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EDU100

„Encoder Diagnostic Unit“

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1 First steps

To put the unit „EDU100“ into operation the rechargeable batteries have to be installed and they have to be charged. Or the unit have to be powered by the wall plug transformer.

1.1 Switching On / OFF

To switch on the EDU100 you have to push button **ON/OFF** for approx. 2 seconds. The unit is ready for operation if the display is illuminated and the Logo of company Huebner appears.

To switch off the EDU100 you have to push the button **ON/OFF** also for 2 seconds.

1.2 First start-up

1.2.1 Language selection

On first starting up of the EDU100 the user will be asked to select a language. The start-up setting is English.

If you miss this selection then the user will be asked again on next start-up to select the language.

Later the language can also be changed in menu Settings (see 2.5.1 Settings - Language).

1.2.2 Time / Date

The EDU100 has an installed real-time clock. This clock is also working when the unit is switched off provided that the rechargeable batteries are charged and installed.

If the EDU100 has been without power the user will be asked after switching-on to set time and date.

You can pass entering this setting and change the setting at a later time in menu Settings (see 2.5.2 / 3. Settings – Time / Date)

1.3 Main menu

After starting the EDU100 you can see the main menu display. The display items 1-4 at the upper display border are also shown in all menus.

- 1 showing the actual date
- 2 showing the connection status (see 1.4)
- 3 showing the rechargeable battery status (see 1.5)
- 4 showing the actual time

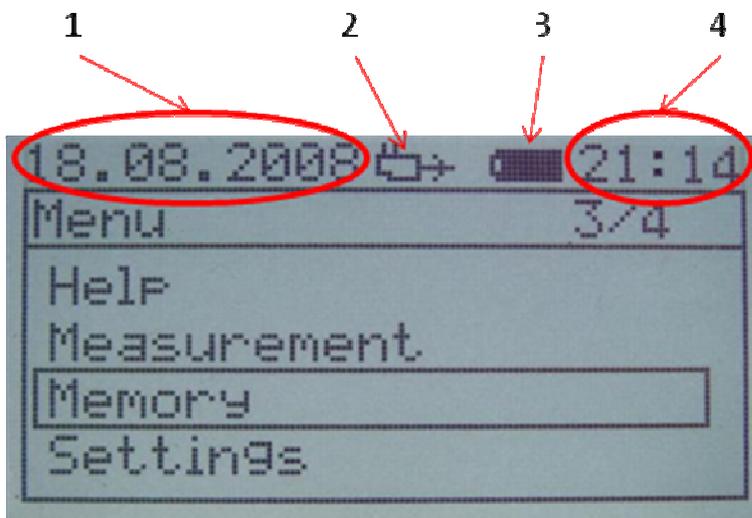


Fig. 1: Start-up screen

1.3.1 Connection status

As shown in Fig. 1 the connection status is displayed with item 2.
Following symbols can be shown:

- EDU100 is powered by wall plug transformer

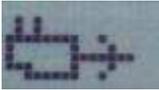


Fig. 2: Symbol wall plug transformer

- EDU100 is powering the encoder

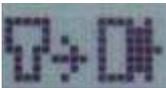


Fig. 3: EDU supplies encoder

- EDU100 is powered by the encoder

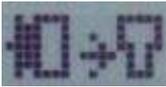


Abb. 4: Encoder supplies EDU

- No external power supply connected



Abb. 5: No external power supply

1.3.2 Status of rechargeable batteries

As shown in Fig. 1 the status of the rechargeable batteries is displayed as described in item 3.

Following symbols can be shown

- No battery installed.



Fig. 6: No battery

- Charge state of battery

Full.



Empty



Fig. 7: Battery state

- Battery is charging. Symbol is permanently changing from „empty“ to „full“.



Abb. 8: Battery charging

1.4 Menu setting

All menus are based on the same structure, see Fig. 9

- 1 Item of menu
- 2 Status line (see 1.3)
- 3 Data entry for cursor and max. number of entries in menu
- 4 Cursor

In all menus the cursor will be moved by the arrow buttons **↑** and **↓**. The menu item is selected by **ENTER**. One step backward to the former menu is possible with **ESC**.

