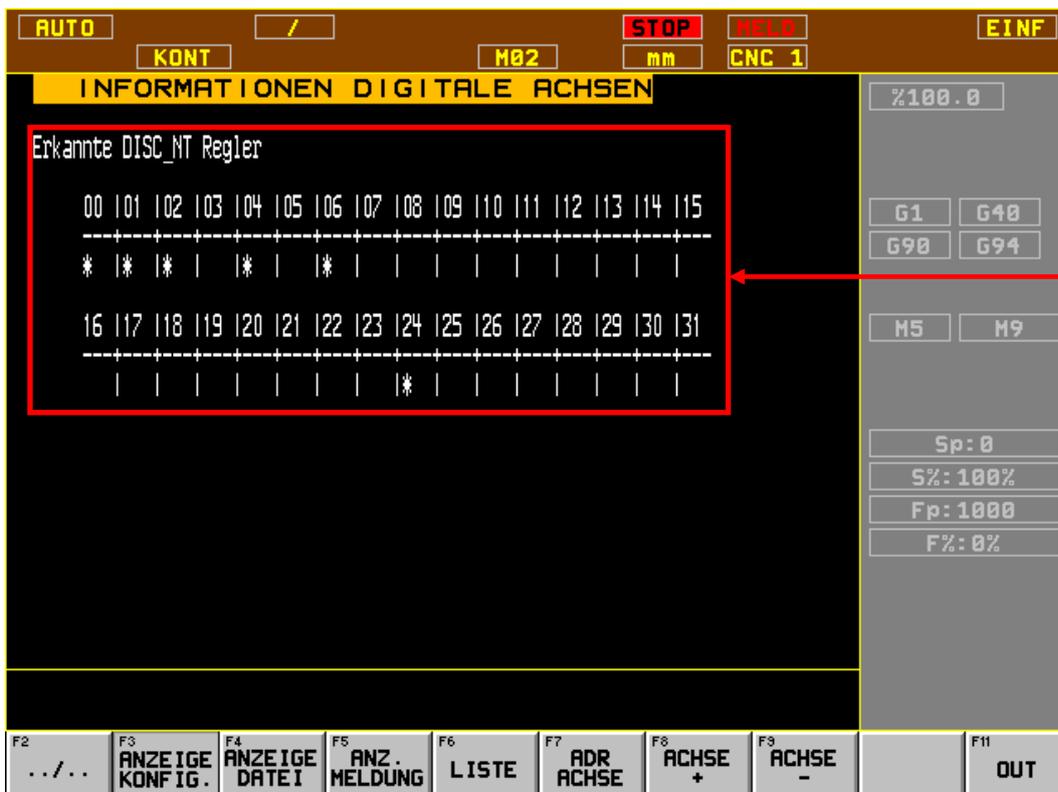
If you want to check the cnc drive system, for example to check if all drives are hooked up to the cnc bus system or if you need to know whether a glass-scale is active or not it is easy to use the PC standard MMI program.

Open the program like described above. The PC standard MMI will open up on the left top side of the PC screen. This program always starts in the axis view. You should be able to see all values of the measuring systems. Like given in the picture above.

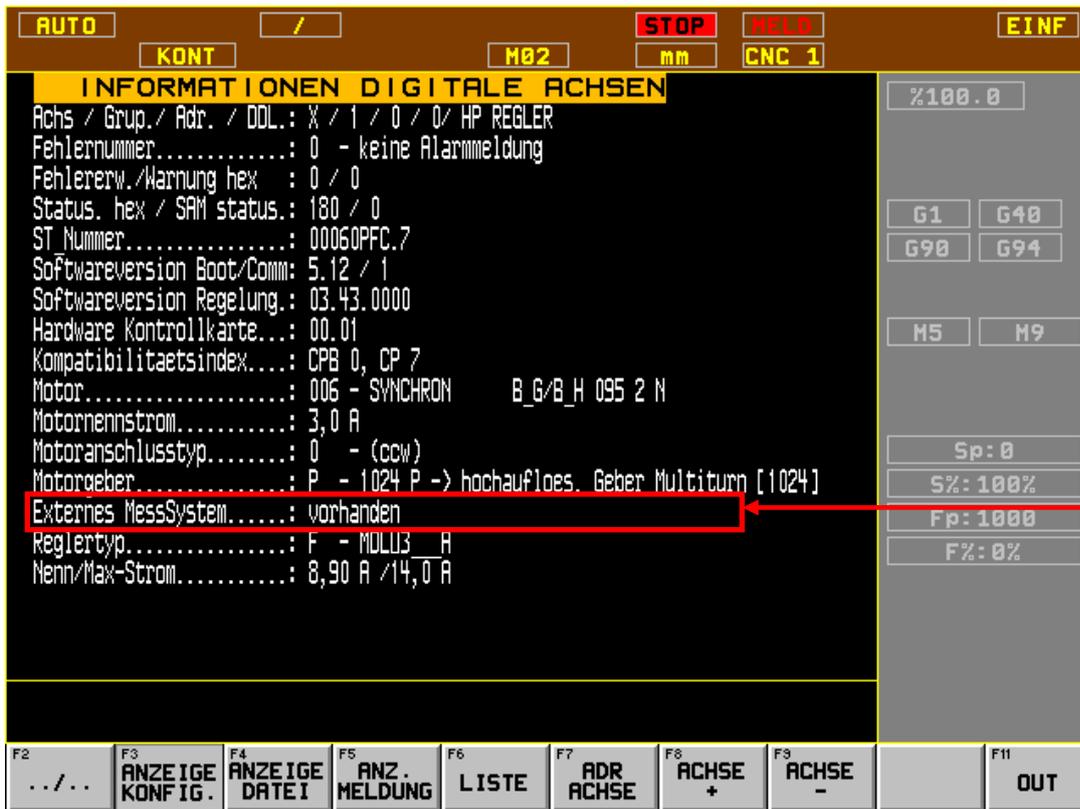
Hit the F10 key to change to the I/O screen.



Now choose menu 4. Type in 4 and <Enter>. The screen will switch to the axis overview, where all drives are shown, which are hooked up at the cnc bus.



With keys F8 and F9 you can go through every drive and check further information on all axis



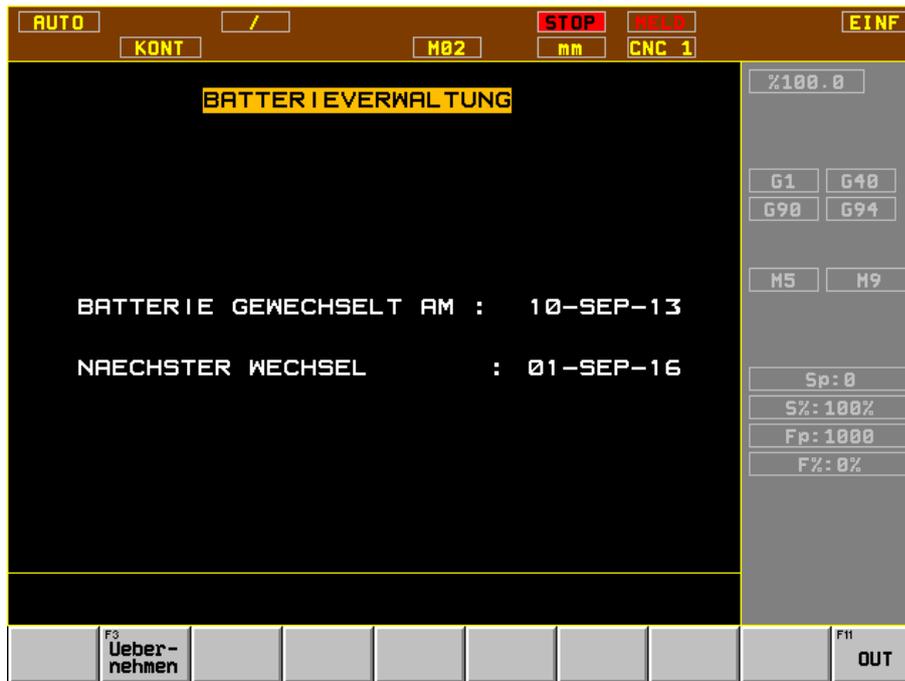
Glass scale measuring system present.

8.3. Reset Battery Change Timer

After changing a battery, the battery timer, which generates the warn message, needs to be reset. This can be done with the standard MMI. Start the standard MMI and go to screen “F11 – UTIL”



No you need to call menu 5 – BATTERIEVERWALTUNG (battery management). Type in “5” and <ENTER>. You will see following screen:



The first line shows the last date, the battery was replaced and the second line shows the date, the next change should be done.

If you changed the battery like described in chapter “CNC Control” → “battery change”, then you should reset the timer by pressing <F3>. Now the control asks if the time and date of the control is correct:



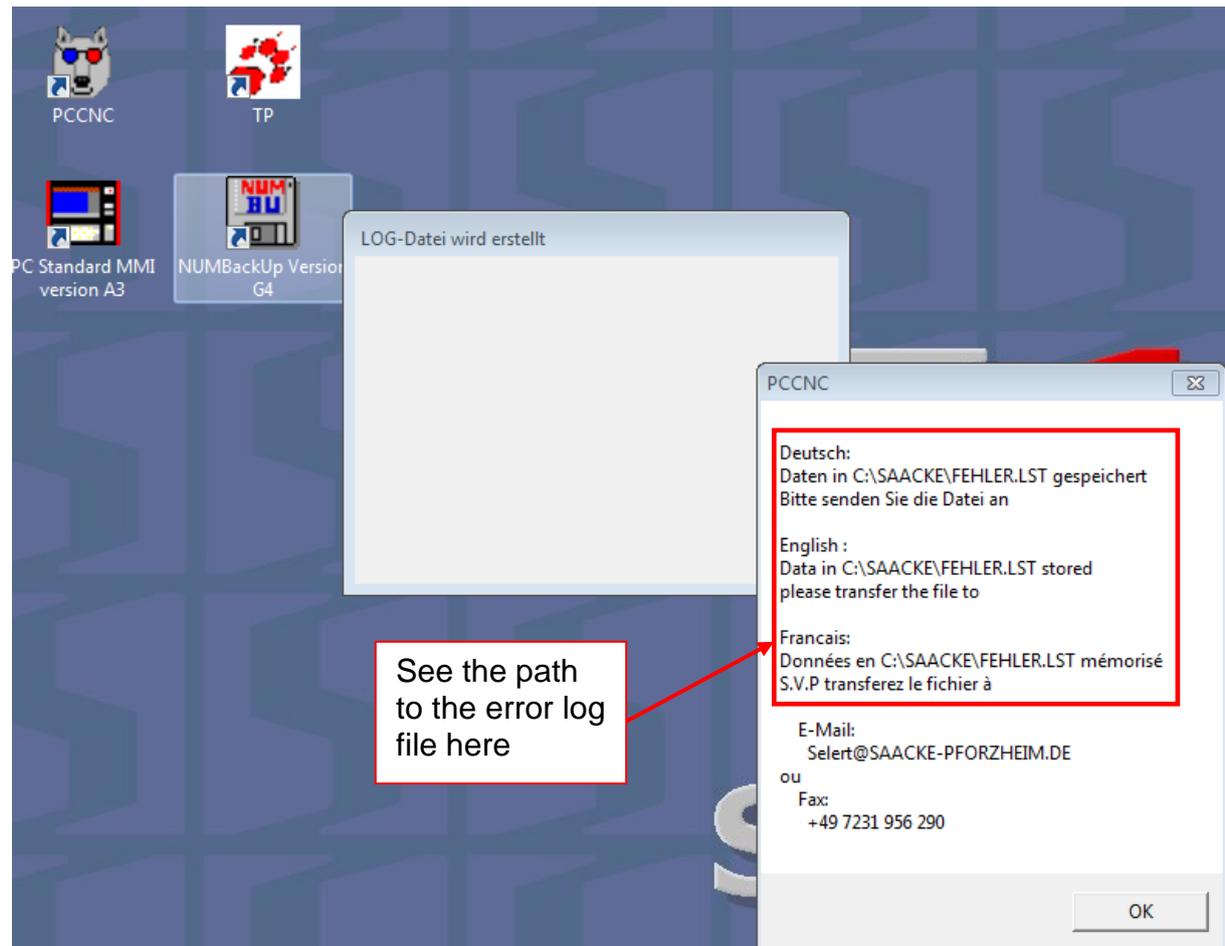
If it's correct, quit with <F10> and the battery timer is reset.

9. PCCNC EXE – create an error log file

The Program PCCNC.exe provides functionality to create an error log file in case of errors which could not be identified by the customer itself.

If you ever have such a serious error condition, **let the machine leave in error condition and go to the PCs' desktop**. Here you can find a icon named PCCNC. Perform a double click on that program.

It will take a few seconds, the program collects every data from the control which is necessary for error diagnosis.



See the path
to the error log
file here

When every data is collected into an error log file, the program will tell you where you can find this file.

With the help of windows explorer and a usb stick, copy that file and send it to SAACKE service for analysis. Also tell the SAACKE staff, what happened before.

The File Name: FEHLER.LST

The Path to file: C:\SAACKE

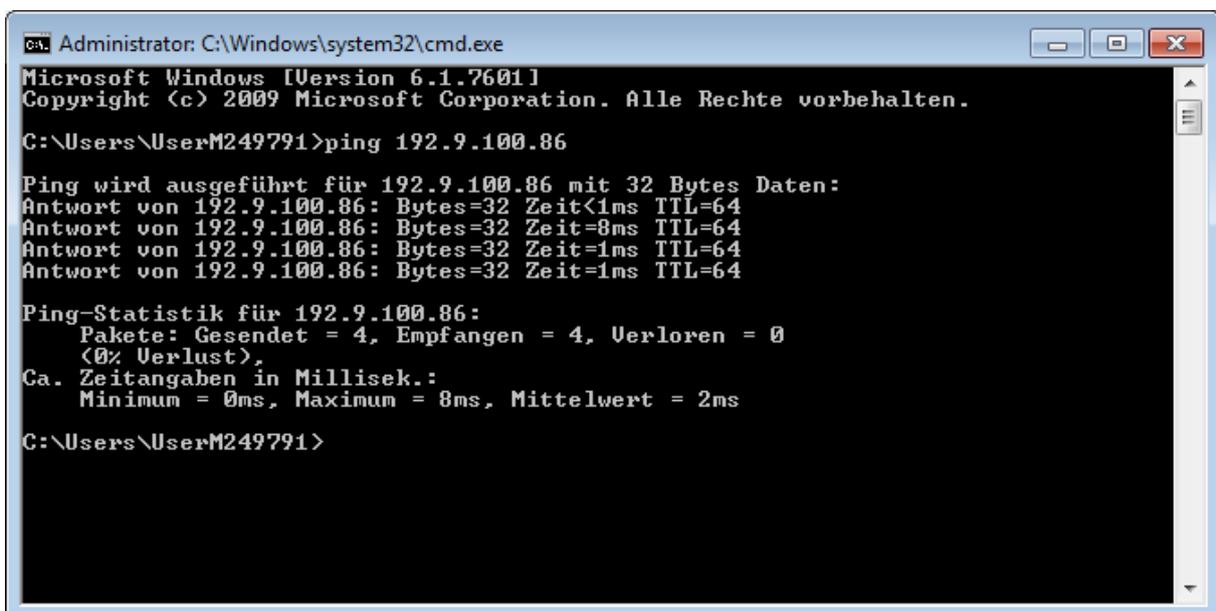
10. Check PC – CNC Connection

Whenever the connection between CNC Control and machines' PC fails, it is possible to localize the problem by performing some simple steps. In newer machines, the connection will be established by an IP network connection. But there is always the older serial COM link present, if the IP connection fails at any time.

The first check is, to figure out if the basic IP connection between the Ethernet adapter of the PC and the Ethernet adapter of the control is working. To check that low level link, go to Windows → Start → and type in "cmd".

The command console will open up.

Type in: ping 192.9.100.86



```

ca. Administrator: C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. Alle Rechte vorbehalten.

C:\Users\UserM249791>ping 192.9.100.86

Ping wird ausgeführt für 192.9.100.86 mit 32 Bytes Daten:
Antwort von 192.9.100.86: Bytes=32 Zeit<1ms TTL=64
Antwort von 192.9.100.86: Bytes=32 Zeit=8ms TTL=64
Antwort von 192.9.100.86: Bytes=32 Zeit=1ms TTL=64
Antwort von 192.9.100.86: Bytes=32 Zeit=1ms TTL=64

Ping-Statistik für 192.9.100.86:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0
    (0% Verlust),
    Ca. Zeitangaben in Millisek.:
    Minimum = 0ms, Maximum = 8ms, Mittelwert = 2ms

C:\Users\UserM249791>
    
```

If the IP connection works, the ping data will have no loss. So it is clear that both network adapter are working.

The IP Addresses of the PC and the controls' network adapter are always the same:

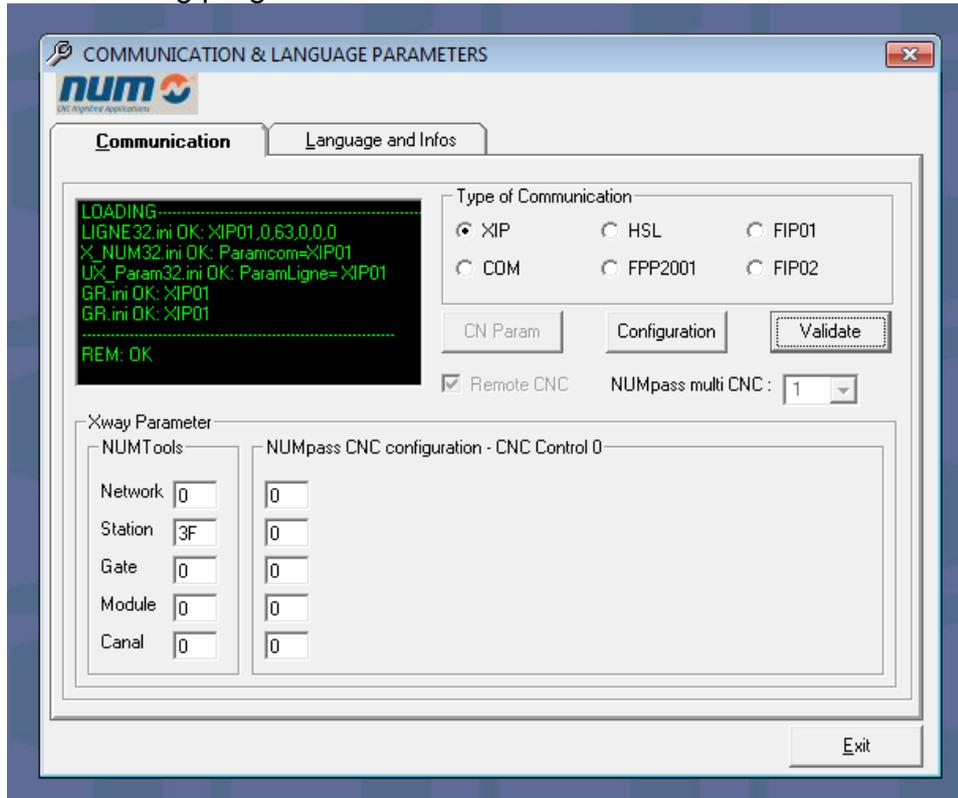
PC	IP Address:	192.9.100.0
CNC	IP Address:	192.9.100.86

The next step is, to check the IP com driver. This driver should always be present in the task of windows:

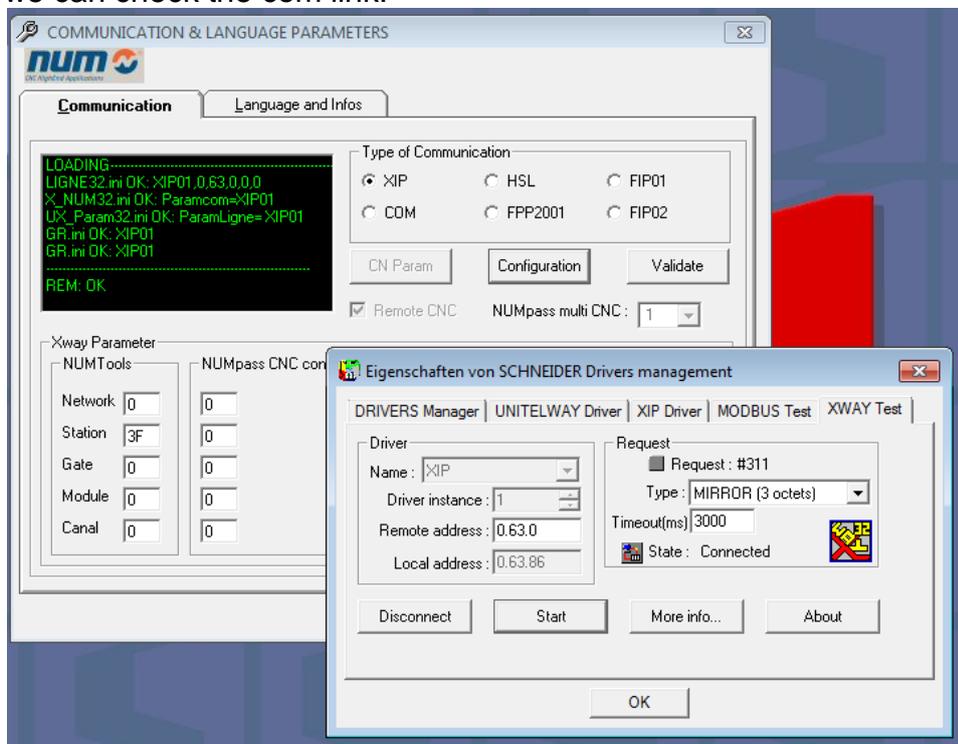


Open the Communication settings by "Start→NumTools→COMMUNICATION→Communication and language parameters"

The following program will start:



In this screen you can see that the communication will be established by XIP. That's the Ethernet connection. The address of the station is 3F. If you click "Configuration" we can check the com link:



Go to register "XWAY Test", check if remote address is set to 0.63.0.

Remote Address of XIP: 0.63.0

Click on button “connect” and “start”. The state should be changed to “Connected” and the Request should be counting and blinking.

→If this works, the driver is running and connected to the control

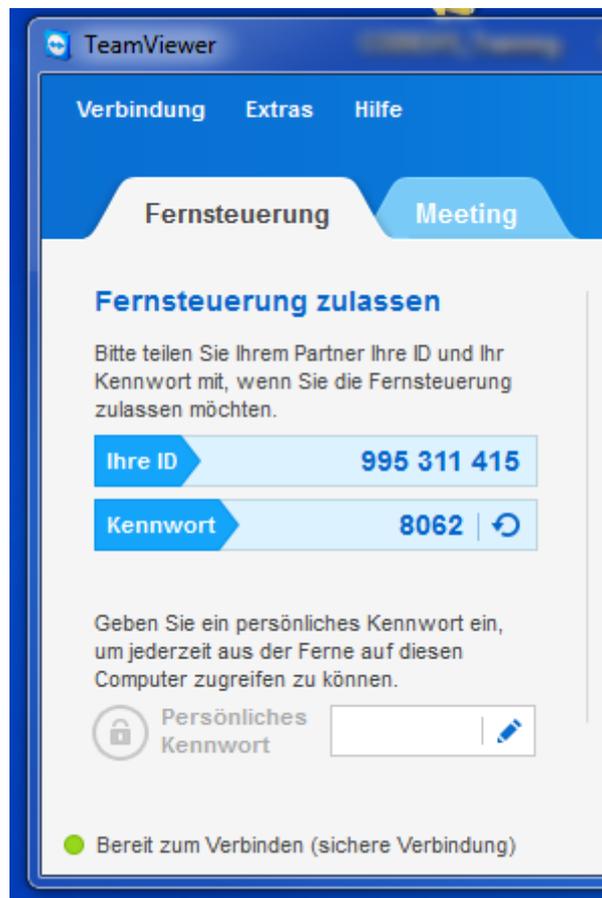
Click “Stop” and Disconnect”, close the program.

11. Saacke Online Support with Team Viewer

Online support can be provided by the help of an online connection to SAACKE service with Team Viewer.

Team Viewer is an PC remote control program. SAACKE is able to hook up to the machines’ PC.

To establish a connection, the machines’ PC must be hooked up to an internet line and you need to open Team Viewer:



Call the SAACKE service staff, tell them your error condition and what happened before. Give as much as information as possible.

To establish connection, give the ID and the password to the service staff and they can connect to the machines’ PC.

12. SAACKE HMI



Axis image

effective from version 5.4

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1 Introduction

The SAACKE axis image has been developed for a user-friendly machine dialogue. The machine is no longer operated via a CNC monitor, but via a Windows programme.

The easy-view PC surface of this programme permits unproblematic implementation of all the machine functions. In addition, further applications making work on the SAACKE machine easier can be started from this surface.

After the machine has been switched on and the PC booted, the axis image is started by clicking the icon



on the desktop.

2 Starting the axis image of the SAACKE machine

After the icon has been clicked as described in Chapter 1, the axis image of the machine is displayed on the PC (see fig. 1).

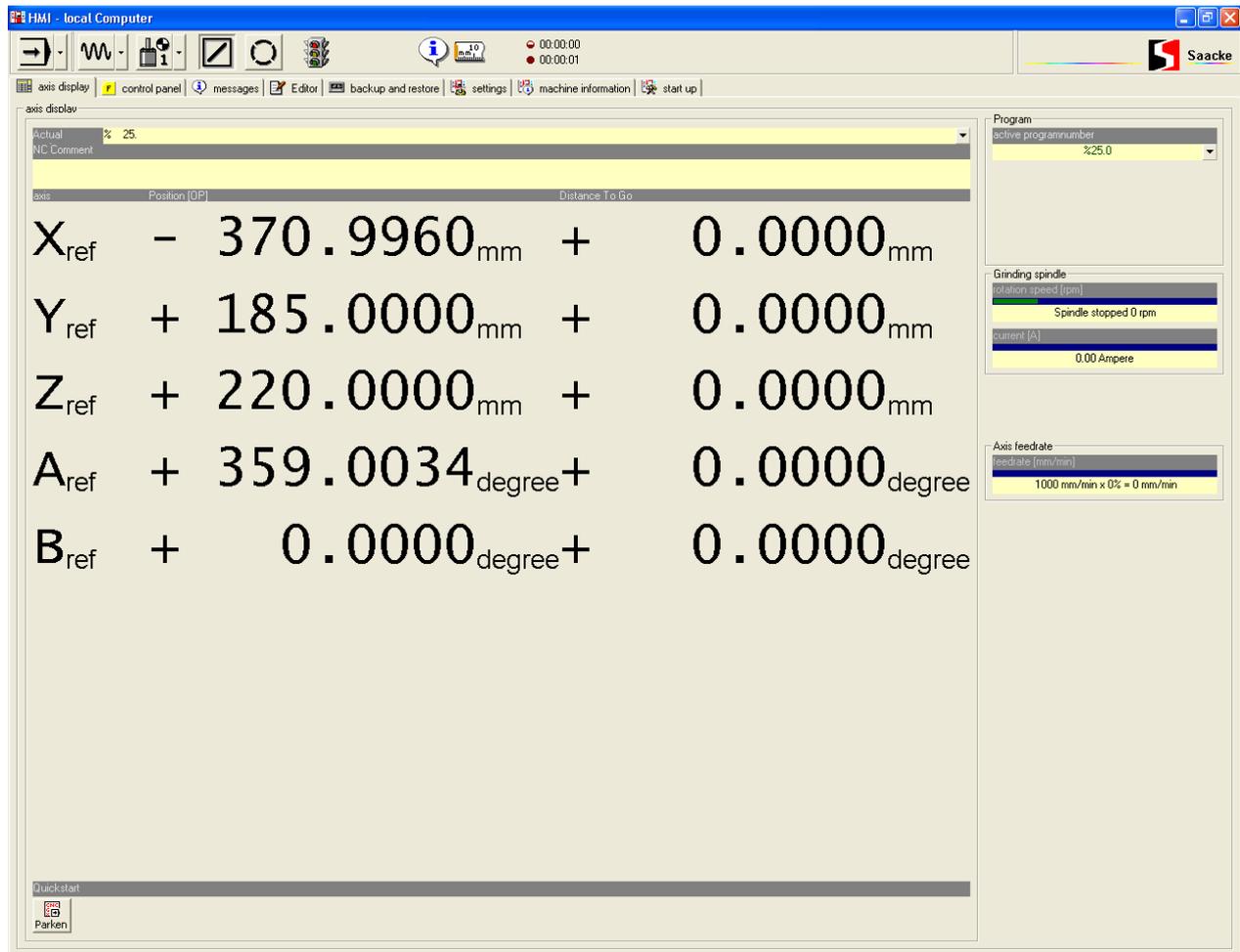


Fig. 1

Machine operation takes place from this surface.

3 Axis positions

The current positions of the machine axes can be read off (see fig. 2).

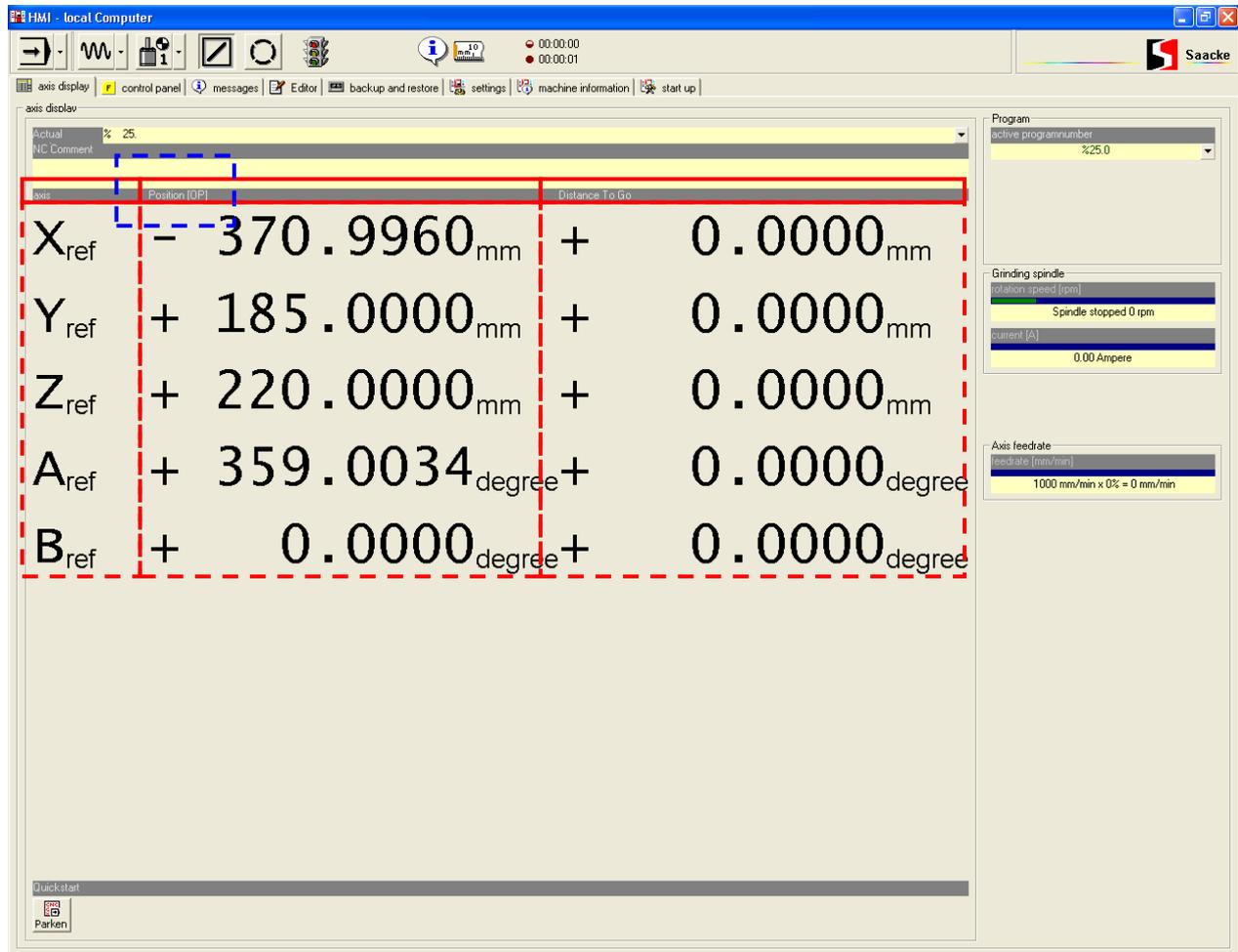


Fig. 2

The existing axes are listed under **Axis**.

The **Position** column shows the current axis position.

Please make sure that the axis position is displayed in OP mode (relative to a programmed zero point) or in OM mode (relative to the zero point of the machine).

The reference zero point is displayed with designation **Position [OP]** or **Position [OM]**. Point-and-click on **[OP]** and **[OM]** respectively can be changed into the other mode.

Distance to go shows the incremental distance of the axes yet to be moved. (In fig. 1 and fig. 2, there is no movement command on the machine, i.e. the remaining distance for all the axes is 0).

4 Programme selection, programme editor

Under **Program**, the active CNC programme on the machine is displayed. (In fig. 3, the programme **%25.0** is active).

By clicking on the arrow on the right beside the displayed active programme, all the CNC programmes available on the machine are listed (see fig. 4).

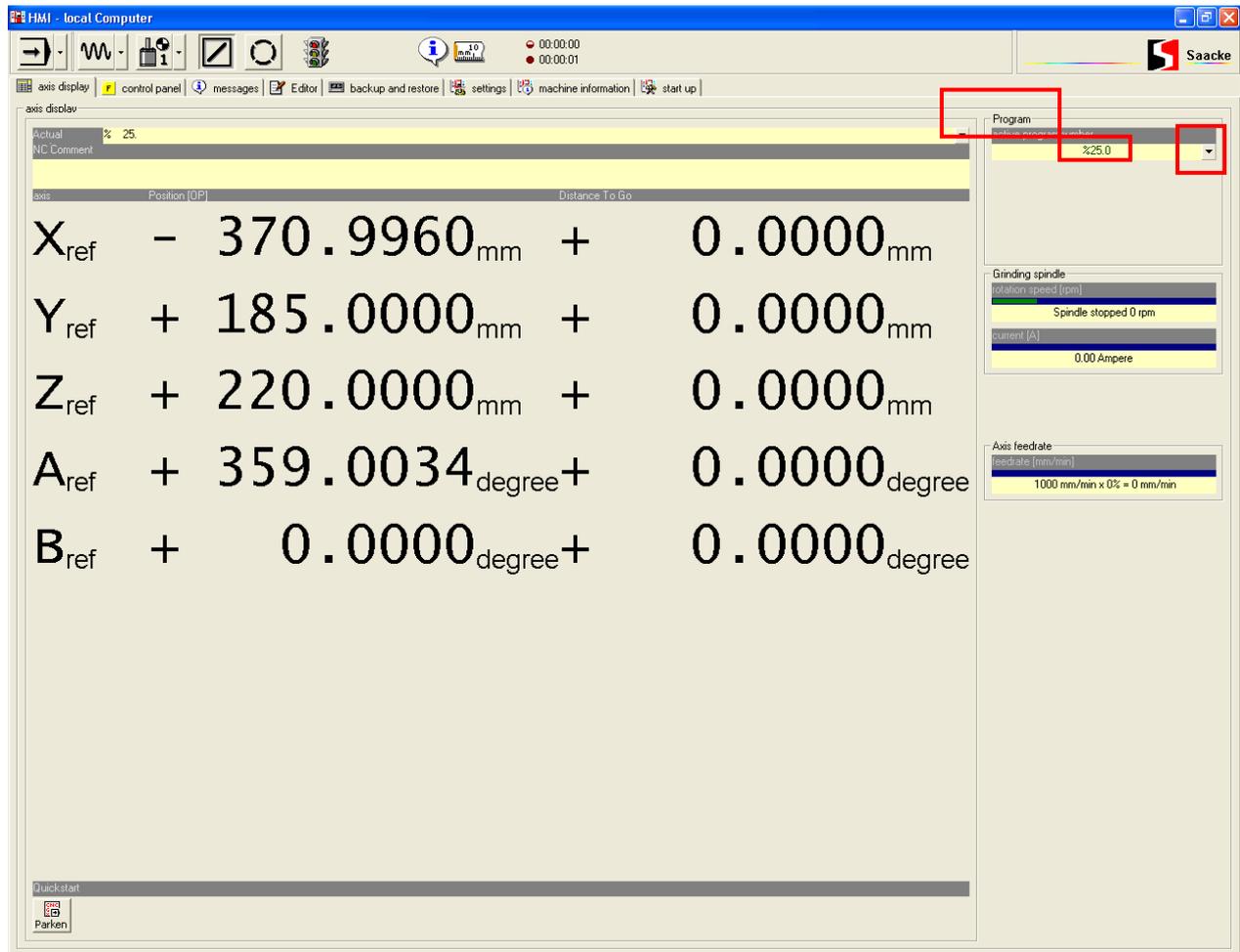


Fig. 3

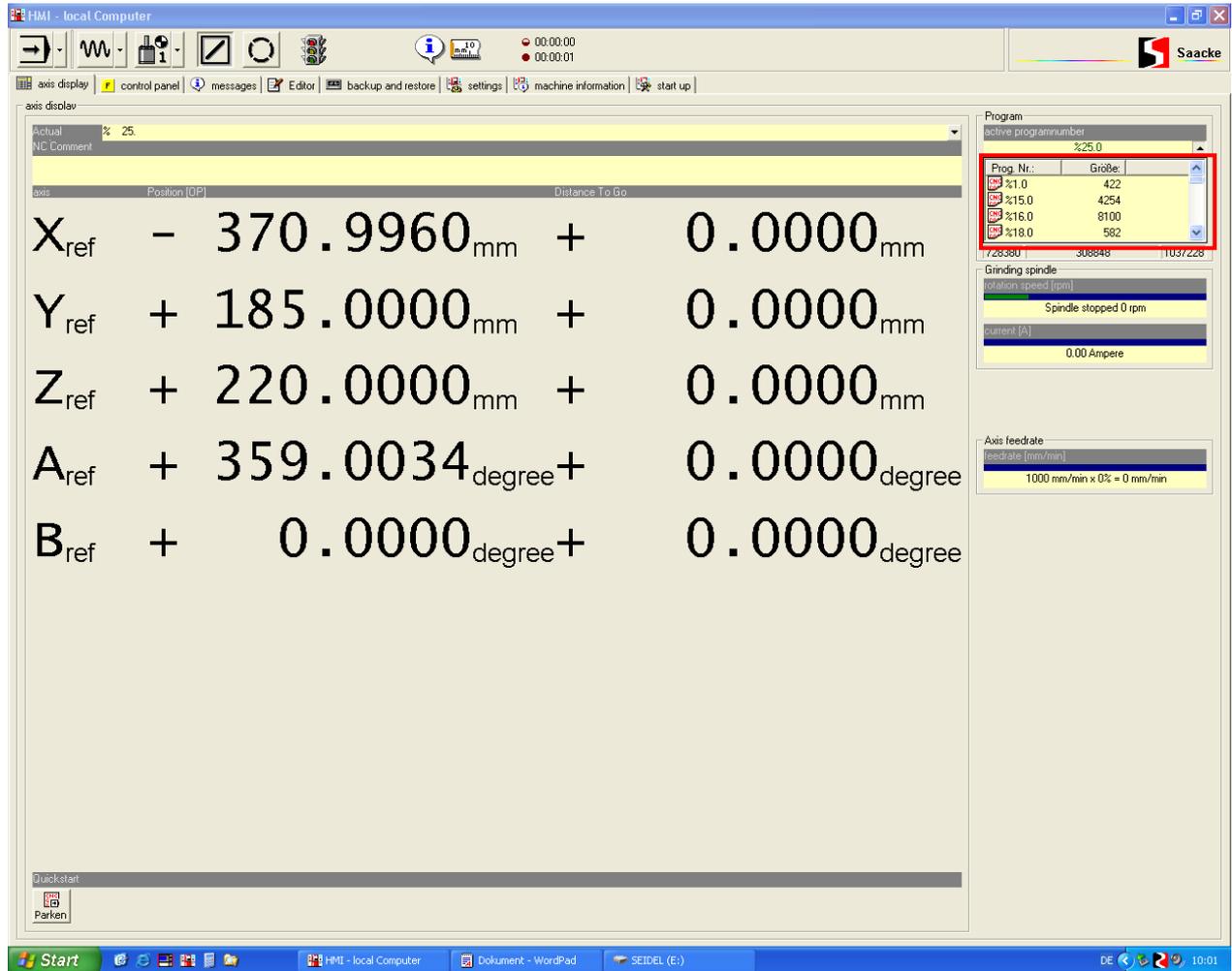


Fig. 4

The listed programmes are sorted in ascending order according to the programme numbers.

The following menu selection is opened by marking a programme and clicking with the right-hand mouse key:

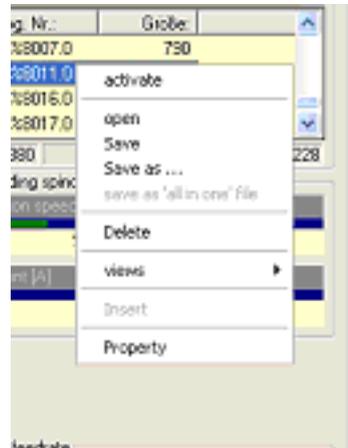


Fig. 5

- activate Activates the marked programme on the machine.
The appropriate programme number is then displayed in the line "Active programme number".
- open Opens the marked programme in the SAACKE NC editor and enables editing, saving, transmission etc. of the programme. The programme is displayed after opening under the register sheet "Editor".
(Operating instructions of the editor see **Chapter 11 register sheet "Editor"**)
- save Enables saving of the marked programme.
- save As Analog "save" with indication of the path.
- Delete Deletes the marked programme from the machine.

- Views Makes possible a selection of the views of the pictured NC Programmes in accordance with fig. 5a.

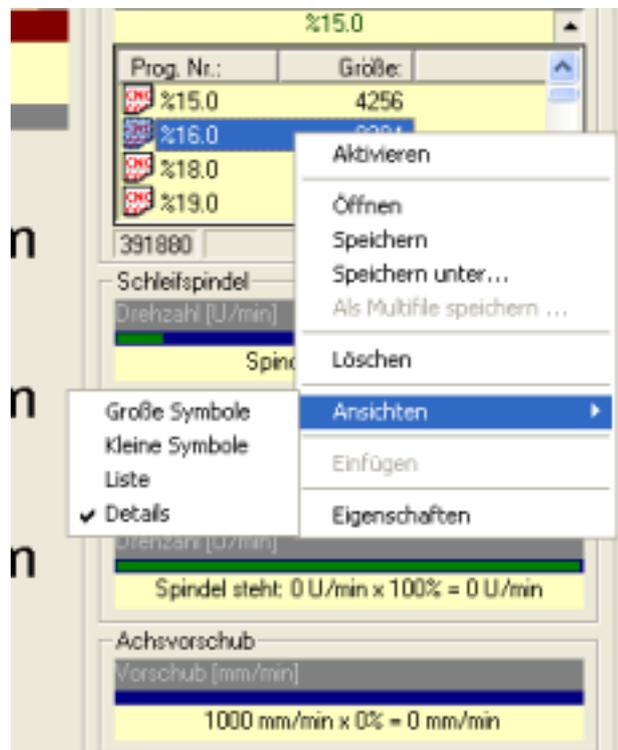


Fig. 5a

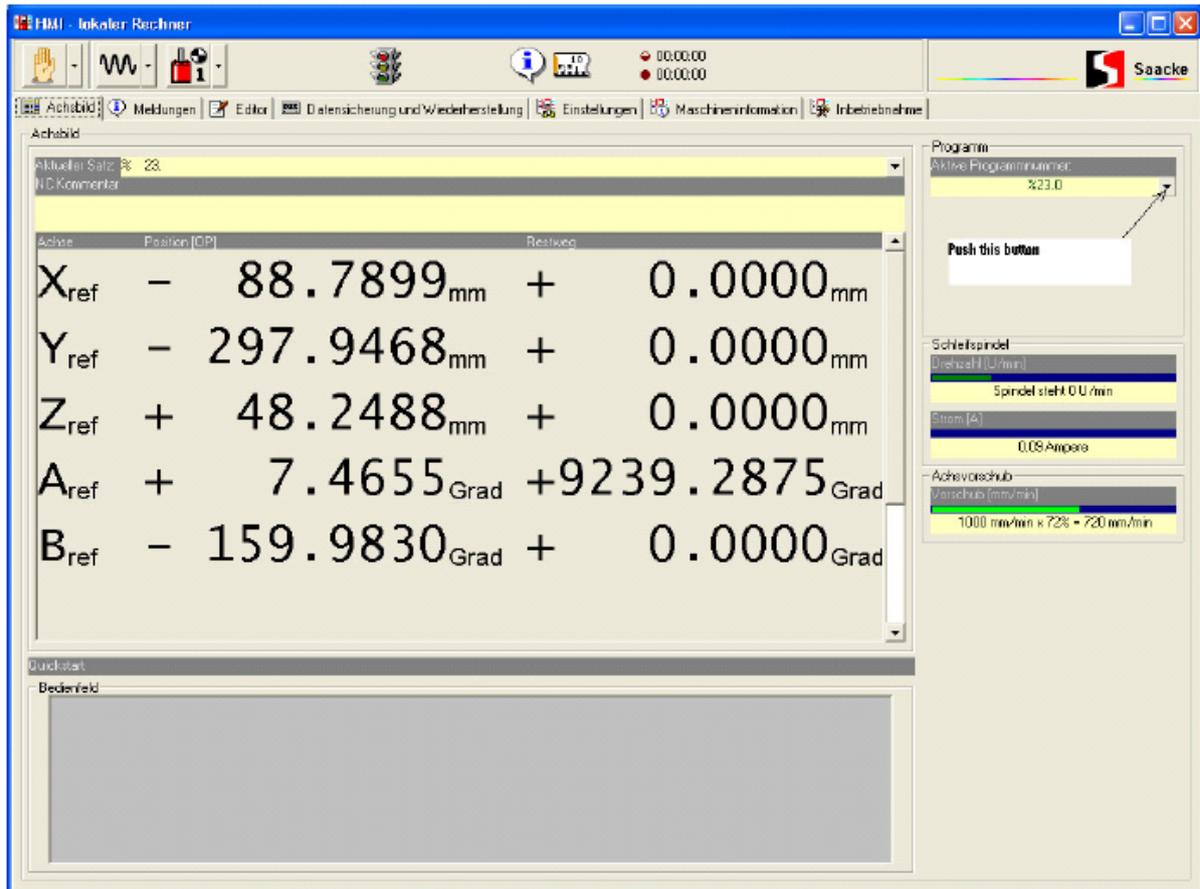
- Properties

A handout appears according to fig. 5b, on which a description of the marked programme is to be seen. With „OK“ or „Cancel“ you can leave the properties again. In the case of a possible change you can save the change with „Take over“ and „OK“ and leave the page.