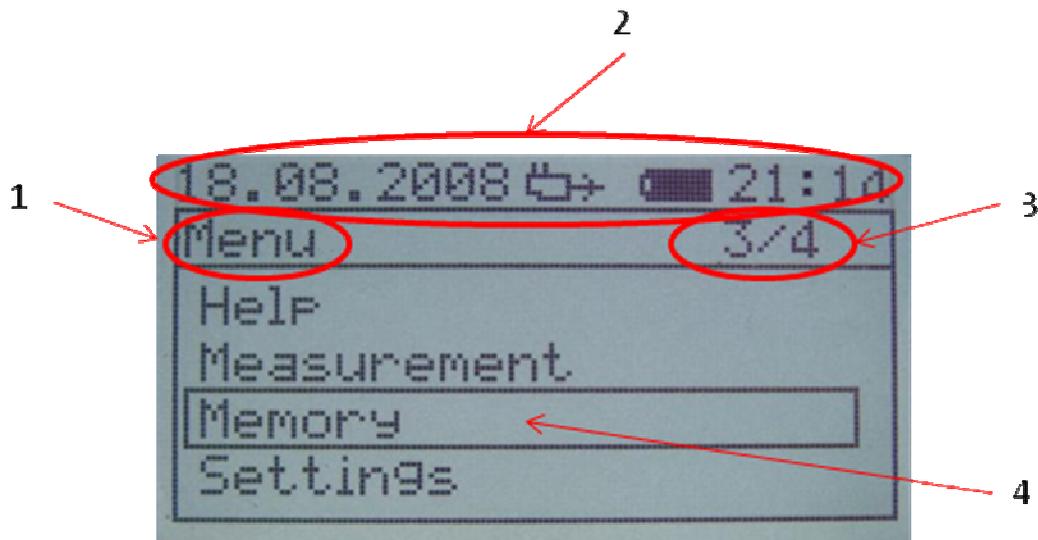


Fig. 9: Main menu

1.5 Input fields

There are 3 kinds of input.

1.5.1 Text input (file names)

By repeated pressing of a button you get different characters. The buttons and the corresponding characters are shown in table 1.

On entering a character the cursor will move right after 2 seconds by one digit to the next free digit.

With **SHIFT** you can toggle between capital and small letters.

With  and  the cursor can be moved.

With **DEL** the last character will be deleted. Is the cursor located at a position in the middle of the text all characters right hand of the cursor will be deleted.

With **ENTER** the input will be done.

With **ESC** the input will be cancelled.

button	number of pressings				
	1	2	3	4	5
1	blank	1	---	---	---
2	A	B	C	2	---
3	D	E	F	3	---
4	G	H	I	4	---
5	J	K	L	5	---
6	M	N	O	6	---
7	P	Q	R	S	7
8	T	U	V	8	---
9	W	X	Y	9	---
0	0	---	---	---	---
*	-	—	·	,	---

Table 1: Keypad coding

1.5.2 Numerical Input (serial number, pulse rate)

With the keypad you can enter the requested numbers.
On entering a number the cursor will move one digit to the right.

With  and  the cursor can be moved.

With **DEL** the last figure will be deleted. Is the cursor located at a position in the middle of a number all digits right hand of the cursor will be deleted.

1.5.3 Change of input (time, date)

The actual value is shown in the input field. With the keypad you can change the data at the cursor position.

If more than one input field is existing you can switch with  and  between these fields.
The input change will be checked for plausibility. If you enter an illegal value this value will be ignored and the old value is shown again.

2 Menu structure

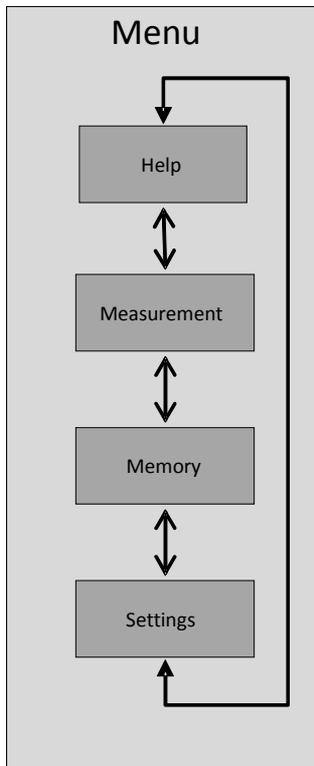


Fig. 10: Main menu structure

2.1 Help

Here you get the connection diagram to connect the unit to an encoder.