Fig. 5b

a. CNC memory information



HMI - Inkolor Rechner

00:00:00
00:00:00

Programm: %23.0
Aktive Programmnummer: %23.0
Push this button

Schleifspindel
Drehzahl (U/min)
Spindel steht 0 U/min
Strom (A)
0,08 Ampere

Achsvorschub
Vorschub (mm/min)
1000 mm/min x 72% = 720 mm/min

Achse	Position [CP]	Restwert
X _{ref}	- 88.7899 _{mm}	+ 0.0000 _{mm}
Y _{ref}	- 297.9468 _{mm}	+ 0.0000 _{mm}
Z _{ref}	+ 48.2488 _{mm}	+ 0.0000 _{mm}
A _{ref}	+ 7.4655 _{Grad}	+9239.2875 _{Grad}
B _{ref}	- 159.9830 _{Grad}	+ 0.0000 _{Grad}

Prog. Nr.:	Größe:
%20.0	170
%21.0	146
%22.0	138
%23.0	120
...	...

2041800 44004 2085804

free memory size use memory size Memory size

5 Grinding spindle, current, axis feed, quickstart

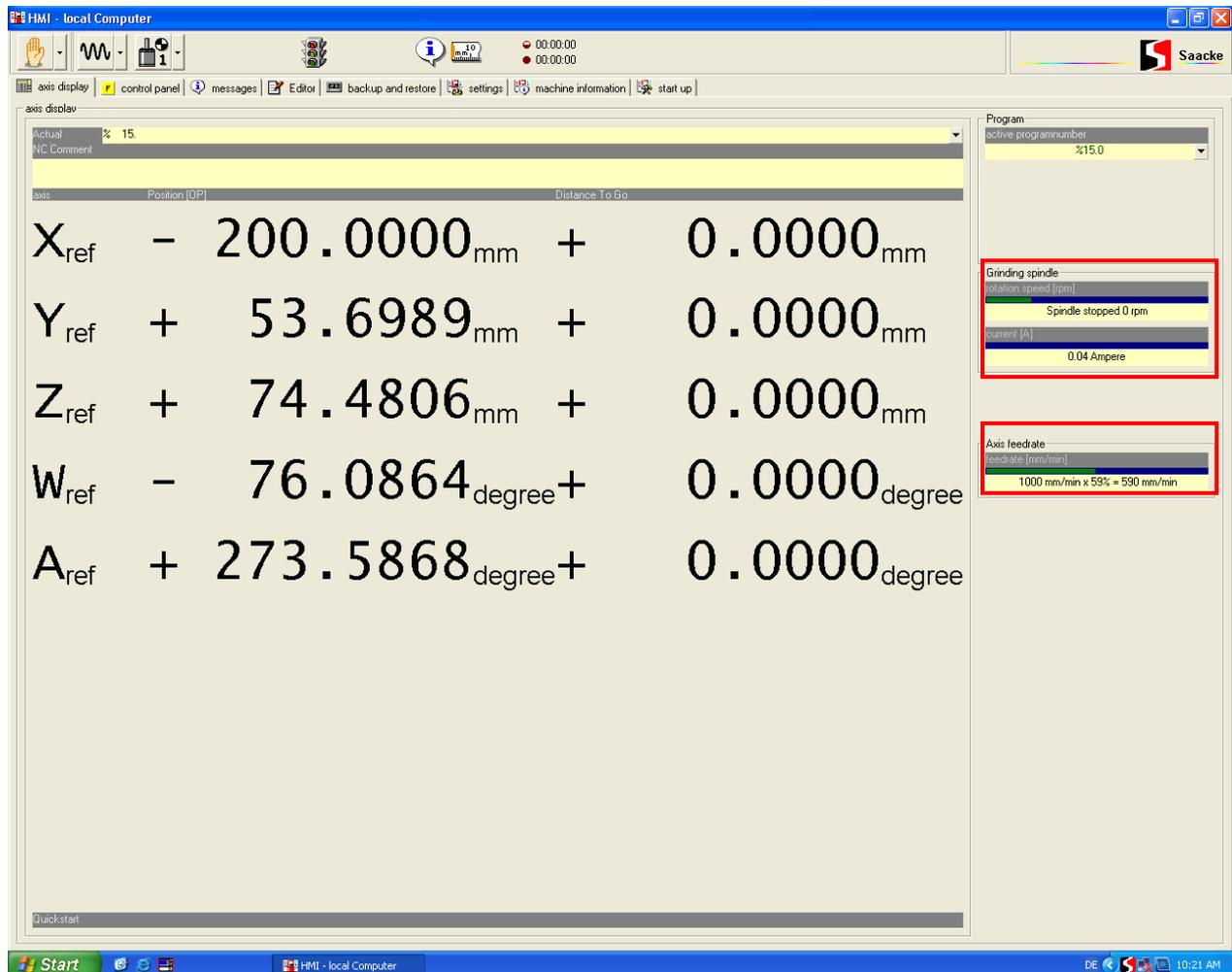


Fig. 6

5.1 Grinding spindle and current

Displays the current speed of the grinding spindles, the current consumption necessary for this (measured in Amperes) being displayed under **Current**.

5.2 Axis feedrate

Axis feedrate shows the current axes feed.

5.3 Quickstart

With the left pressed mouse button you can drag a programme from the programme list of the machine (top right) into the quickstart bar.

This makes possible a fast starting of frequently used programmes. Depending on the setting (see **Chapter 13 register sheet “Settings”**) before a programme starts from the quick bar, is made an enquiry or the programme starts directly without enquiry.

6 Actual set and NC comment

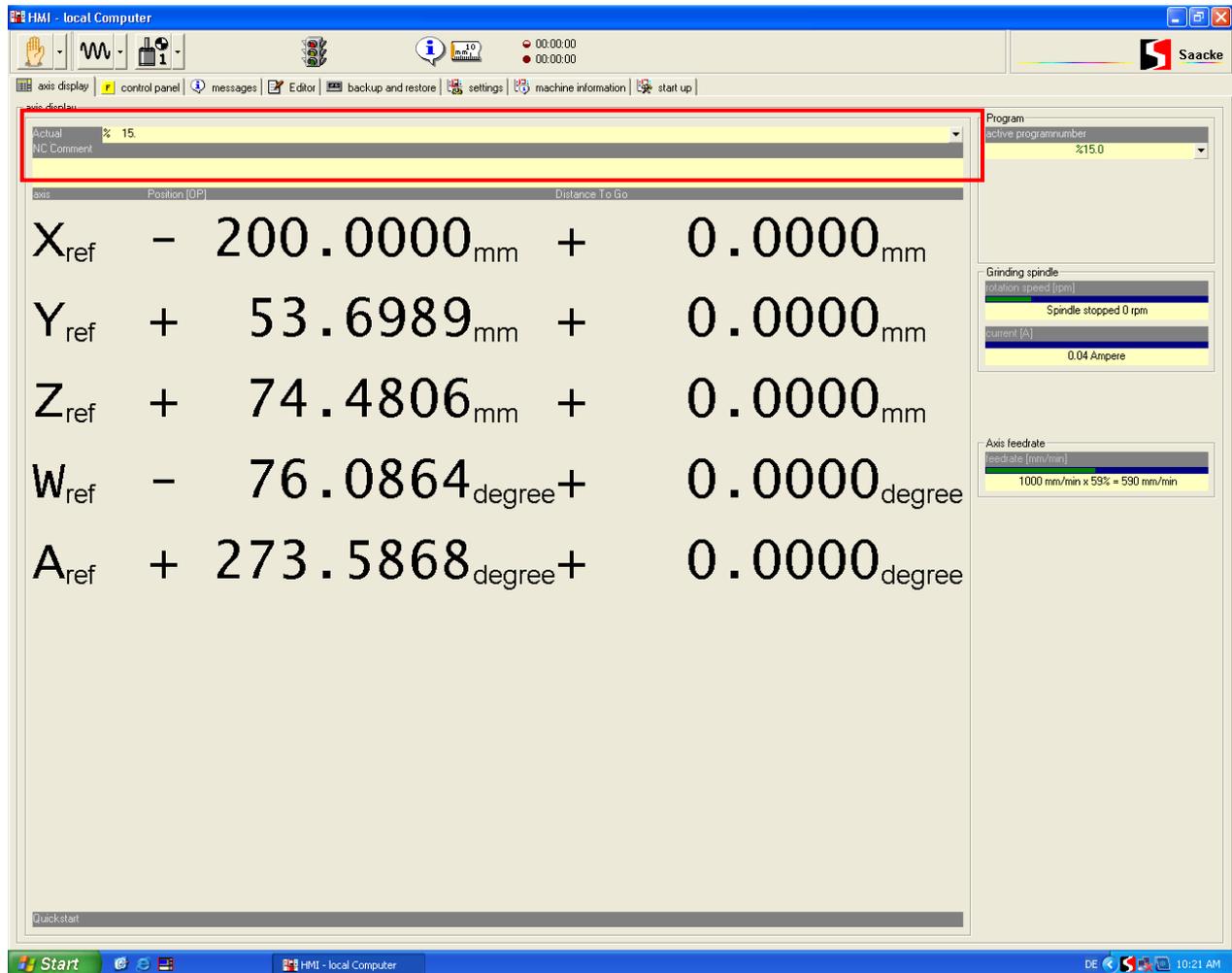


Fig. 7

6.1 Actual set

Under **Actual**, the set of the machine programme currently running directly in the NC programme is displayed.

If the machine was stopped, then the active programme is displayed on this line.

If a programming fault is displayed during the programme sequence, the incorrect programme sentence can be found by clicking the right-hand arrow.

6.2 NC comment

In the line **NC comment** the last report programmed is displayed during a programme sequence.

If a fault is outside the programme sequence (e.g. EMERGENCY STOP pressed), this fault is displayed in this line. Additional information can be displayed by clicking the **Info** field on the tool bar (see Chapter 7.8 Machine Messages).

7 Function bar

The function bar makes different settings possible.

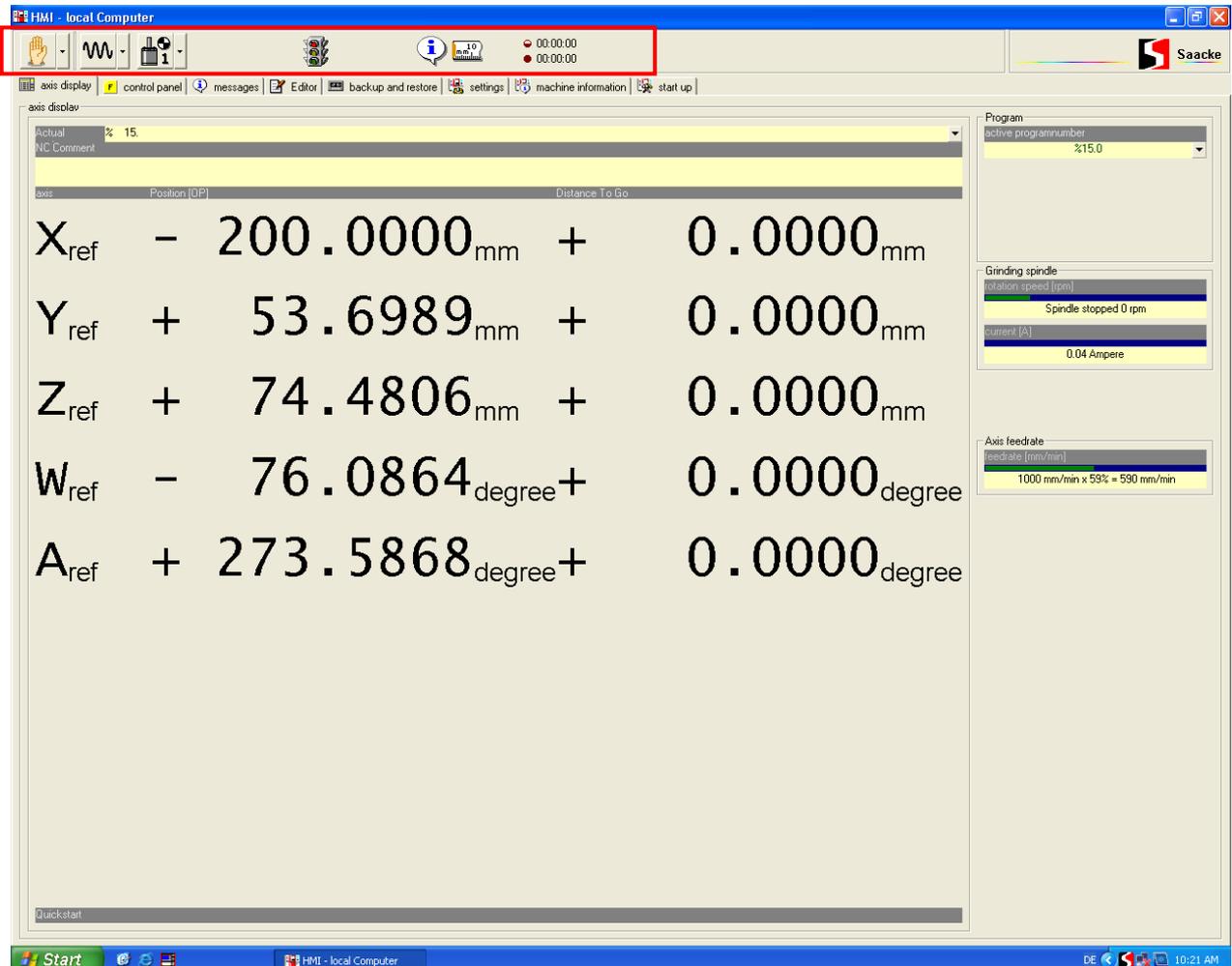


Fig. 8

7.1 Mode of operation

By clicking the mode of operation, the operator can select the various modes of operation of the machine:

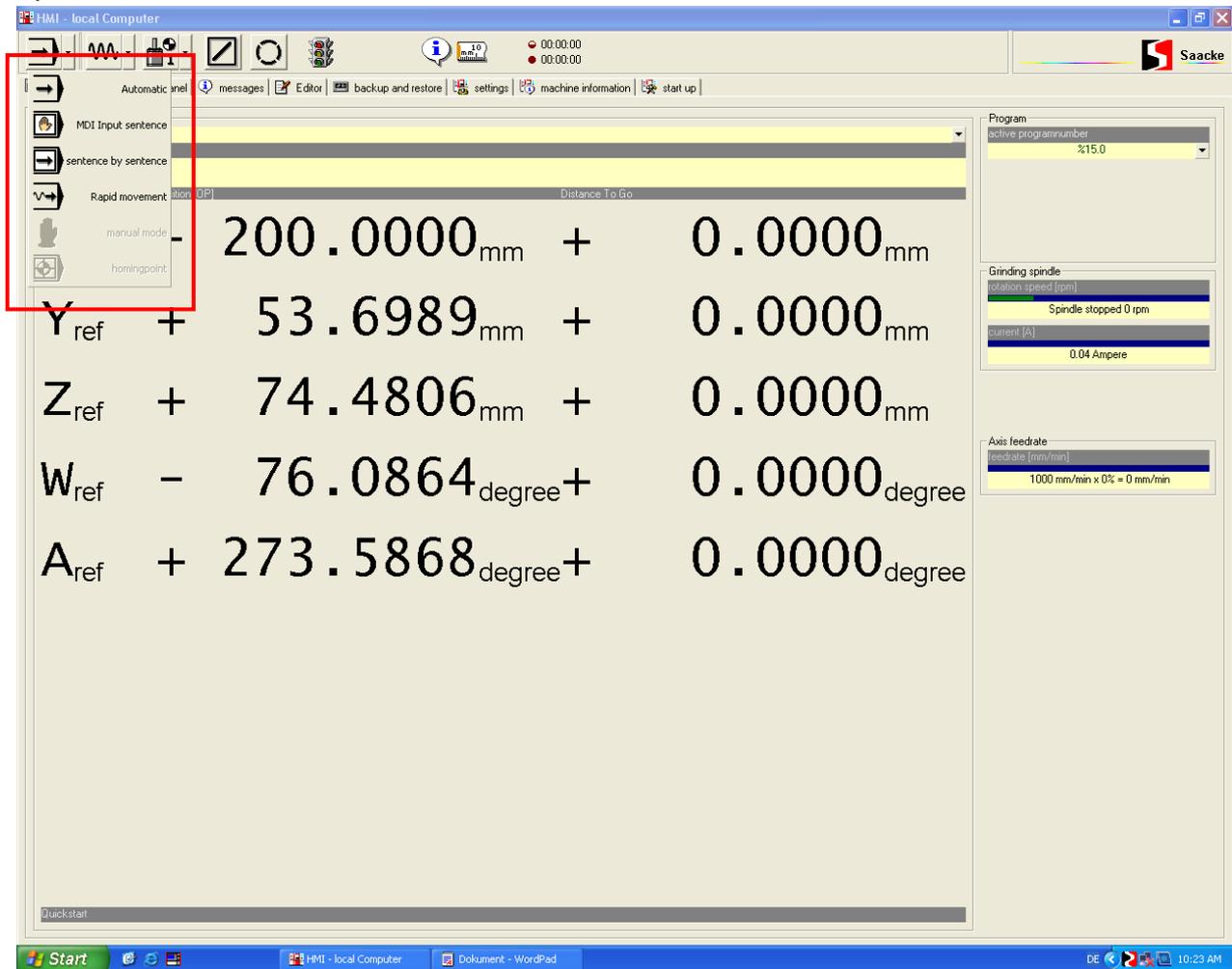


Fig. 9

The following window appears:

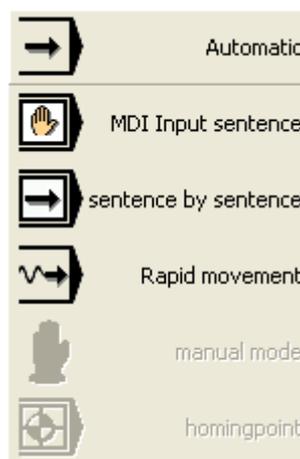


Fig. 9.1

7.1.1 Automatic

Automatic mode of operation has been activated.

As a rule, NC programmes are run in this mode of operation.

For a correct programme sequence thereby the key switch must stand on „Automatic“.

7.1.2 MDI input sentence

In this mode of operation, an individual command can be entered and carried out. For this purpose, the following form appears after the selection of this mode of operation:

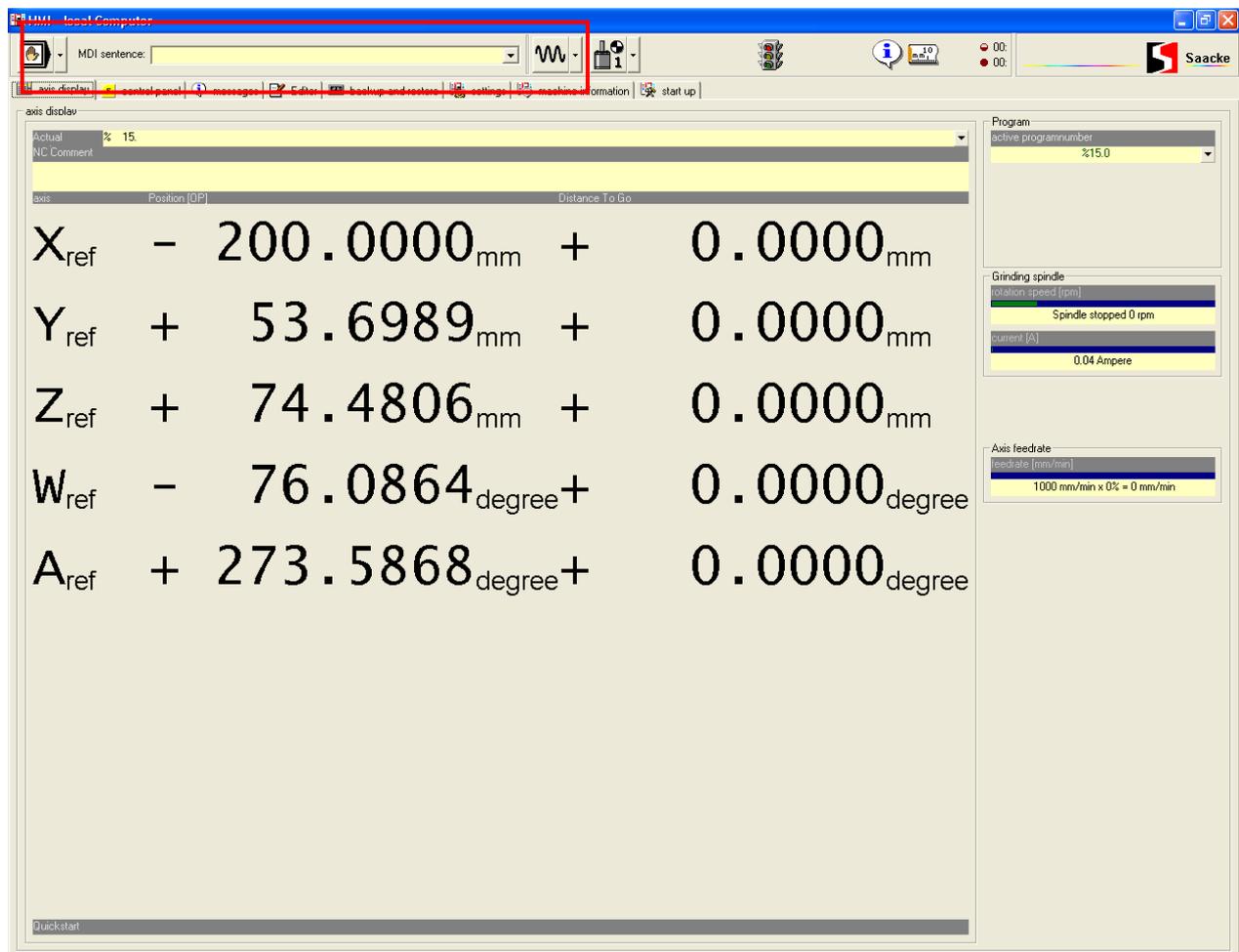


Fig. 9.2

Into this line the desired driving command can be registered, confirmed with Enter and started with Cycle start.

7.1.3 Sentence by sentence

In this mode of operation, the sentences of the NC programme are processed or run step by step following the respective pressing of the Cycle Start key.

7.1.4 Rapid movement

This mode of operation serves test runs with a constant feed motion. As a rule, the operator don't select this mode of operation.

7.1.5 Manual mode

If the key switch is set on „setting-up“, then the mode of operation becomes „Manual mode“ activates.

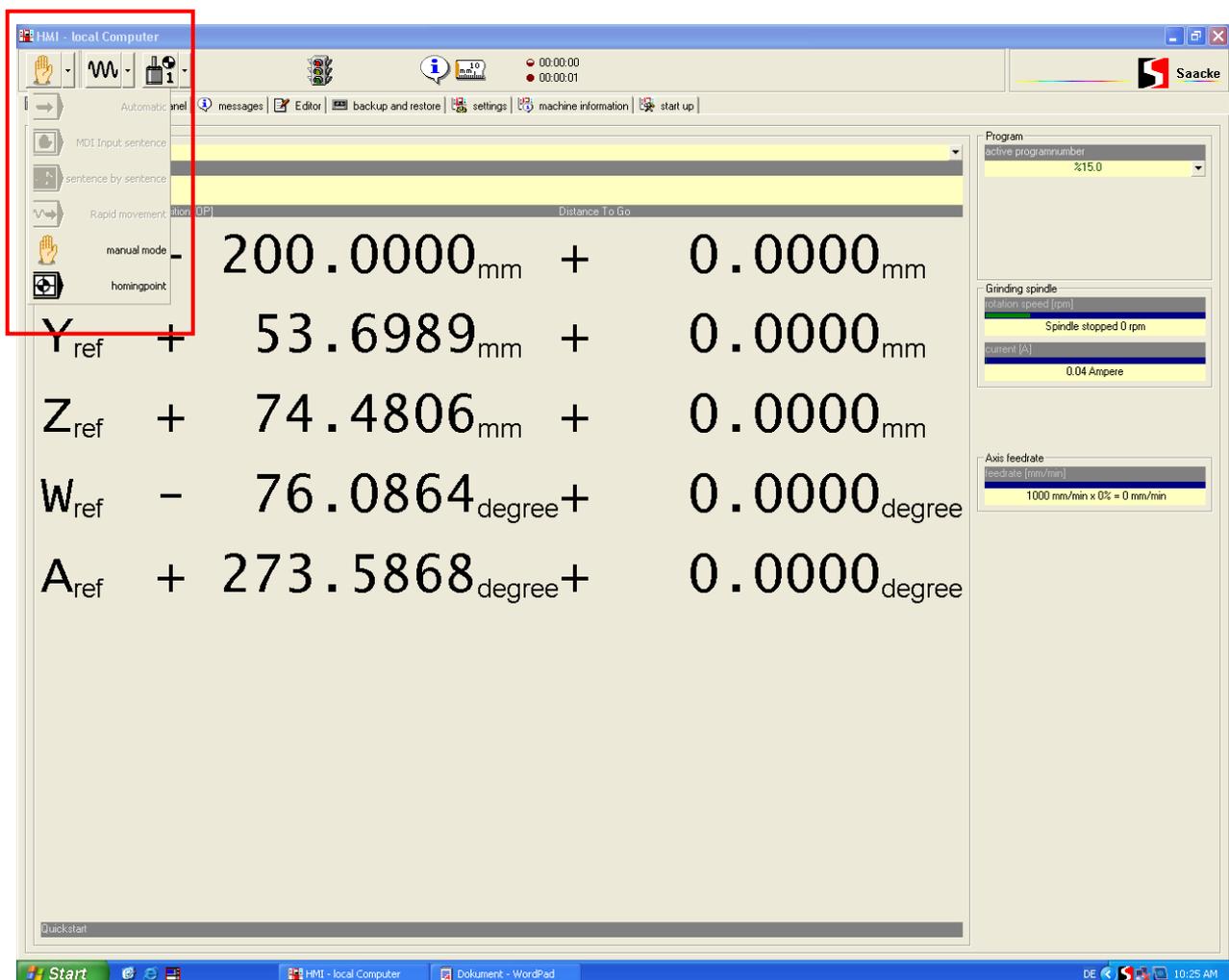


Fig. 9.3

Now the machine can be driven continuously with the handwheel or with the keys + and -.

7.1.6 Homingpoint

For machines, which have no absolute measuring systems, here individual axes can be referenced.

7.2 Manual mode of operation - continuous movement

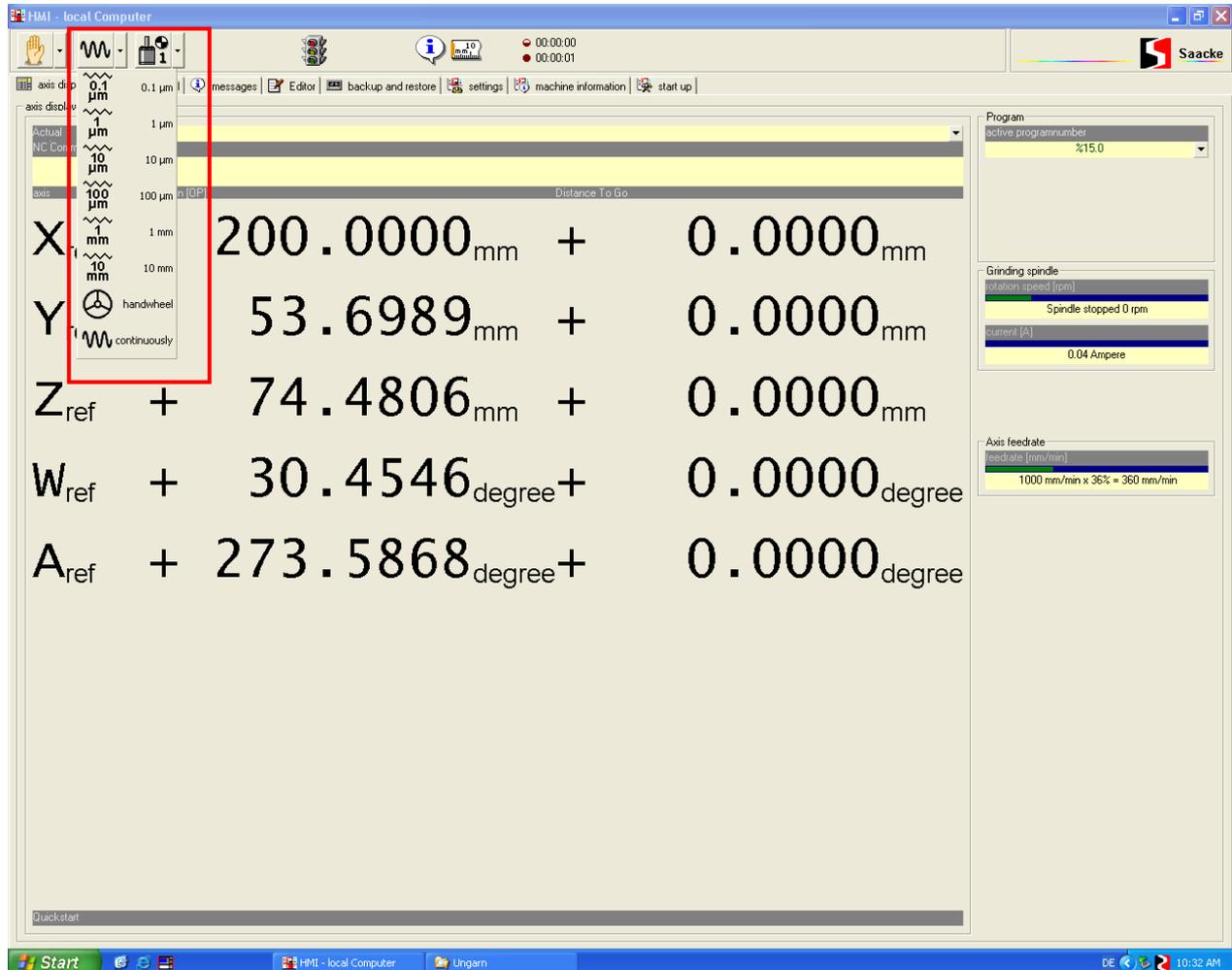


Fig. 10

Here, you can select how manual mode of operation is to be done.

There is the possibility of moving the axes incrementally from 0.1 µm to 10 mm via the + and - keys.

Likewise, the axes can be moved incrementally with the electronic hand-wheel from 1 µm to 100 µm.

In addition, the axes can be moved continuously via the + and - keys.

7.3 Machine stationary (traffic lights)

The traffic lights display the current situation of the machine.

A red light means that the machine is stationary or that no programme has been started.

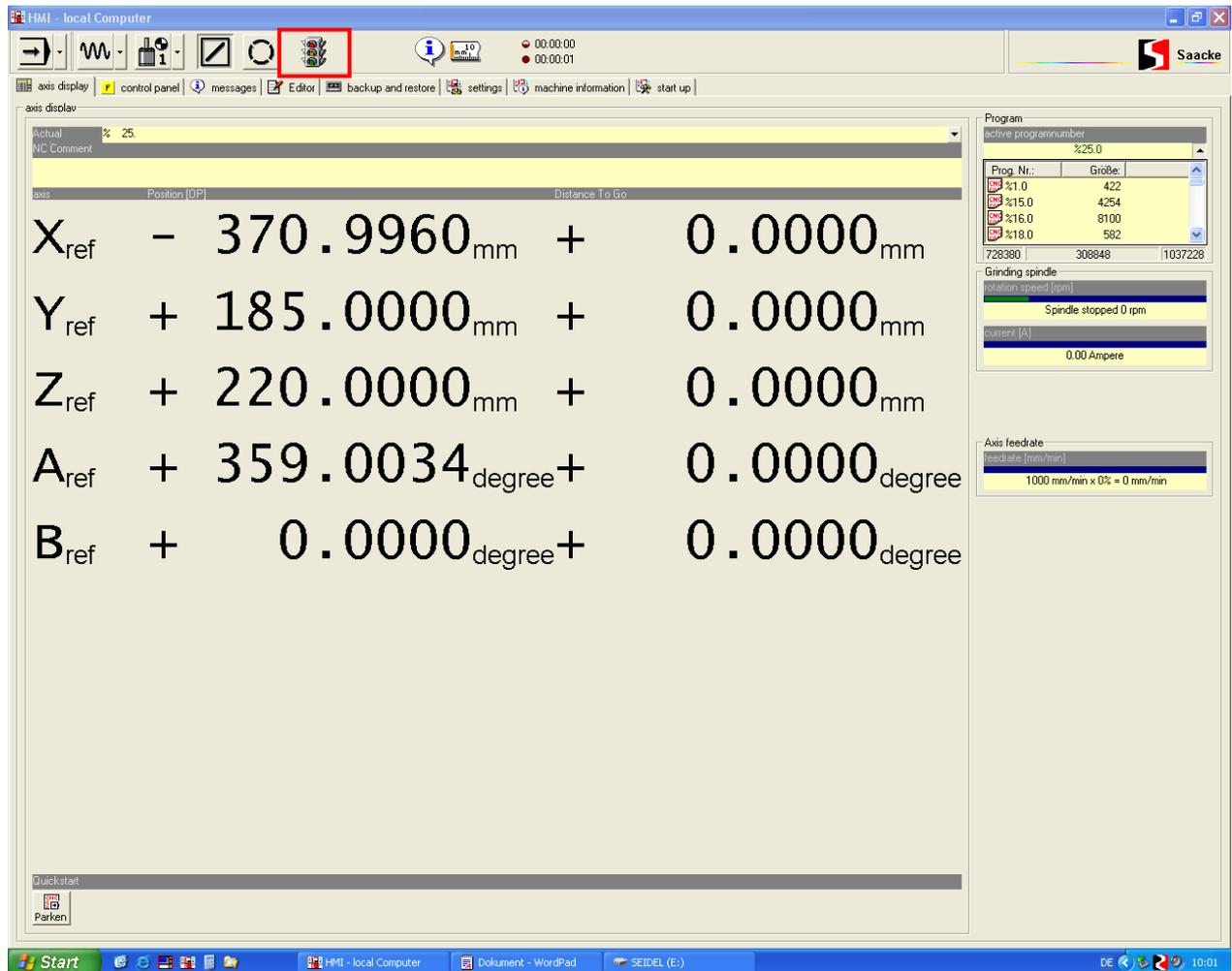


Fig. 11

7.4 Condition of measuring probe

Here is displayed the condition of measuring probe.

You can select measuring probe 1 or measuring probe 2.

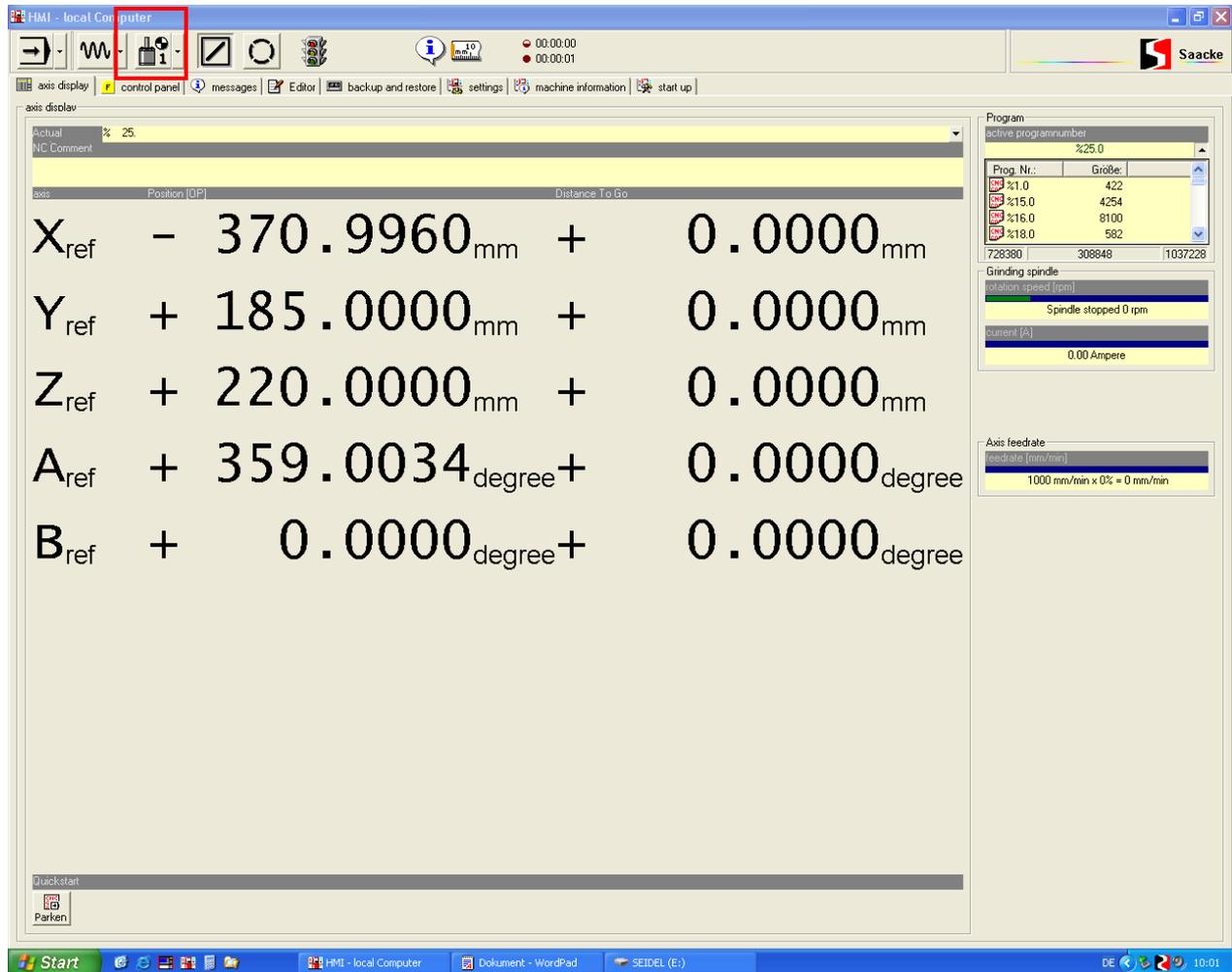


Fig. 13

Figure 13 shows that the measuring probe 1 is NOT positioned.

When the measuring probe is positioned a red marking appears..

7.5 Ignore sentence

By single clicking the mode "Ignore sentence" can be activated. Certain programme lines in a CNC programme are exist no longer. This function is generally deactivated. It should not to be activated without consultation with the Company Gebr. SAACKE GmbH & Co. KG.

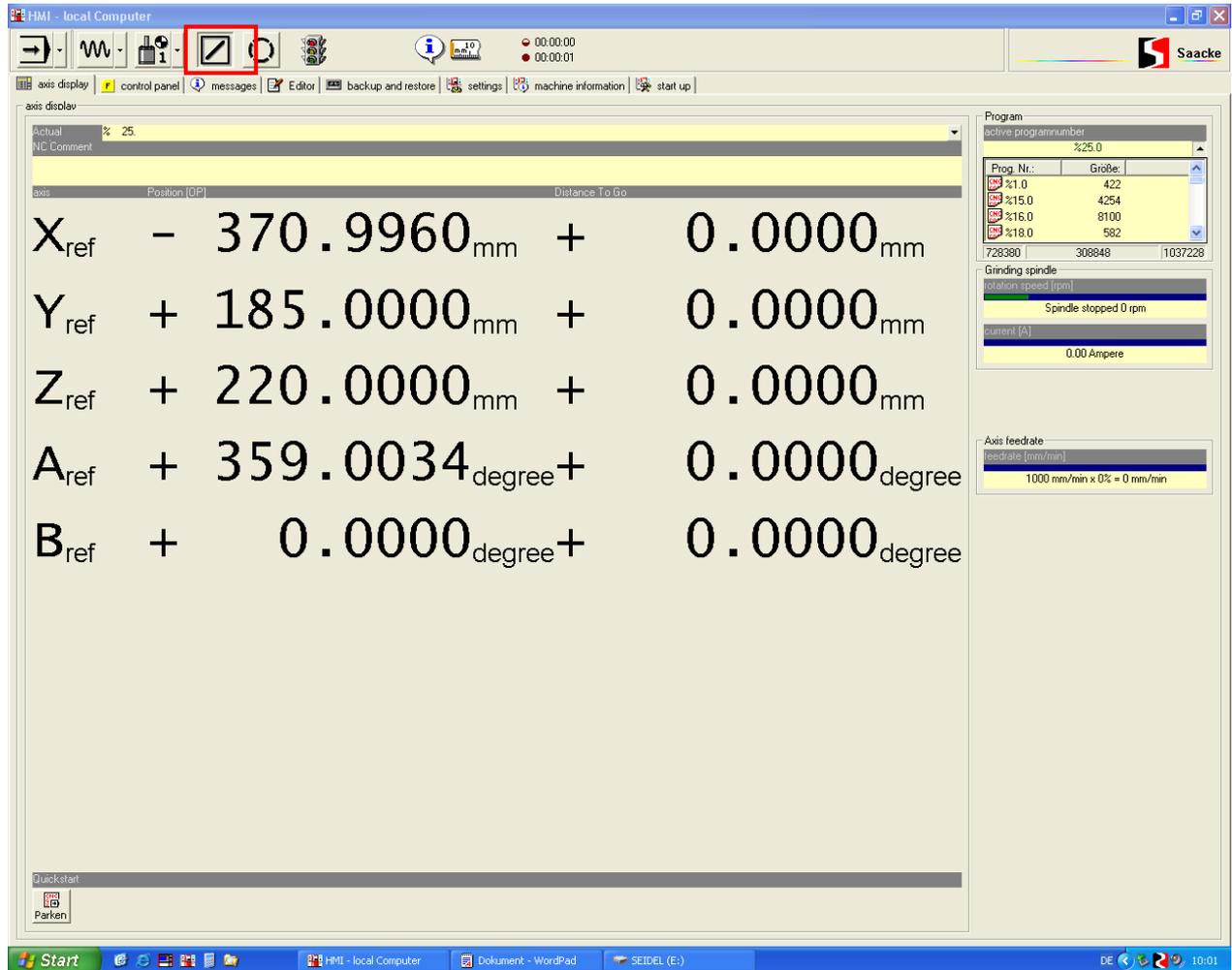


Fig. 14

7.6 Programmed stop

Activate the programmed Stop M01.

This function also should be activated only after consultation with the company Gebr. SAACKE GmbH & Co. KG.