2.2 Measurement

The general test sequence is shown in Fig. 11.

1 Advice

For the basic tests the encoder have to rotate. Otherwise the basic settings cannot be done.

2 File name input

Here you can specify a name for the file. This input can be passed with **ENTER**.

3 Encoder serial number input

Here you can enter the serial number of the encoder. This input can be passed with **ENTER**.

4 Encoder testing and EDU100 basic settings

Following will be tested:

- Supply voltage
- Supply current (provided that the signals are connected through or the encoder have to be powered by the EDU100)
- Which channels are connected (0°, 0°inv, 90°, 90° inv, marker, marker-inv)
- If the output frequency is not exceeding 100 kHz the amplitude will be measured.
- If no marker pulse is existing the pulse rate have to be entered. Otherwise this will be identified automatically.

Each part of this measurement can be passed with **ENTER**. With **ESC** you can cancel the measurement.

5 Record

The results of this test will be shown in a table at the end.

With **ENTER** you get to the measurement menu.

With **X1** you can repeat the measurement.

With **ESC** you get back to the main menu.

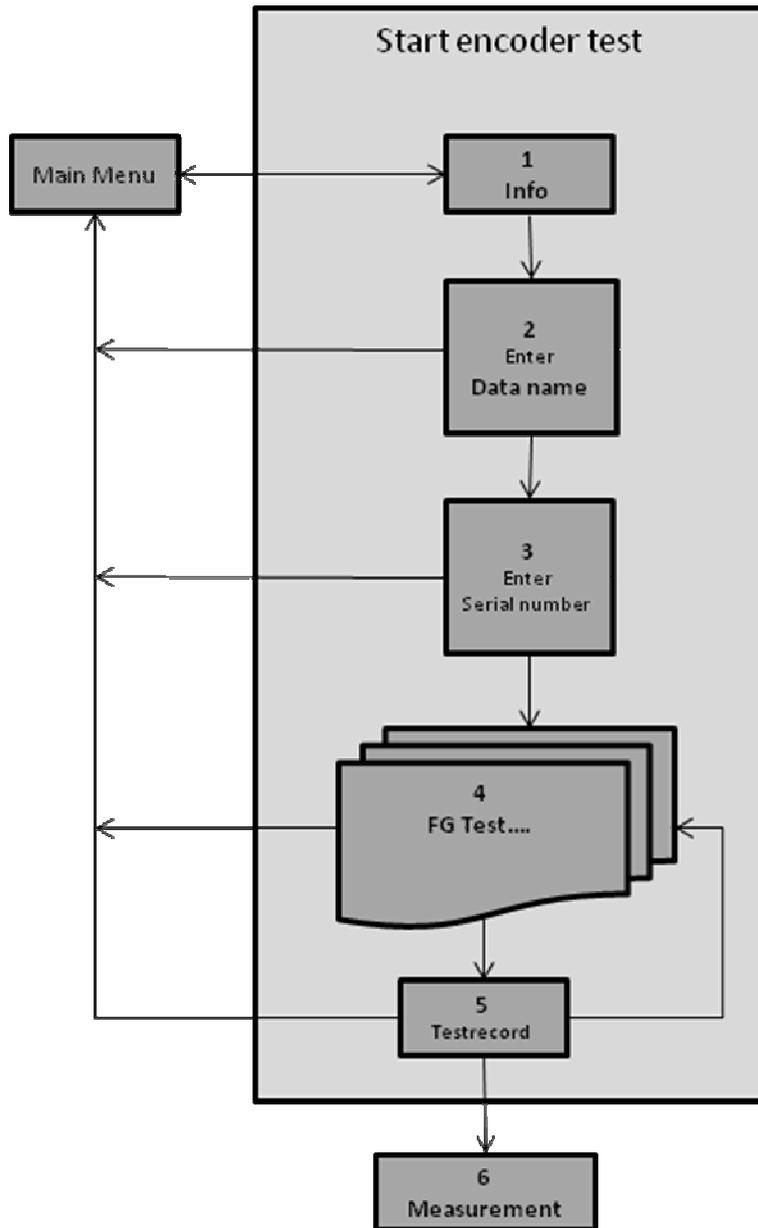


Fig. 11: Measurement sequence

2.2.1 Measurement menu

See 3 for explanations to the specific measurement.