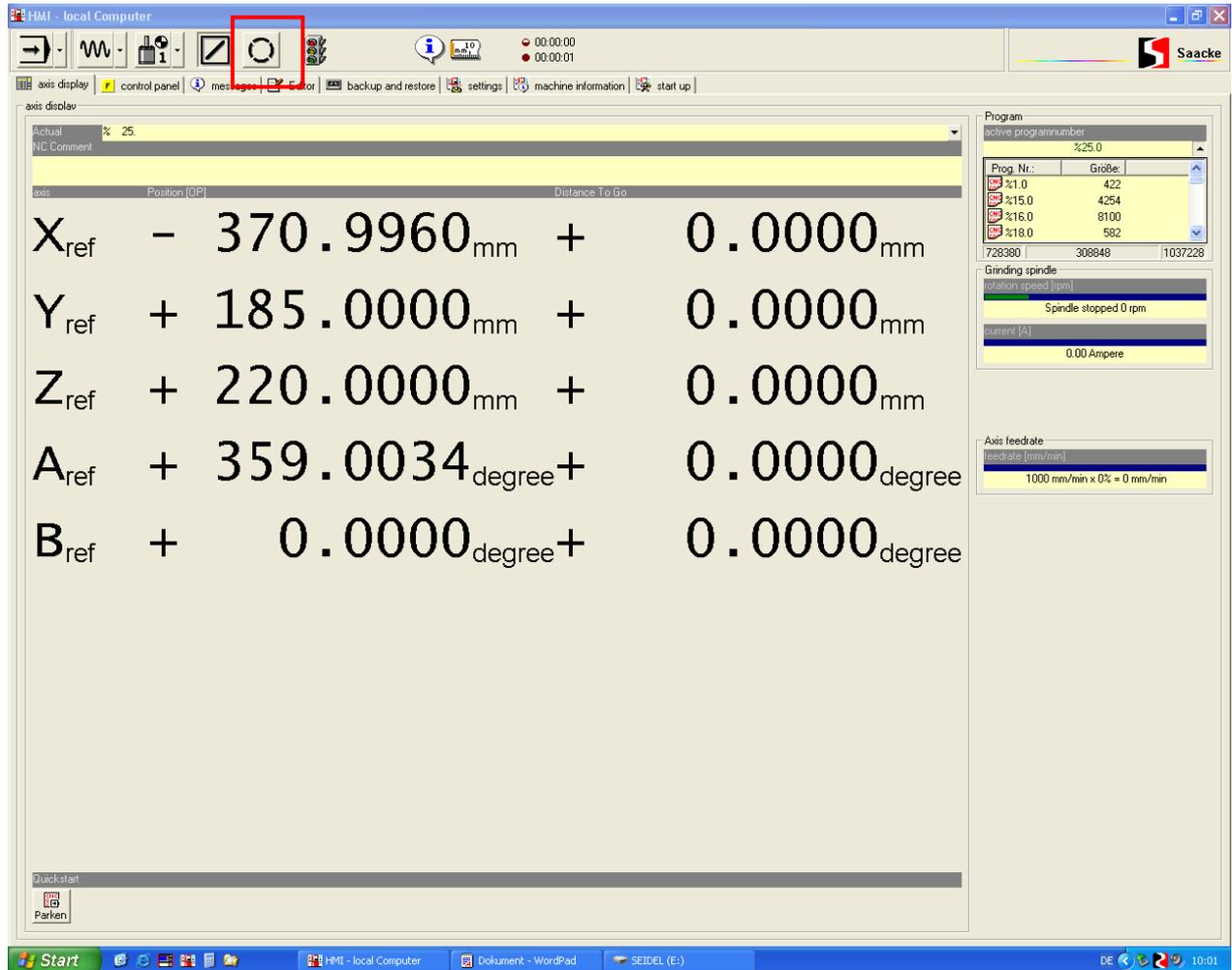


Fig. 15

7.7 Machine information

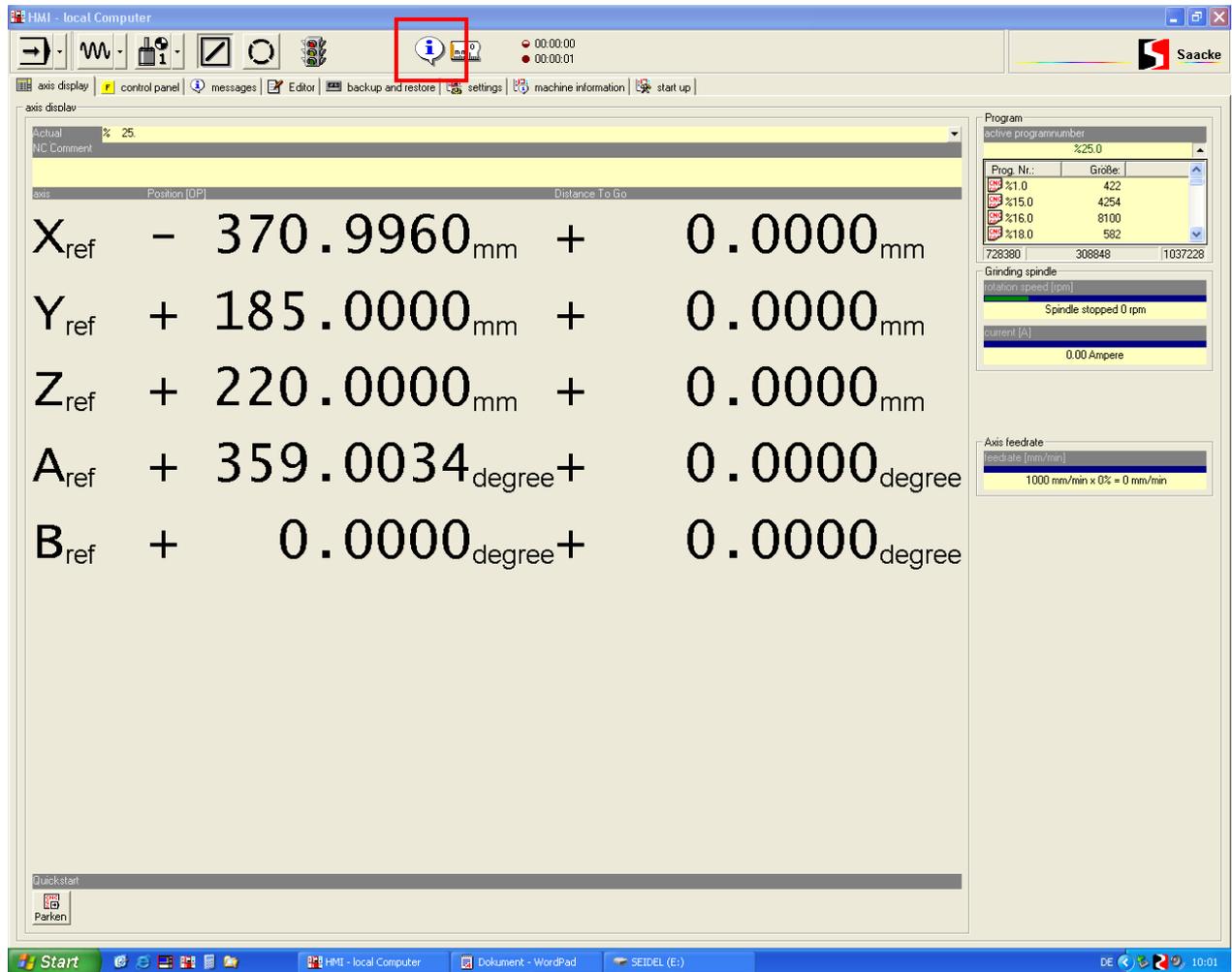


Fig. 16

After the i icon has been clicked for "Information", the register sheet "Messages" is placed into the foreground. (A red „i“ point out an error message on the CNC),

The register sheet „Messages“ it cuts into:

- „Messages“
- „Error history of the driving amplifier“
- „Messages of system start“

By clicking „messages“ all error messages of the NC are displayed (see fig. 17).

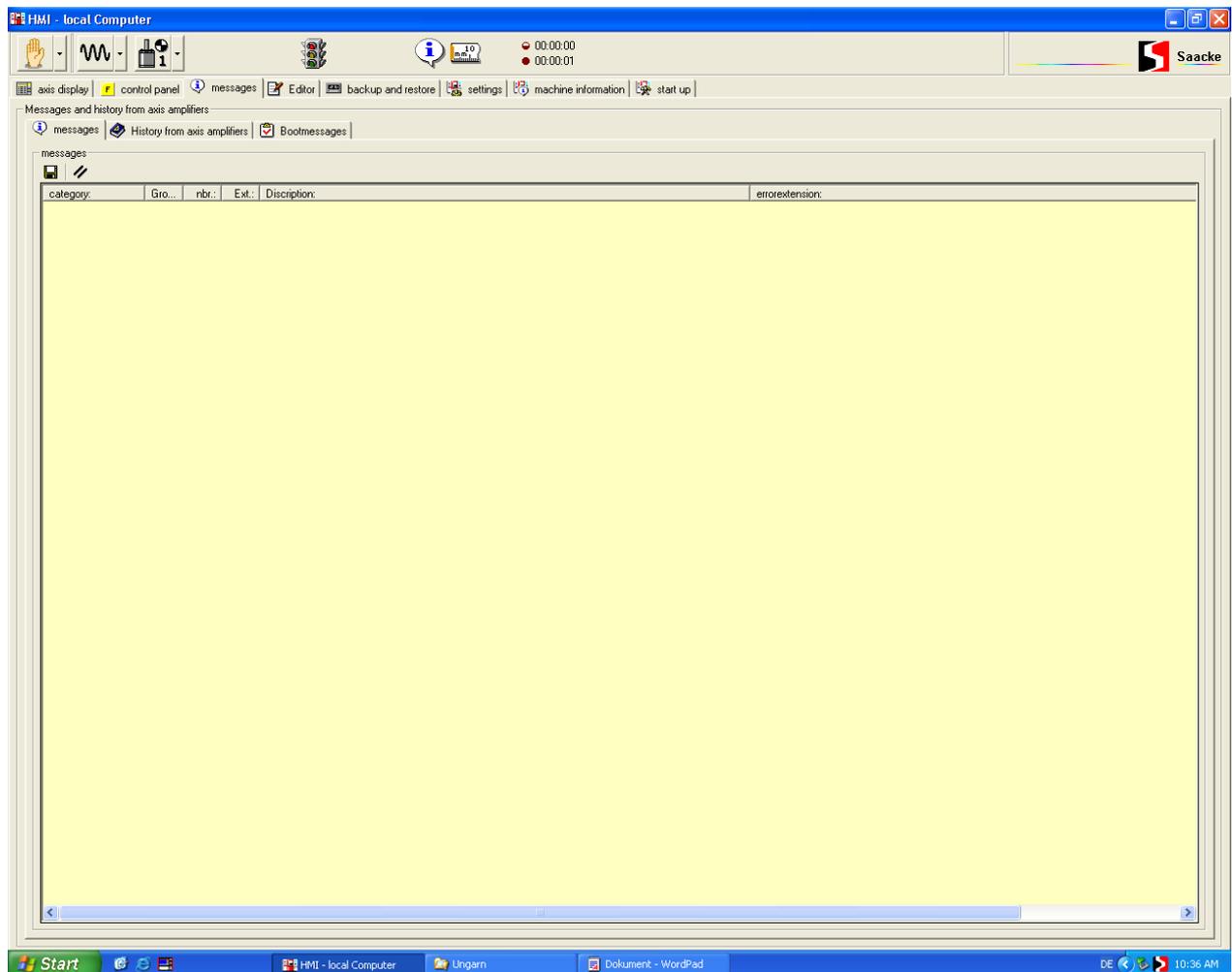


Fig. 17

By clicking the data field „Category“ you can select the individual error message categories.

By clicking the disc symbol you can save the current errors and take a reset with the double slash.

By clicking the „History from axis amplifier“ all error messages of the driving amplifiers are displayed (see fig. 18).

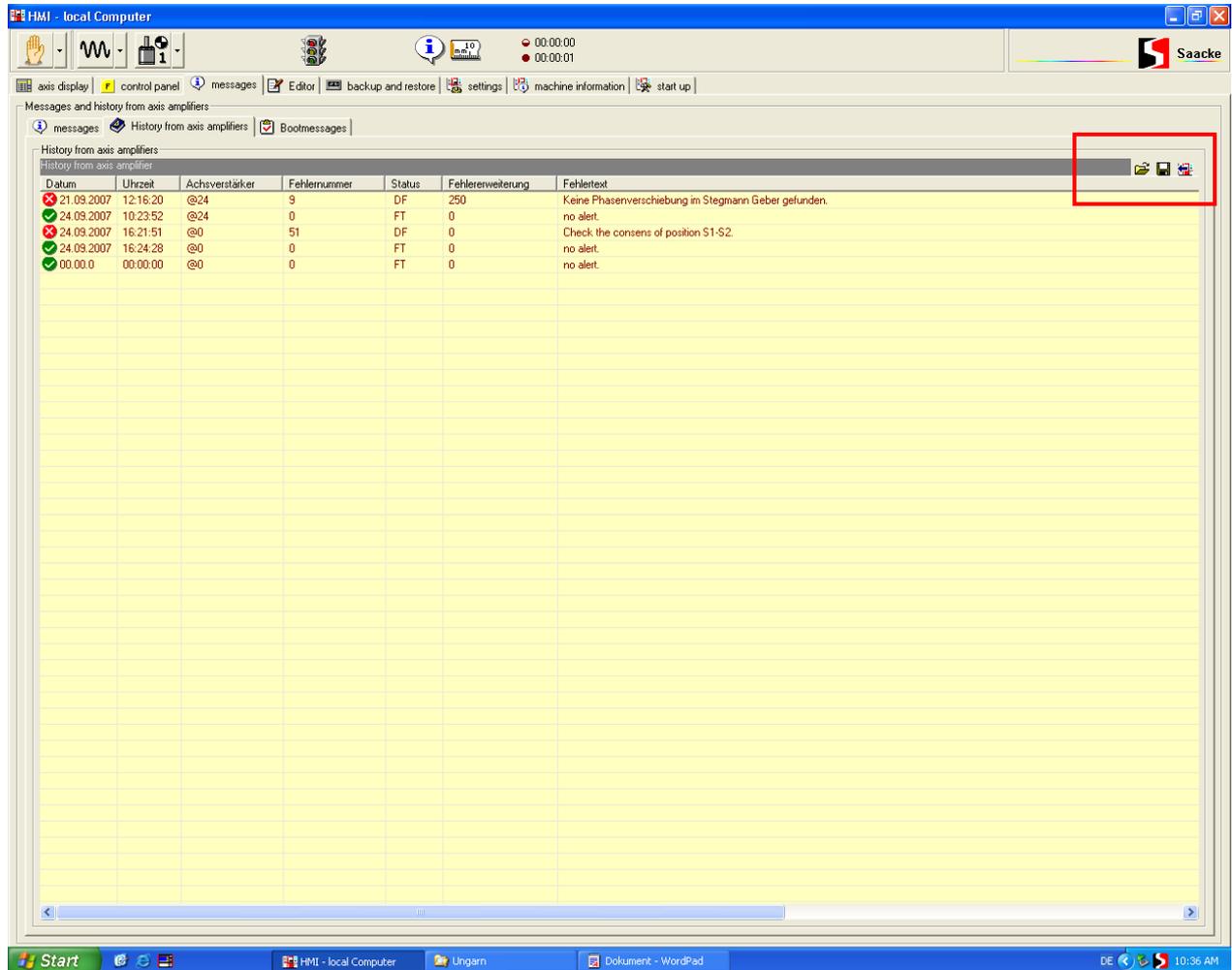


Fig. 18

By clicking the disc symbol, saving of the messages are possible.

By clicking “Receive” the messages can be read again.

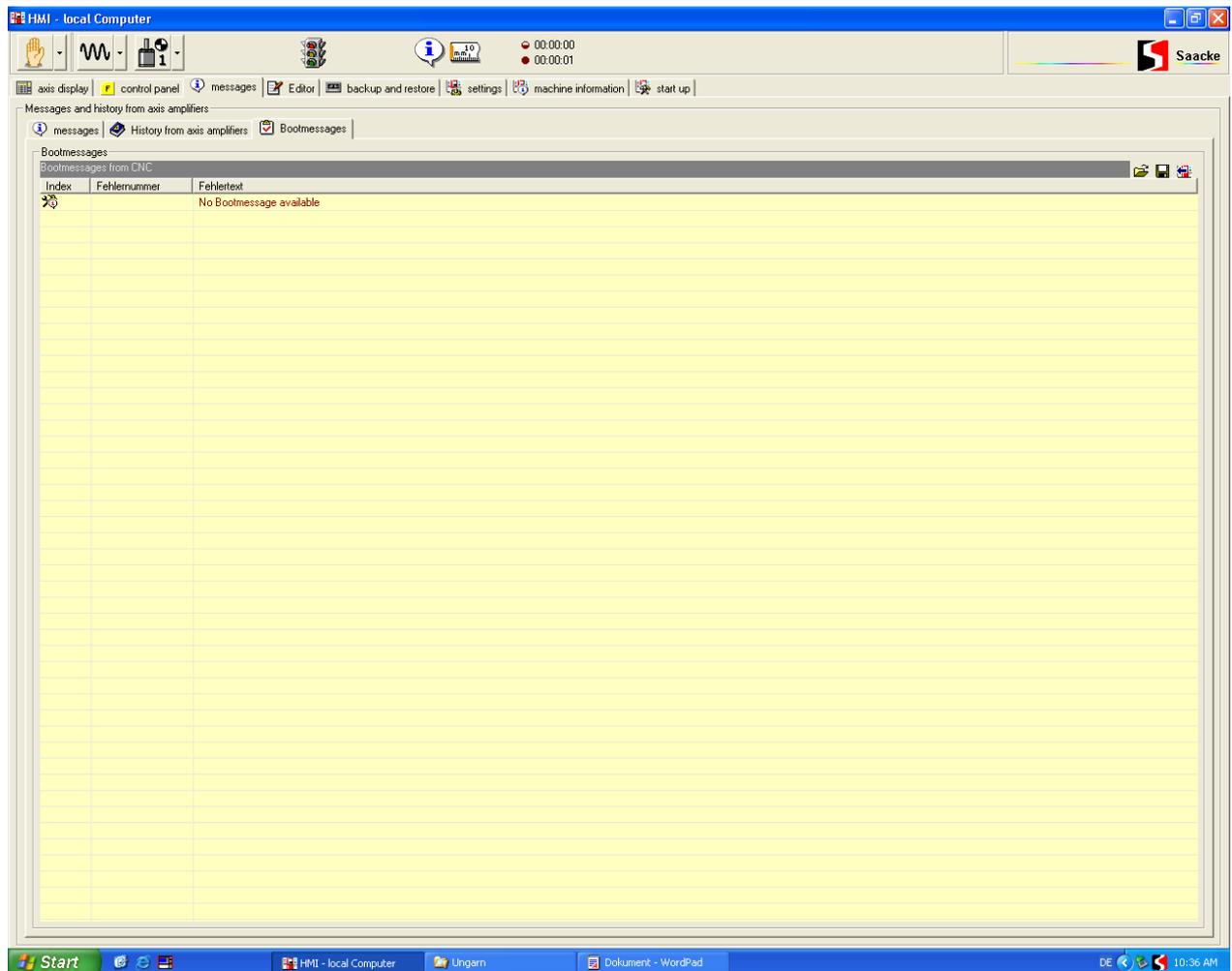


Fig. 19

At the page „Bootmessages“ all messages during the initialization phase are displayed.

The diskette symbol is used as above.

7.8 Unit of measurement of the machine

The current unit of measurement of the machine is displayed as follows.

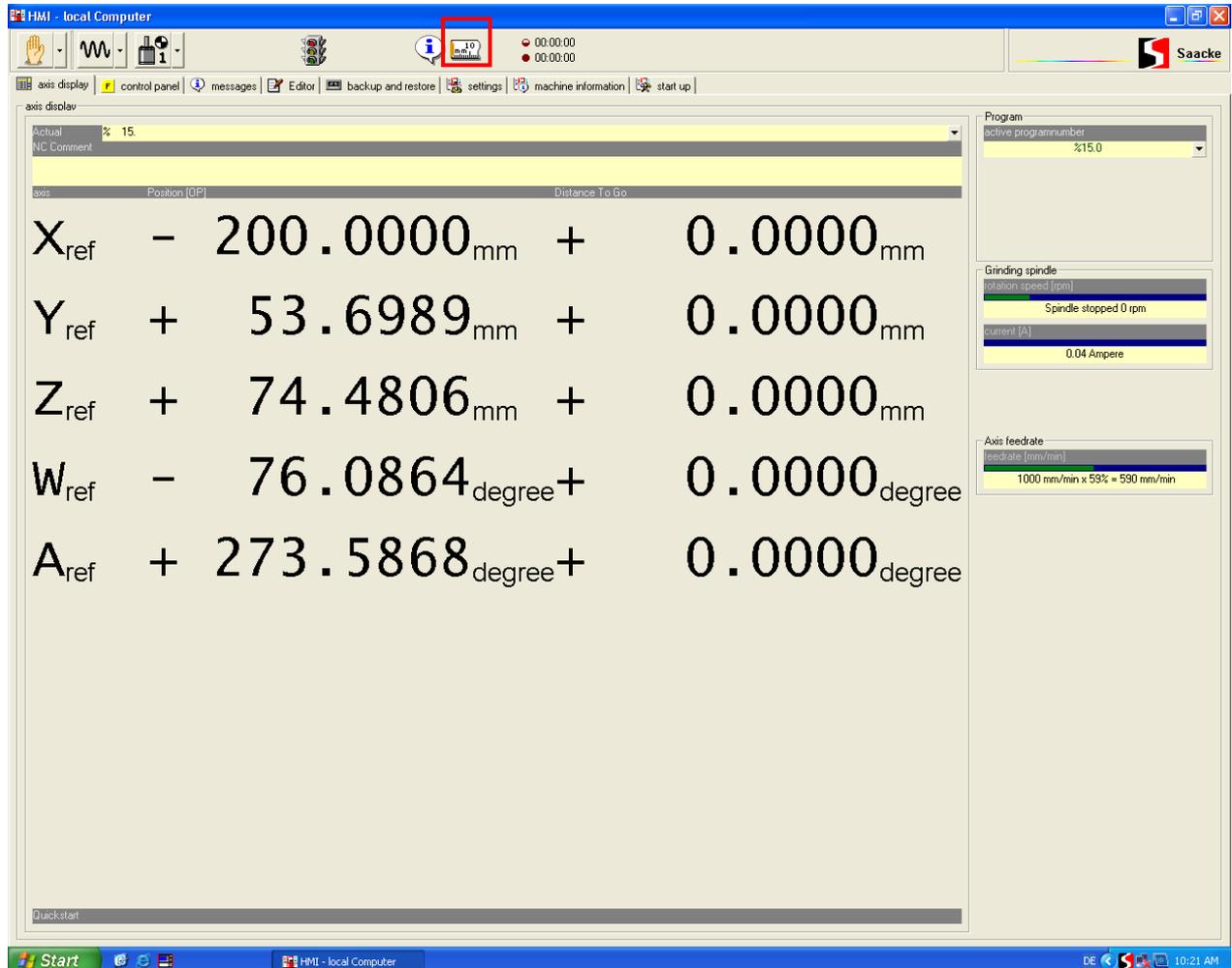


Fig. 20

The display refers to the unit from the configuration of the machine.

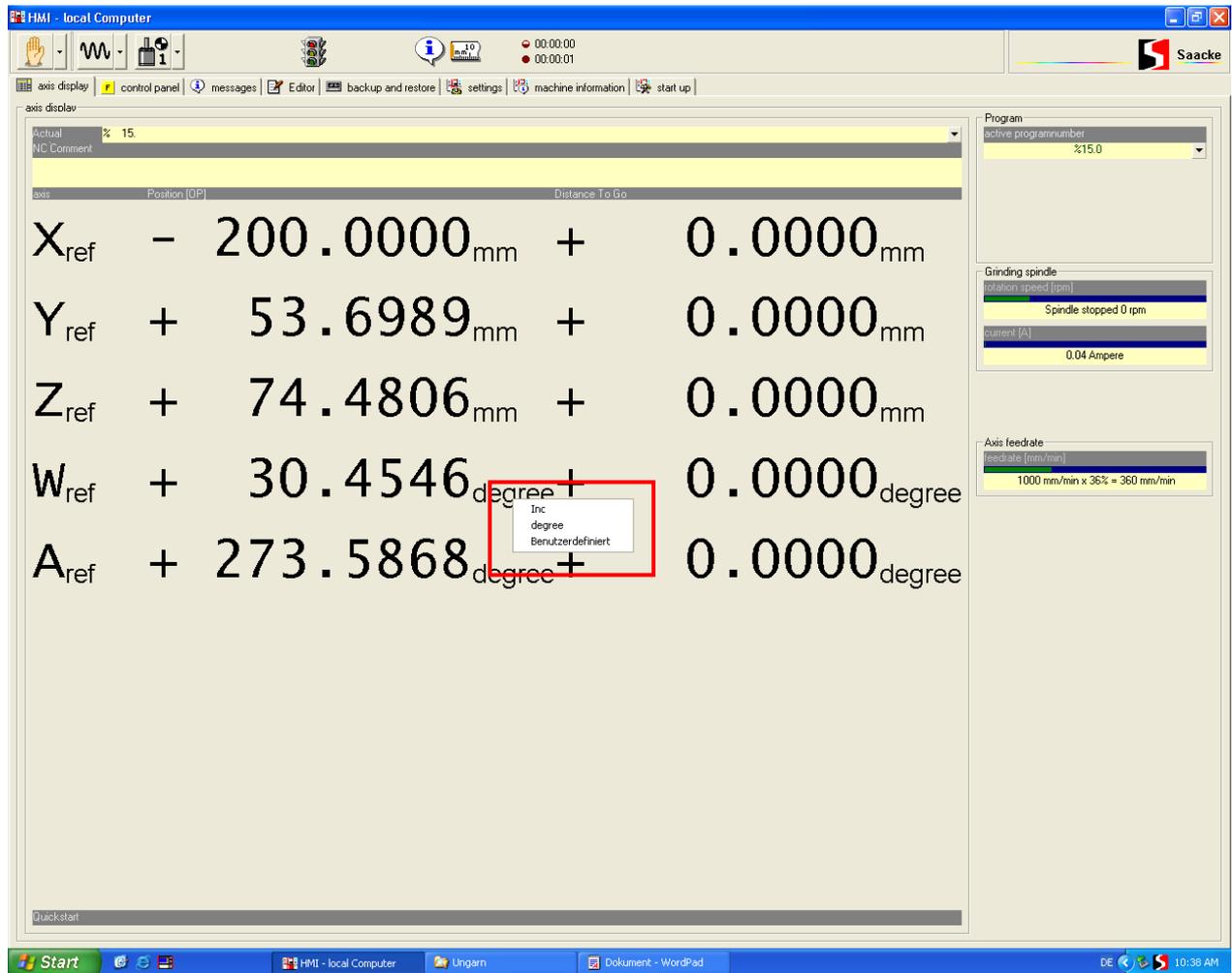


Fig. 21

By clicking with the right mouse button on the data behind the positions of the axes the unit of the display can be changed.

Please observe that the unit of the configuration is not changed.

If you have selected „user-defined“, then you can specify an own unit of measurement on the display by a conversion factor.

8 Register sheet „Axis image“

See

Chapter 3 Axis positions

Chapter 4 Programme selection, programme editor

Chapter 5 Grinding spindle, current, Axis feed, quick start

Chapter 6 Current sentence and numerical control comment

9 Register sheet „Operator panel“

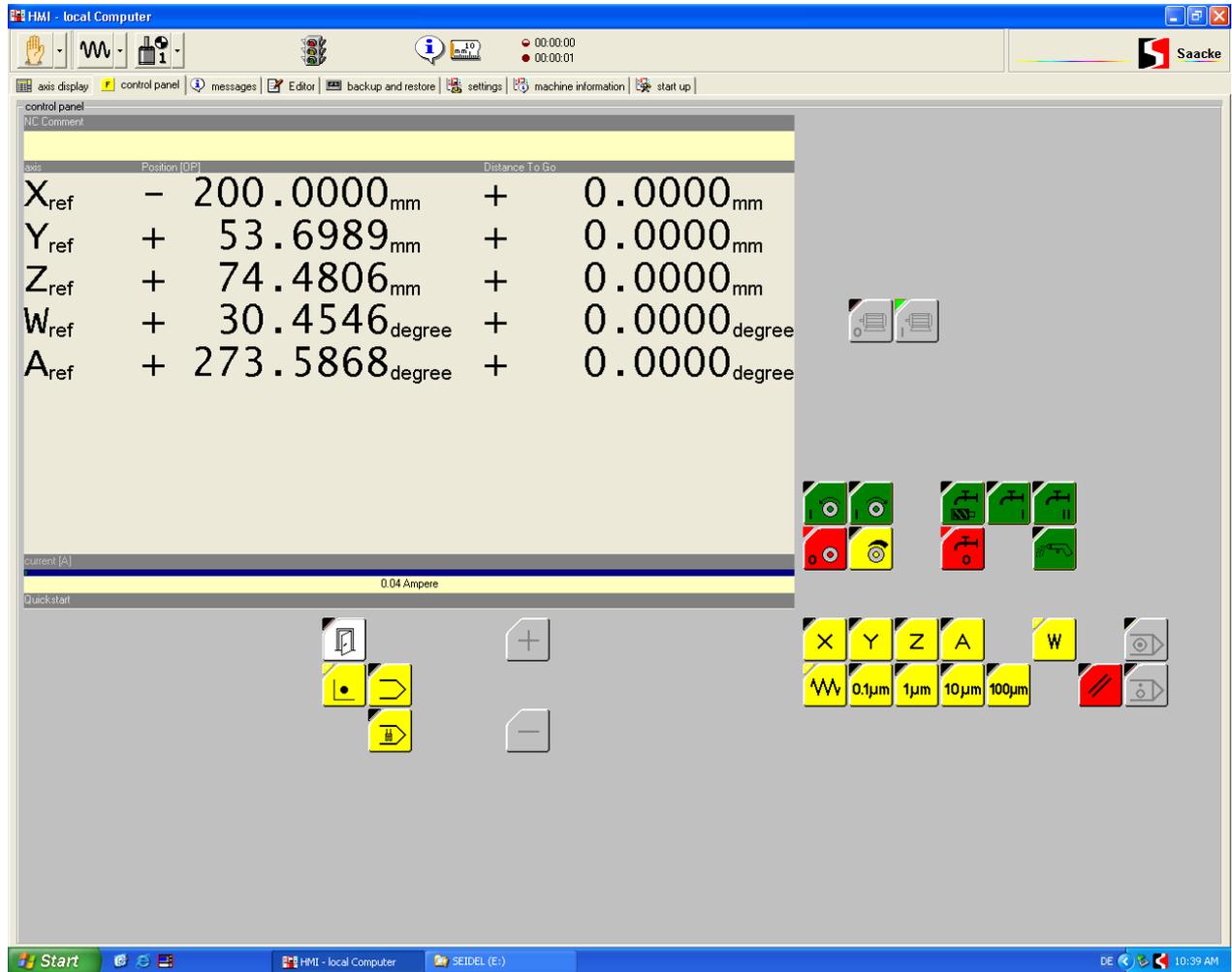


Fig. 22

The axes display on the operator panel corresponds to the chapter „Axis image“.

Depending on the type of the machine and equipment of the machine additional operating keys for the machine are displayed.

10 Register sheet „Messages“

See Chapter 7.7 Machine information

11 Register sheet „Editor“

If a NC programme of the machine is opened according to chapter 4, then this is displayed in the editor:

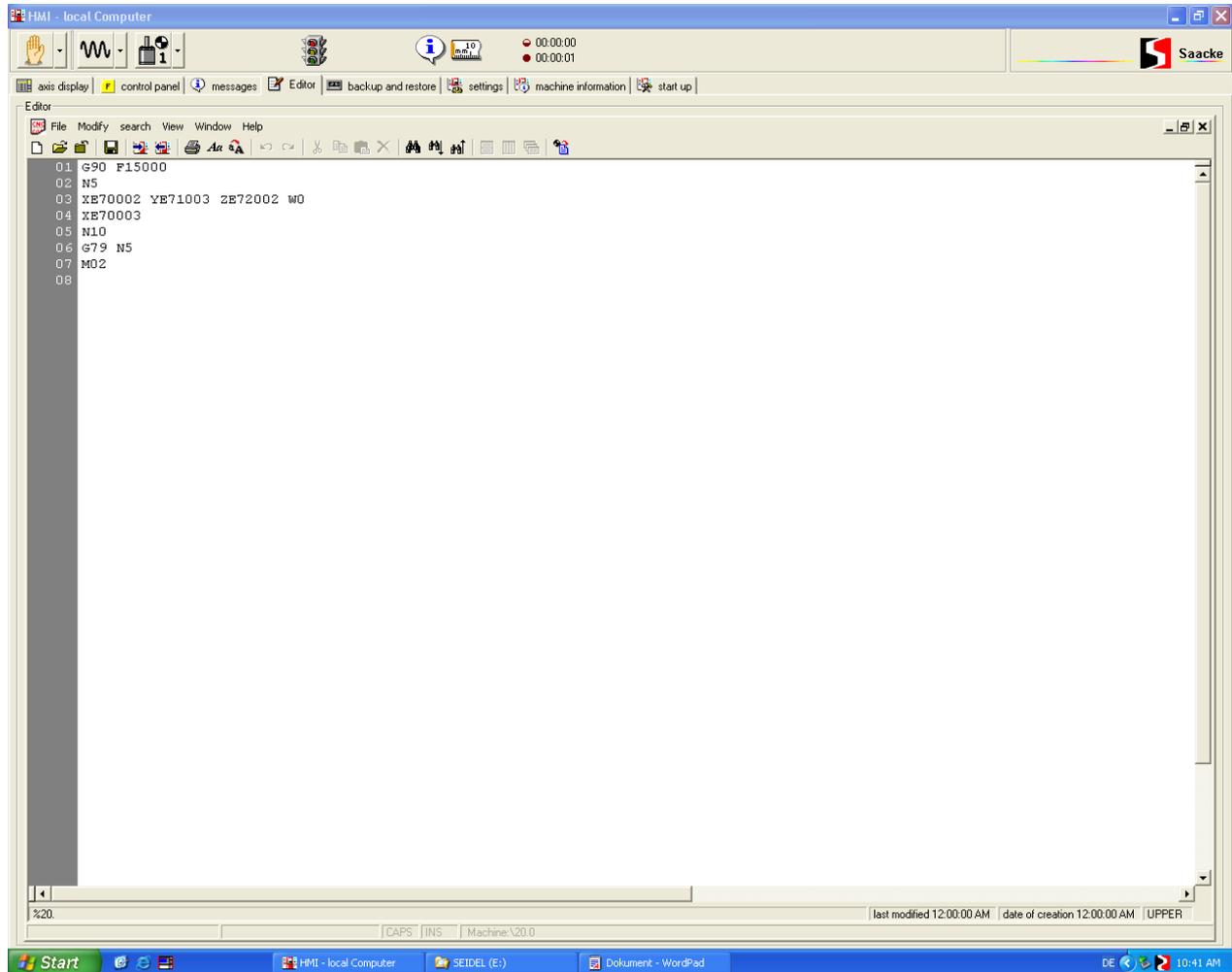


Abb. 23

It is also possible to open any NC programme on the PC by clicking „File“ and „Open“.

Now the NC programme can be for example changed, edited, sent to the machine or formatted.

By clicking „receive“ it is also possible to select and receive a NC programme directly from the editor on the machine.

You find details in the operating instructions SAACKE NC Editor.

12 Register sheet „Back-up and Restore“

At the register sheet „Information“ the information about the last data back-up are displayed.

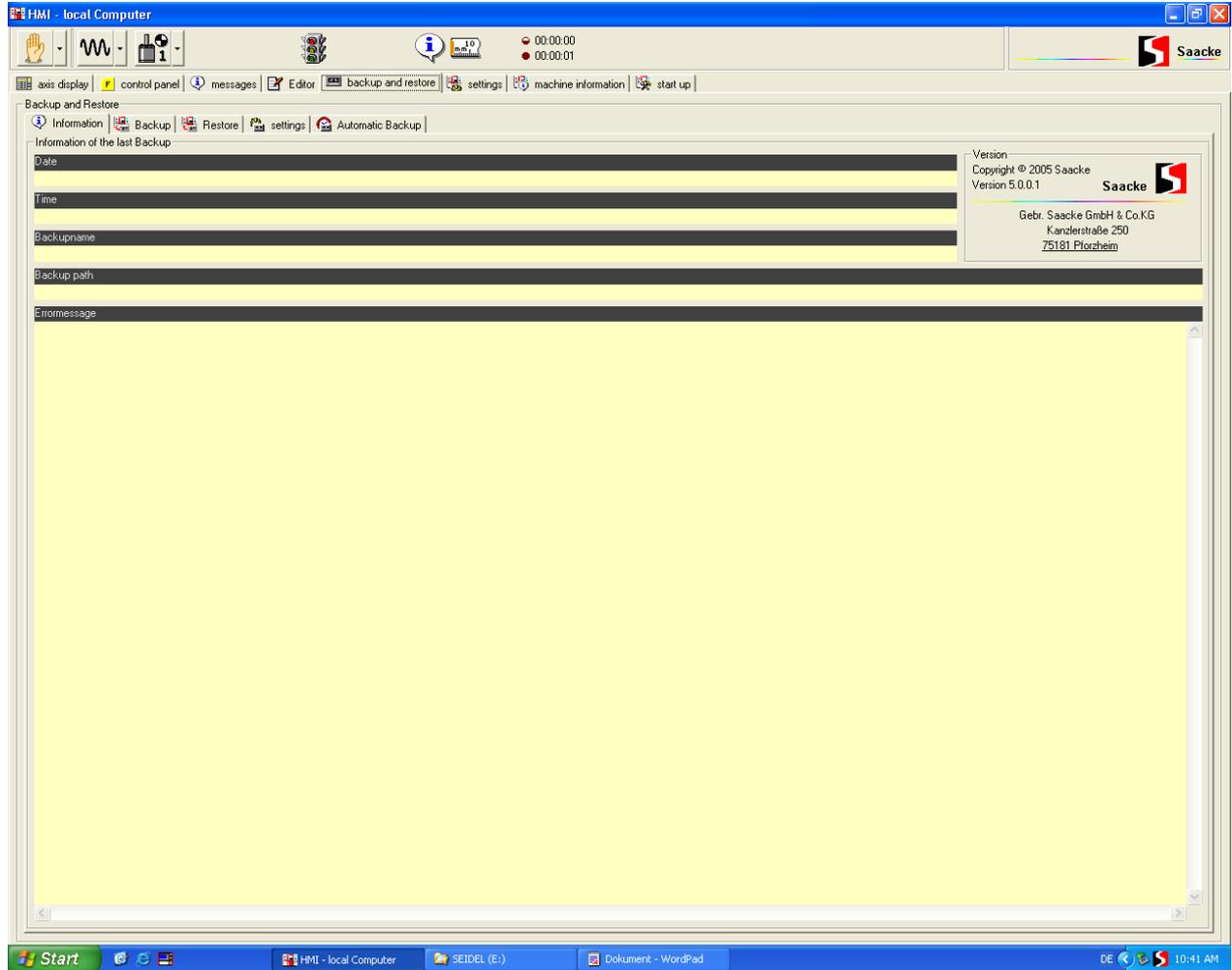


Fig. 24

By clicking register sheet „Back-up“ first all files are displayed which are present on the machine. Also data files near the system belong to it.

By marking Backup you can select the data files which are to be saved.

By clicking „Additional drives, data files and folders“ data files can be taken up from the hard disk of the machine computer to the data back-up.

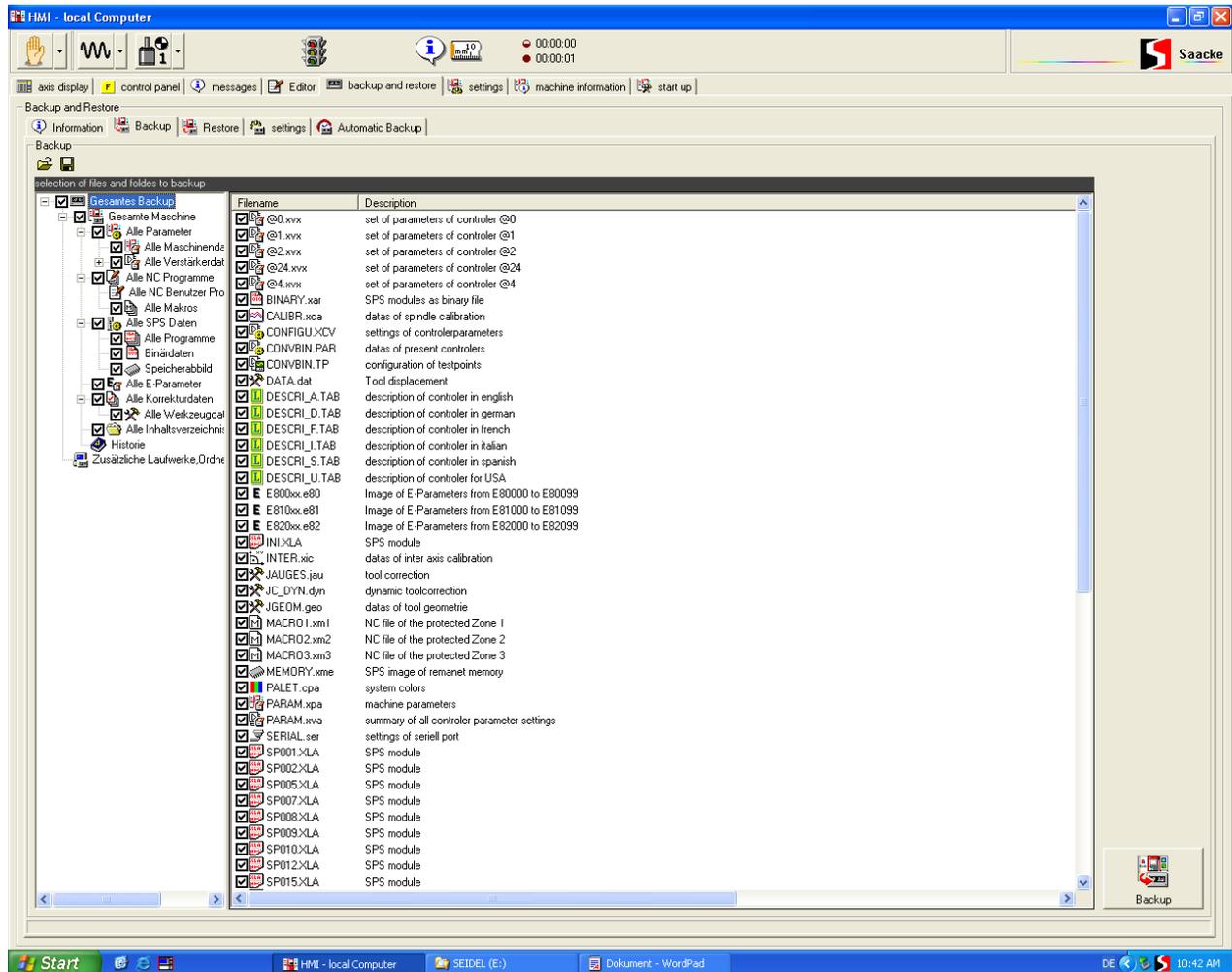


Fig. 25

The settings e.g. where the data back-up is saved are made in the register sheet „Settings“.

By clicking right down „Back-up“the back-up is started.

Here the desired path can be registered and by clicking „back-up name and option“ the desired name can be enrolled.

The button "Accept" must be clicked for saving the settings,.

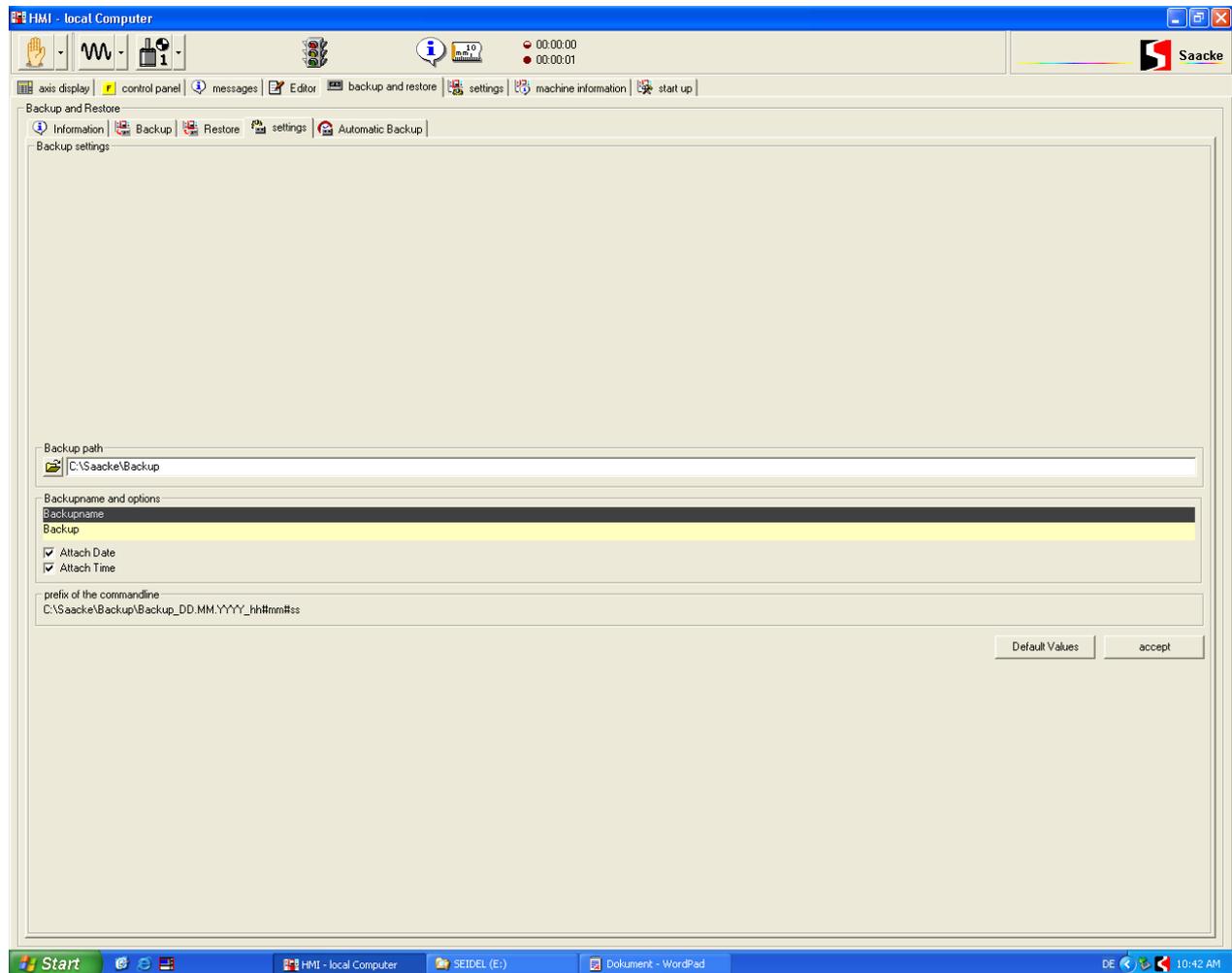


Fig. 26

The path of the data back-up is registered in the line “Restore”.

In the left column the contents of the data back-up are displayed and you can select which data are to be recovered.

By clicking right down „Restore“ this procedure is started.

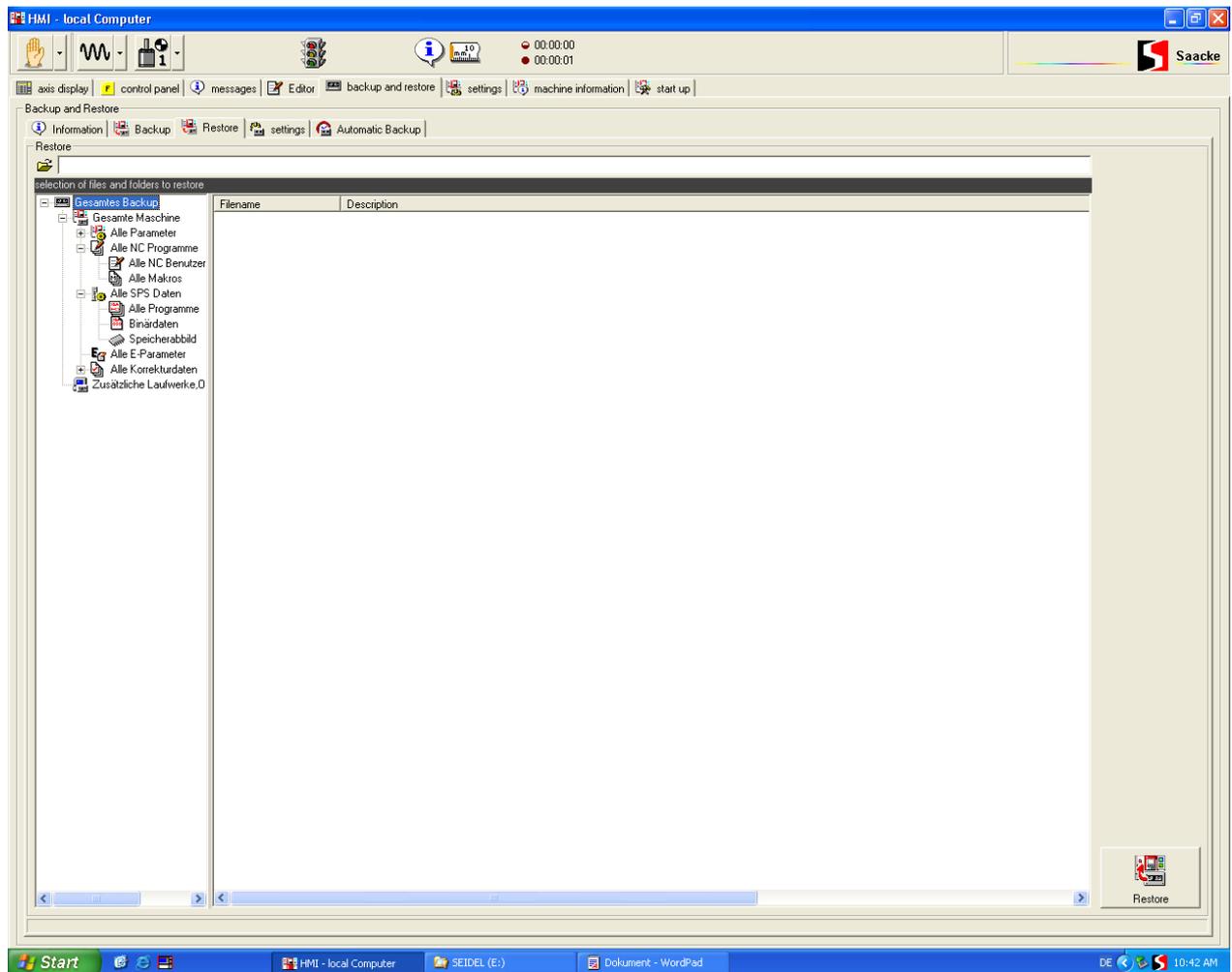


Fig. 27

The parameters for an automatic data back-up can be set here.

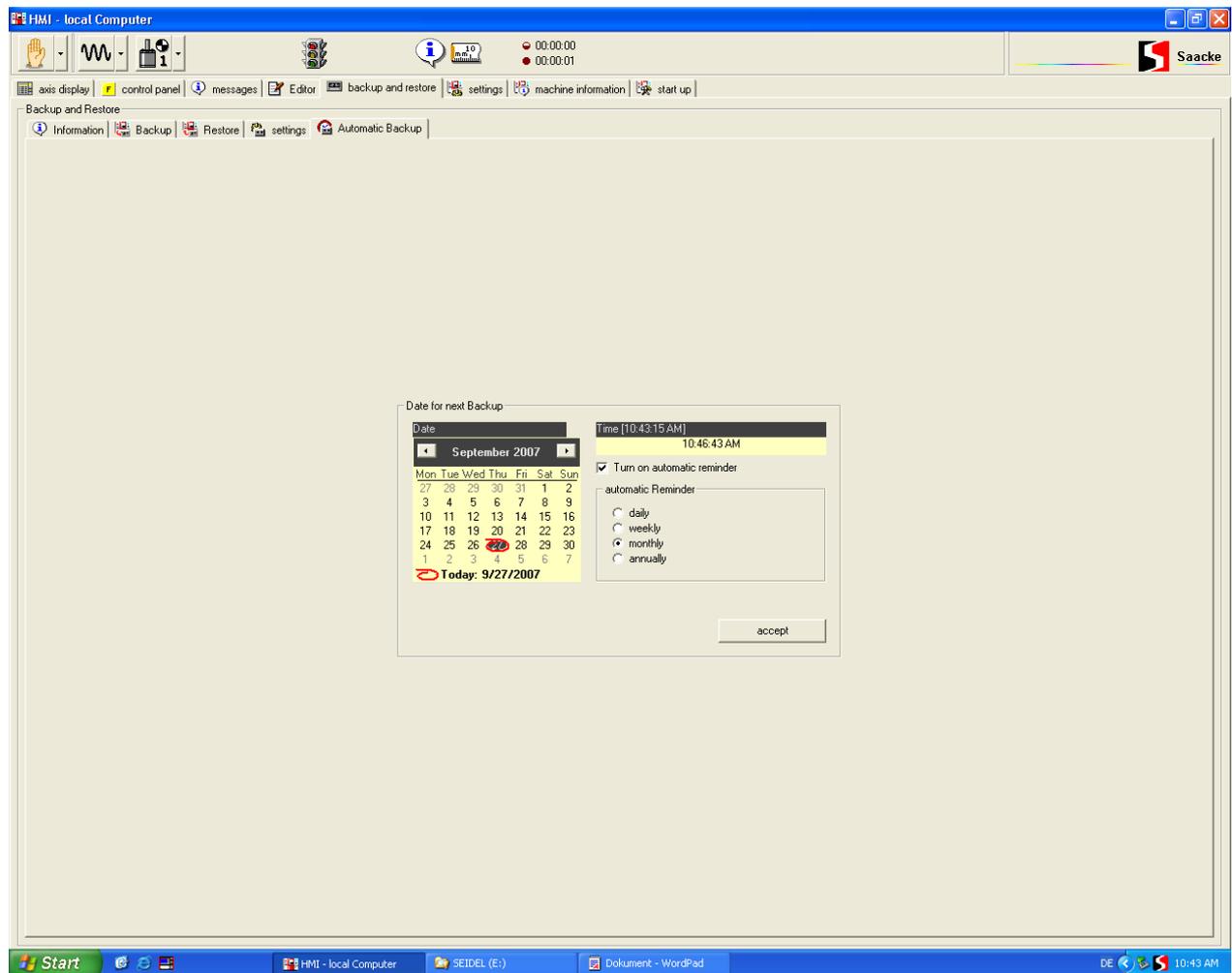


Fig. 28

13 Register sheet „Settings“

Here different settings can be made.

By clicking „National language“ can be selected the appropriate country.

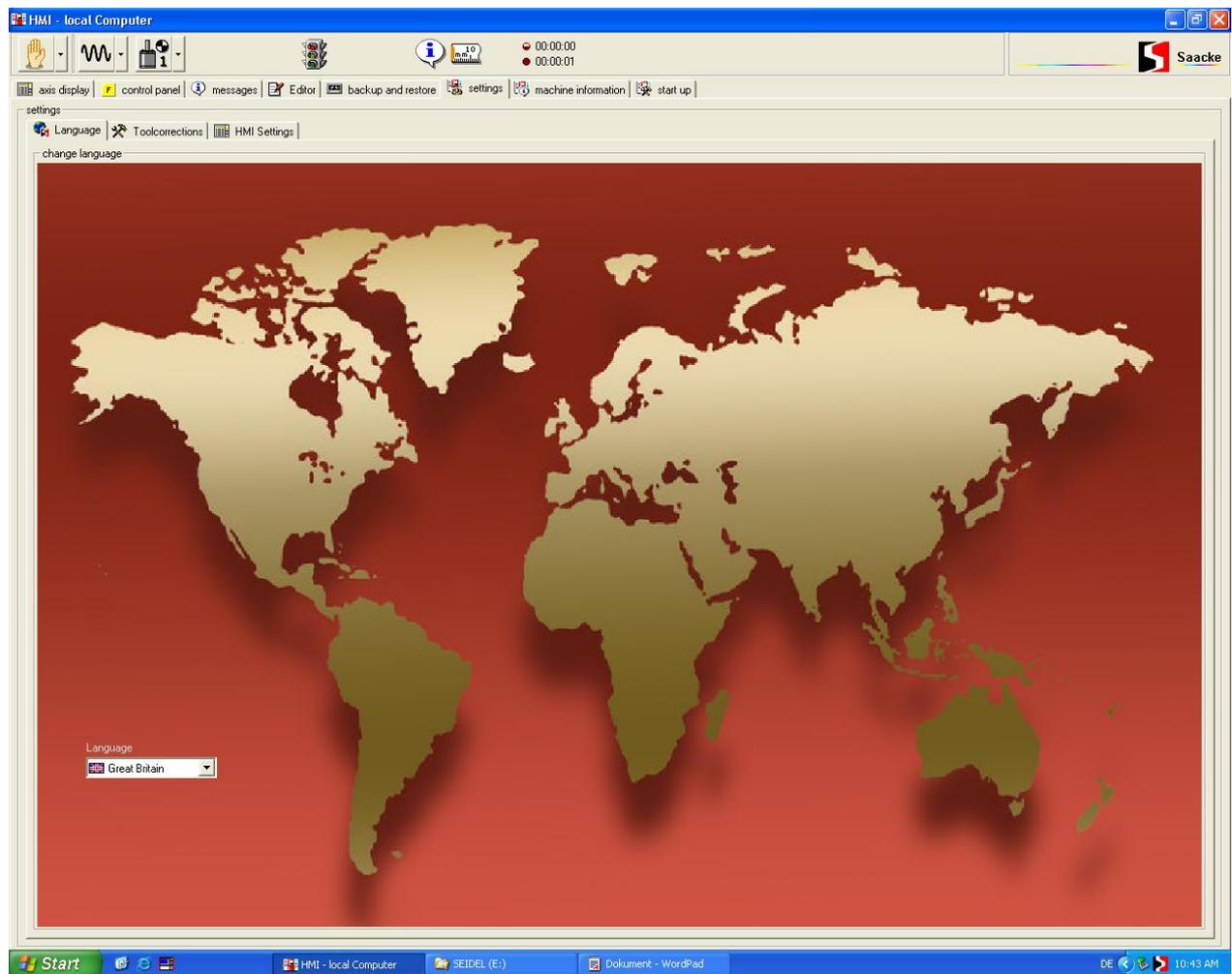


Fig. 29

By clicking „Tool corrections“ the measures of correction for grinding with NUMROTOplus® are entered. These data are saved in a file on the machine and they are used in the NUMROTOplus® grinding programme (see NUMROTOplus® -Documentations).

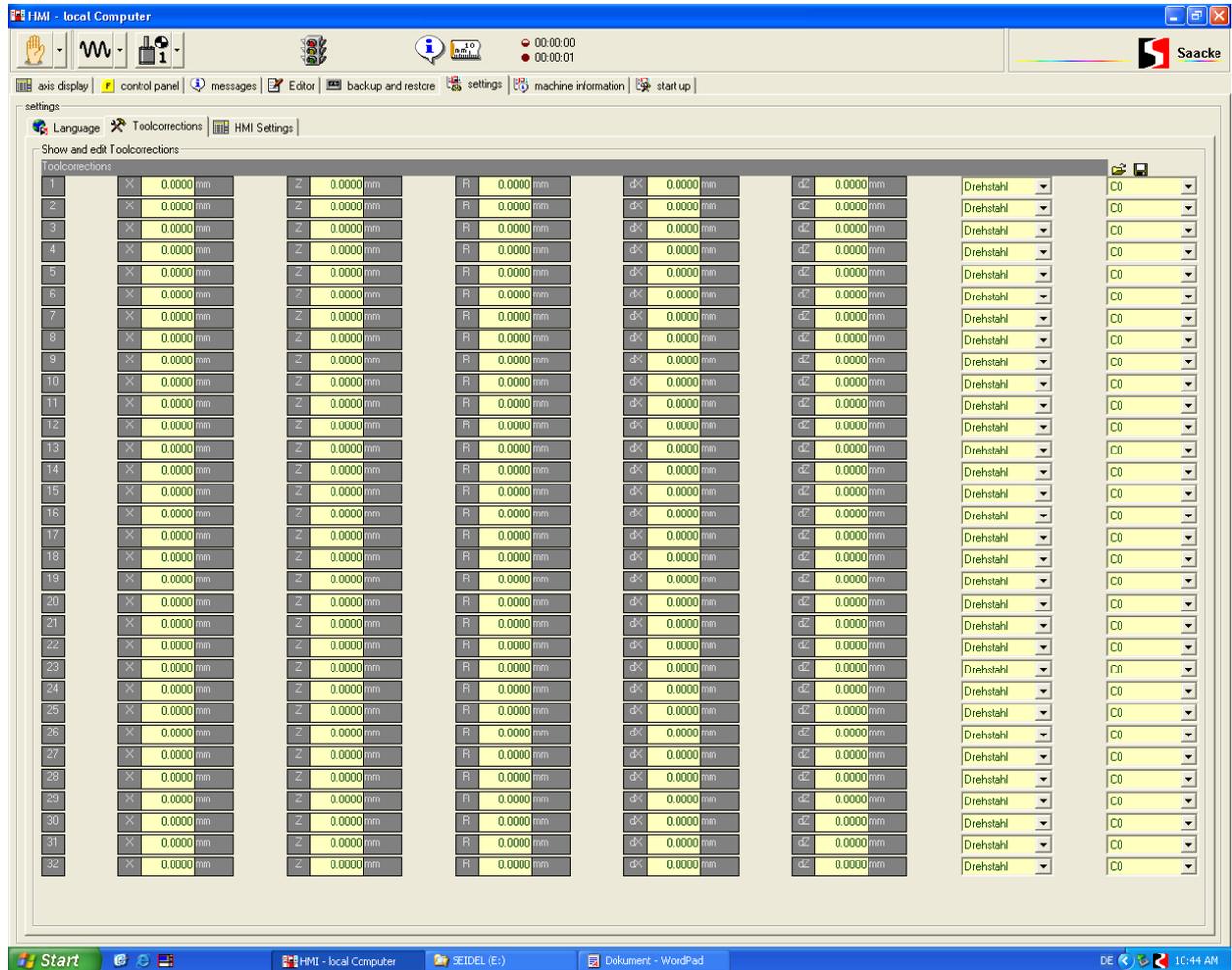


Fig. 29

„HMI settings“

Here some settings for the HMI can be made.

„Messages“

It is specified whether during the appearance of a message the register sheet „messages“ is placed into the foreground automatically.

„Mode Hand“

It is specified whether during the “Manual mode of operation” the operator panel is placed into the foreground automatically.

„Quick start frame“

Here it is specified whether with a programme start from the quick start bar the programme is started directly or only on demand.

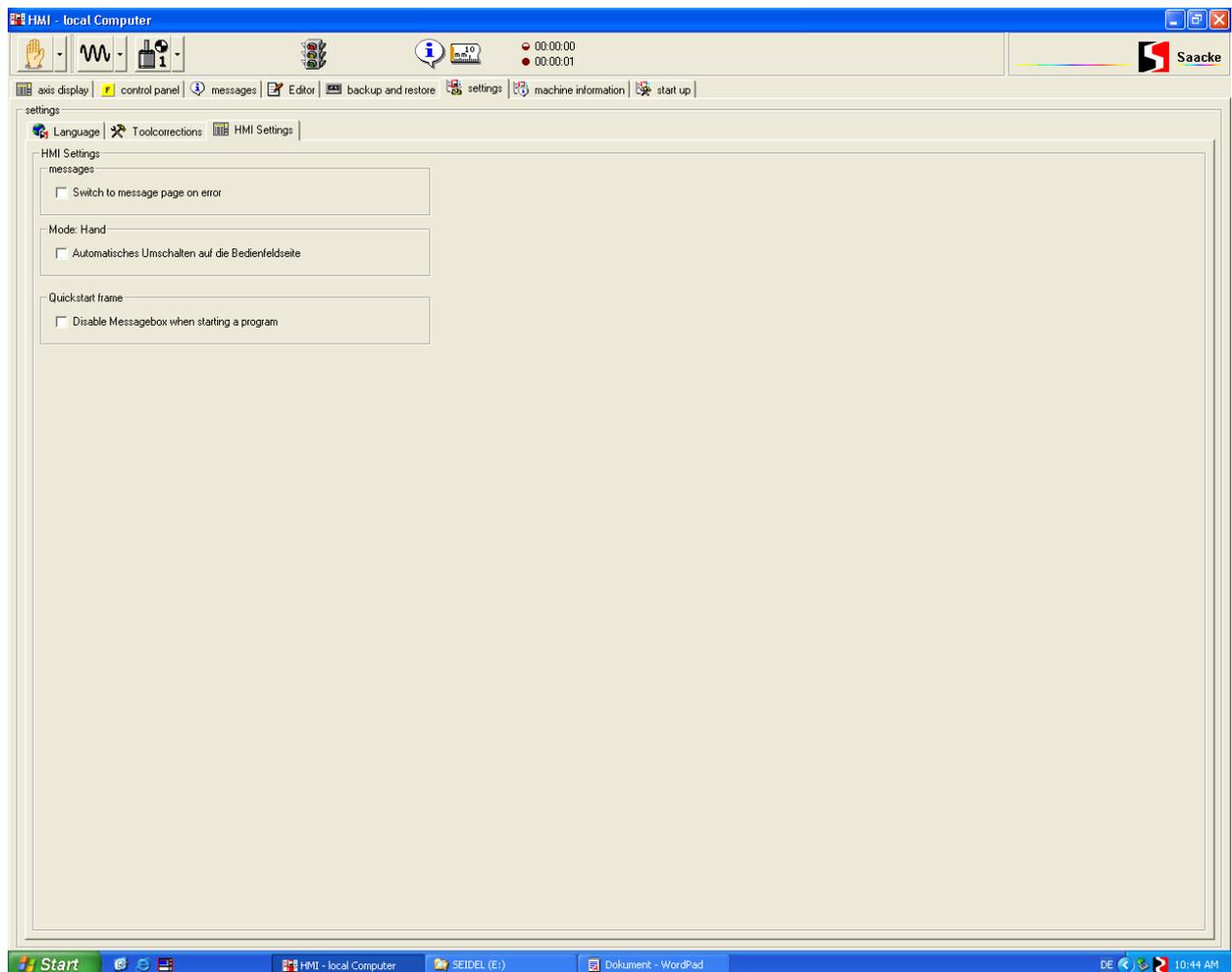


Fig. 30

14 Register sheet „Machine information“

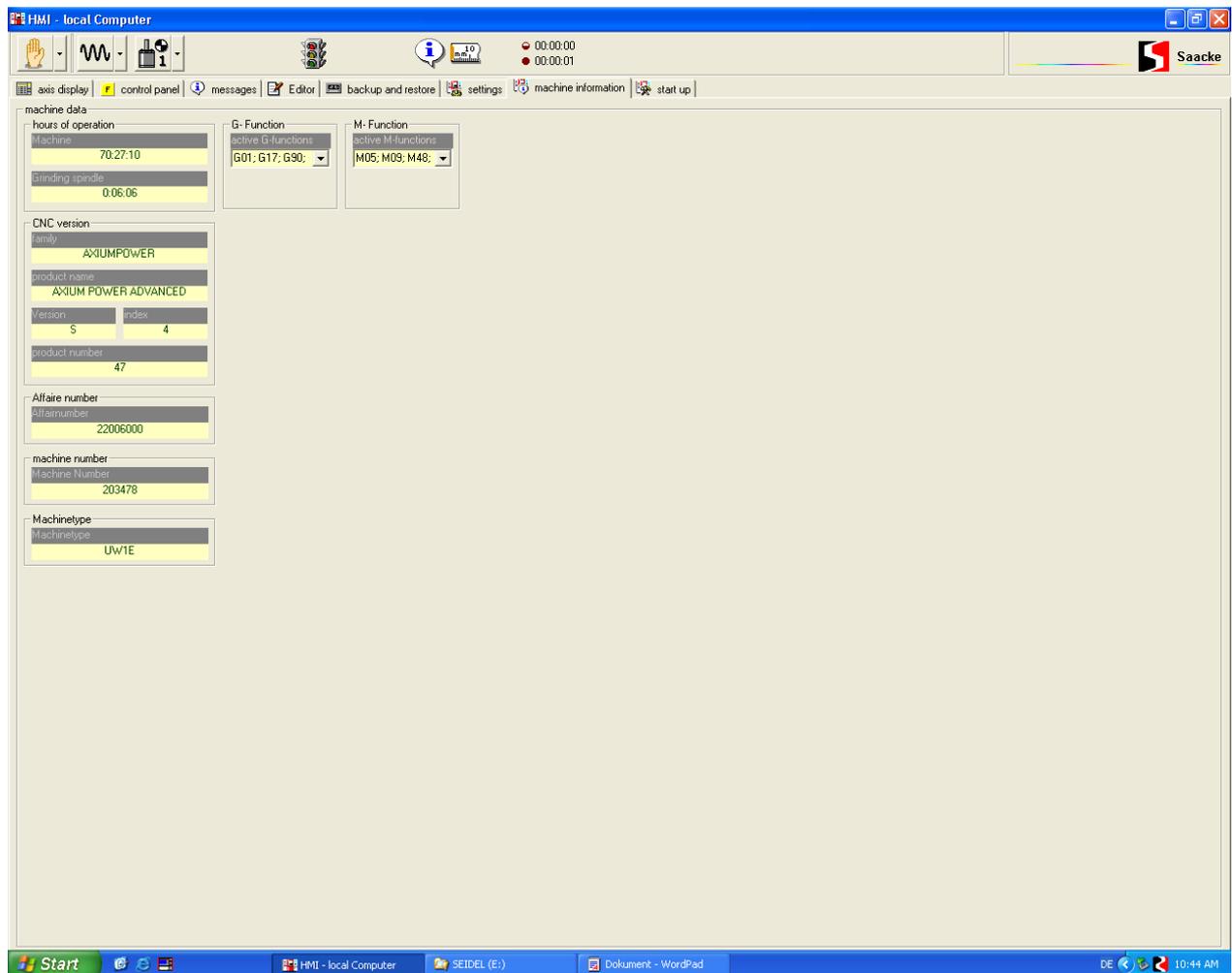


Fig. 31

Hours of operation:

The number of working hours of the machine and of the grinding spindle is displayed.

CNC version:

Data concerning the control are described.

Affaire number:

Machine number of the NUM control is displayed.

Machine number / machine typ:

SAACKE machine number and machine typ are displayed.

Active G functions / Active M funktionen:

Active G functions and M functions are displayed.

15 Register sheet „Start-up“

15.1 Variables

Here the values of different variables can be displayed (e.g. L-parameter, E-parameter etc.).

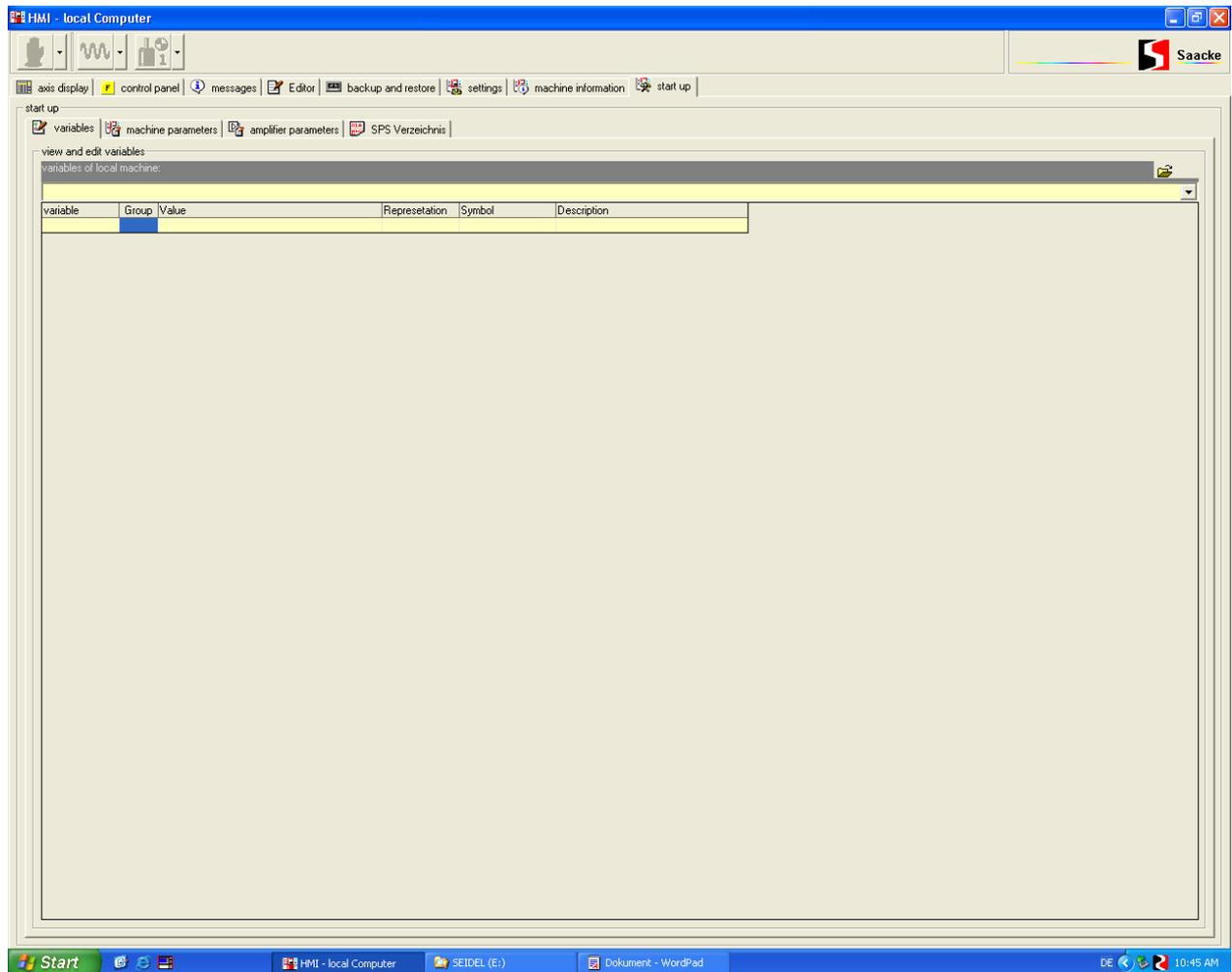


Fig. 32

Right click the mouse button on the last free field in the column “variable”.
 From the appearing menu is „New“ selected and then by entering under „Variable name“ the name of a variable. This is confirmed with “OK”.
 The value of the variables and some describing elements are displayed.

It must be pointed out that the contents of symbolic variables cannot be displayed.

For the creation of a new list a new list name is enrolled into the list line and confirmed with „Enter“.First the empty new list is displayed.
Now the desired variables can be enrolled into this list and their values will be read off.
By clicking a variable and „remove“ the variable is deleted from the list..

15.2 Machine parameters

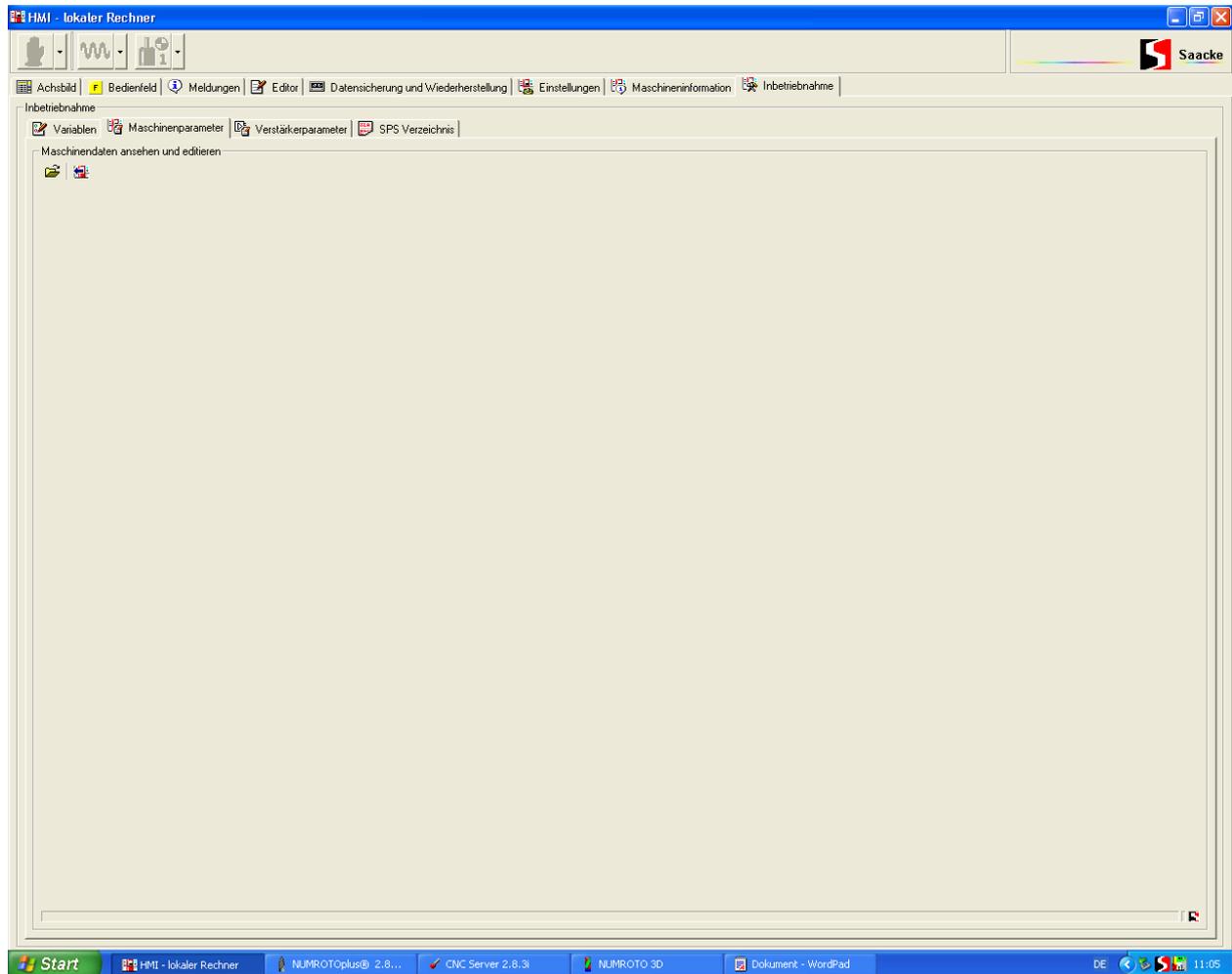


Fig. 33

By clicking the icon „receive“ the different machine parameters and their displayment are loaded.

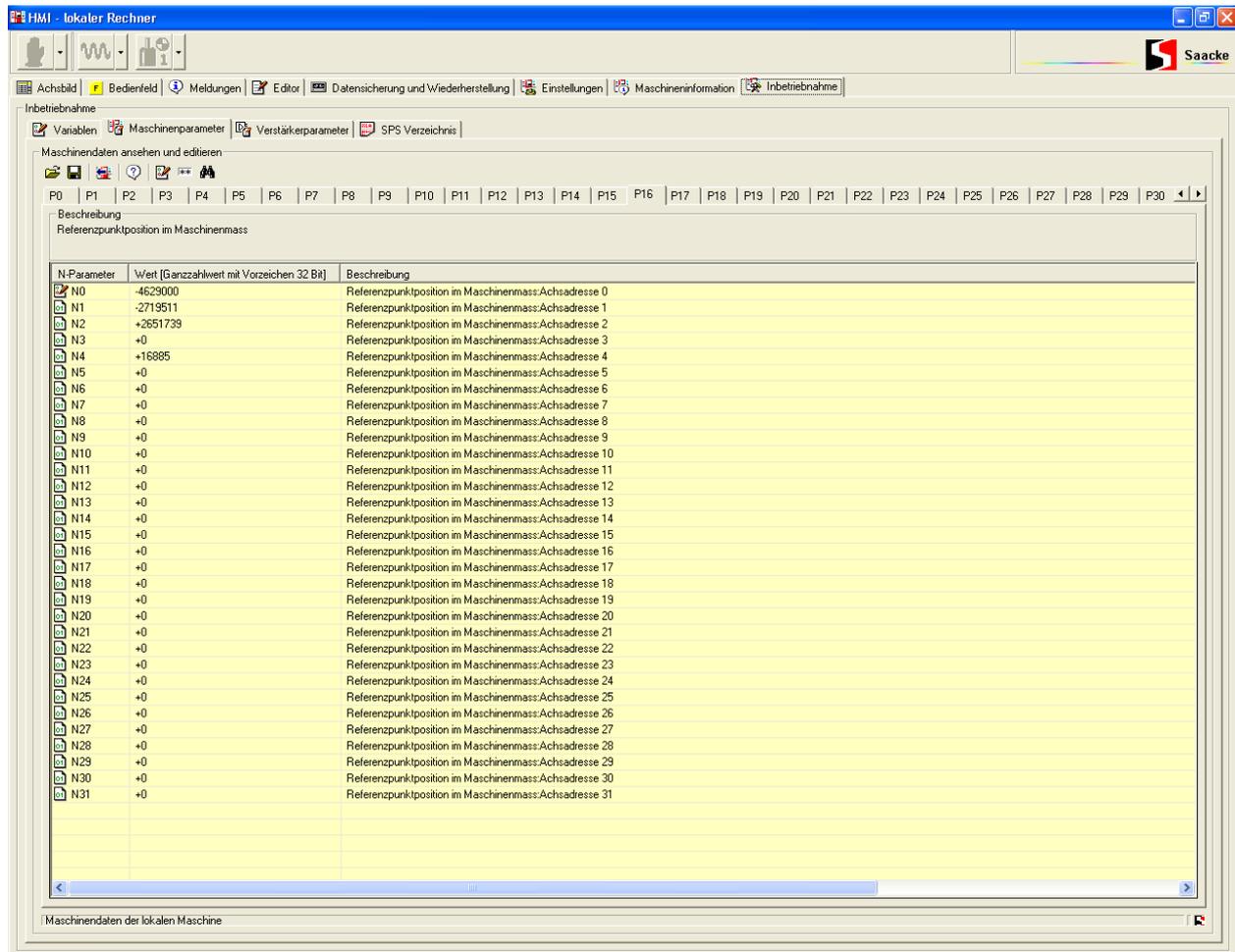


Fig. 34

After input of a password it is possible to change contents of the machine parameters.

ATTENTION! Fatal errors with the program sequence can be as a result of changes. Changes only may be carried out with support by SAACKE employees.

15.3 Driving amplifier parameters

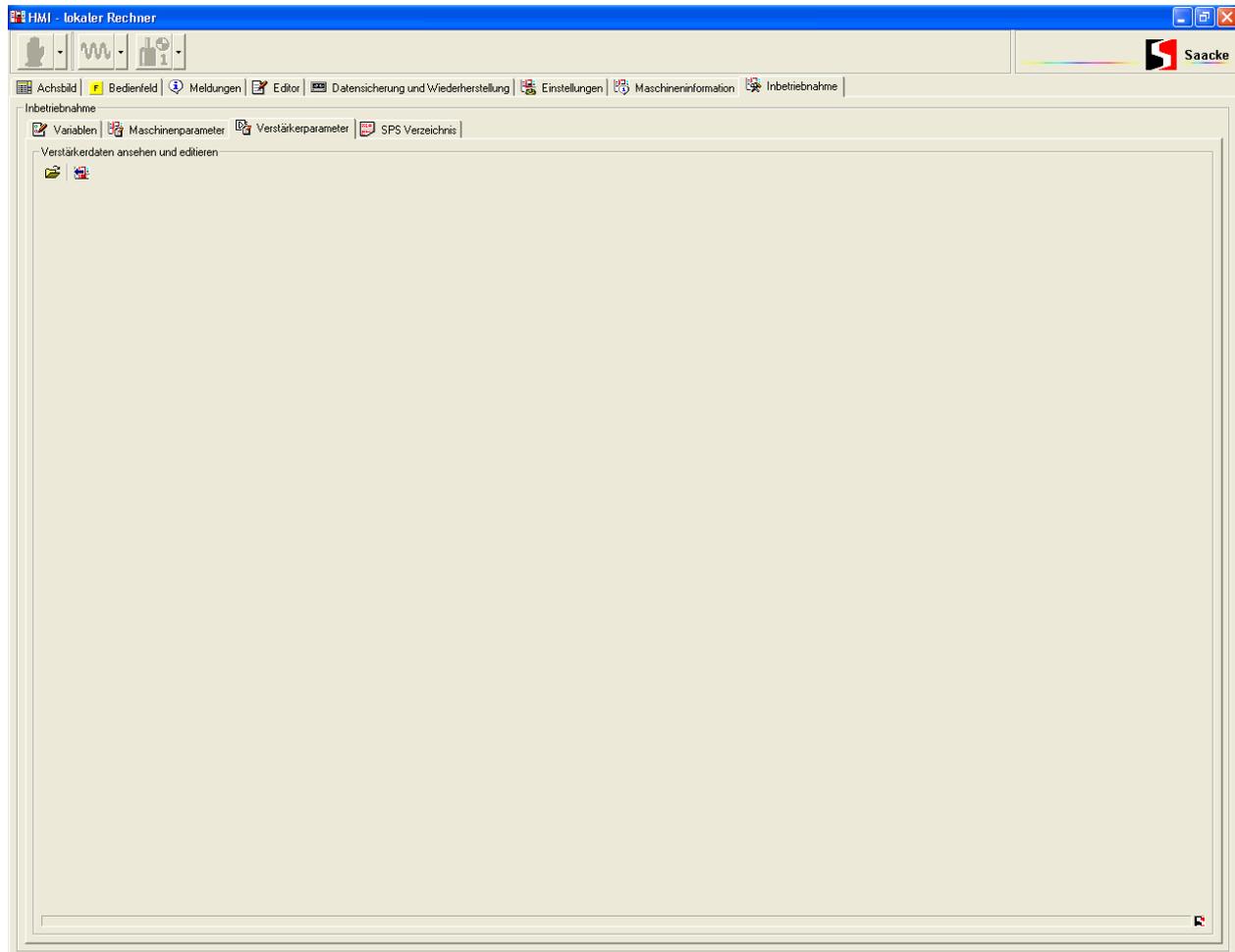


Fig. 35

By clicking the icon „receive“ the different driving amplifiers parameters and their displayment are loaded.

ATTENTION! Fatal errors with the program sequence can be as a result of changes. Changes only may be carried out with support by SAACKE employees.

15.4 SPS directory

Here the PLC programmes of the machine are listed.

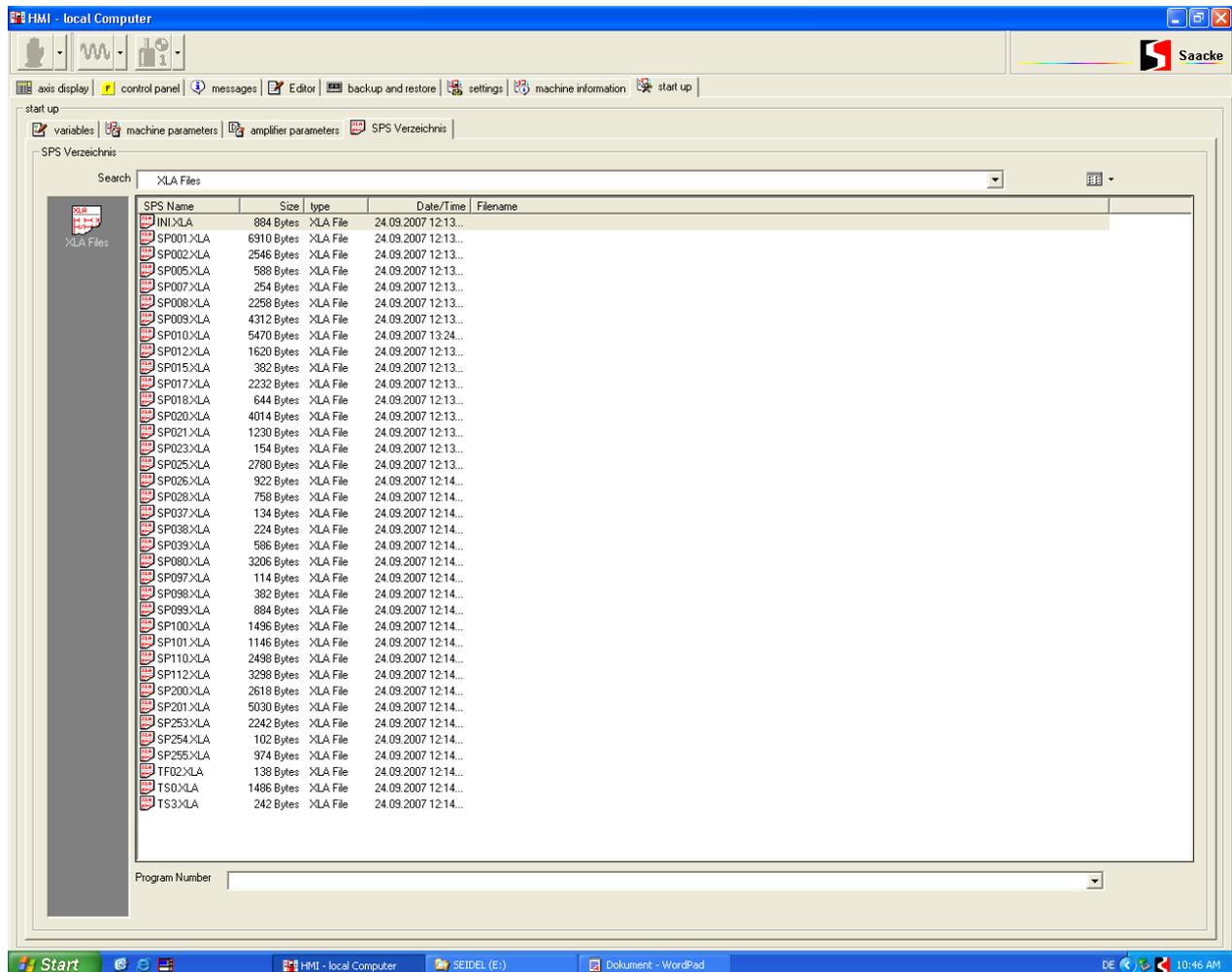


Fig. 36