2.3 Memory management

2.3.1 Memory status

Here the still available memory in percent is shown and also the number of files.

With **DEL** you can delete all data in the memory.

2.3.2 File overview

Here all files saved in the EDU100 will be listed.

In the left column you can find the file names and in the right column the corresponding file creation time as well as the file type (Actual = actual, Frequ.mod. = rotational frequency modulation).

By pressing the buttons **↑** and **↓** the cursor can be moved through the file list.

With **ENTER** the selected file will be displayed. With **ESC** you get back to the file overview.

With **DEL** the selected file will be deleted.

2.4 Settings

2.4.1 Language

Selection of language:

With the cursor buttons **↑** and **↓** you can select the language.

With **ENTER** the marked language will be selected and saved.

With **ESC** you can cancel the selection.

2.4.2 Time

Here you can set the time.

Operation see 1.5 Input fields

2.4.3 Date

Here you can set the date.

Operation see 1.5 Input fields.

2.4.4 FG_Ub -> EDU

Here you can select that the supply voltage of an encoder will be used to power the EDU100. For this purpose the EDU100 has to be connected to an encoder which is already powered. The EDU100 must not be powered by the wall plug transformer.

The selection will be automatically deactivated as soon as the encoder is disconnected from the EDU100.

2.4.5 EDU_Ub -> FG

Here you can select that the supply voltage of the EDU100 will be used to power an encoder. For this purpose the EDU has to be powered by the wall plug transformer. The encoder has to be connected but must not be powered by an external supply.

The selection will be automatically deactivated as soon as the encoder is disconnected from the EDU100.

2.4.6 System info

Here information of the EDU100 will be shown.

3 Measurements

It is to be considered that the max. input frequency of approx. 100 kHz should not be exceeded (see 2.2). With higher frequencies you may get wrong measurement results of the amplitudes.

3.1 Actual

With this measurement the signals of the encoder will be continuously analyzed and the results are shown.

Following data will be displayed:

- **Name**
If assigned.
- **Pulse rate**
Will only be counted once on measurement start-up and displayed.
- **Speed [rpm]**
A positive value corresponds to clockwise rotation.
A negative value corresponds to counter clockwise rotation.
Detection of the direction of rotation is only possible if the 0° and 90° channels are connected!
- **Frequency [Hz] or [kHz]**
- **Supply voltage [V]**
- **Supply current [mA]**
Only possible if the signals are connected through or the encoder is powered by the EDU100.

Measurement results will only be precise as long as the speed is constant.

Depending on the direction of rotation the sign of the following values are positive or negative.

- **Symmetry deviation 0°-channel [error in %]**
Only possible up to input frequency of 150 kHz.
- **Symmetry deviation 90°-channel [error in %]**
Only possible if the 0° and 90°-channels are connected.
Only possible up to input frequency of 150 kHz.

- **Phase error [error in %]**
Only possible if the 0° and 90° channels are connected.
Only possible up to input frequency of 150 kHz.
- **Error monitoring**
The EDU100 monitors failures of the 0° and 90° channel (missing channel or direction of rotation error).
An error will be saved and displayed.
Following Message can be displayed:

E[S]	Error identified (0° and 90° channel)
E[0°]	Error identified (0° channel)
E[90°]	Error identified (90° channel)

With **ENTER** you can acknowledge the error.

An error can be displayed even if there is no failure in case that an extreme speed change occurs or the direction of rotation changes

3.2 Rotational frequency modulation

For the rotational frequency modulation the pulse width deviation within one rotation will be recorded and displayed as deviation in angle seconds. This value can be used to evaluate the mounting quality of the encoder.

For this measurement it is essential that the encoder is rotating with a constant speed. Otherwise the results will not be precise.

The accuracy of this measurement is increasing with higher speeds and higher moments of inertia because this reduces speed variations of the system.

3.4 PC-measurement

When selecting this point the control and display will be passed to the PC. Now all measurements with the EDU100 software can be done.

To establish a communication the PC has to be connected to the EDU100 with the USB-cable prior to switching on the EDU100!

3.4.1 EDU Software

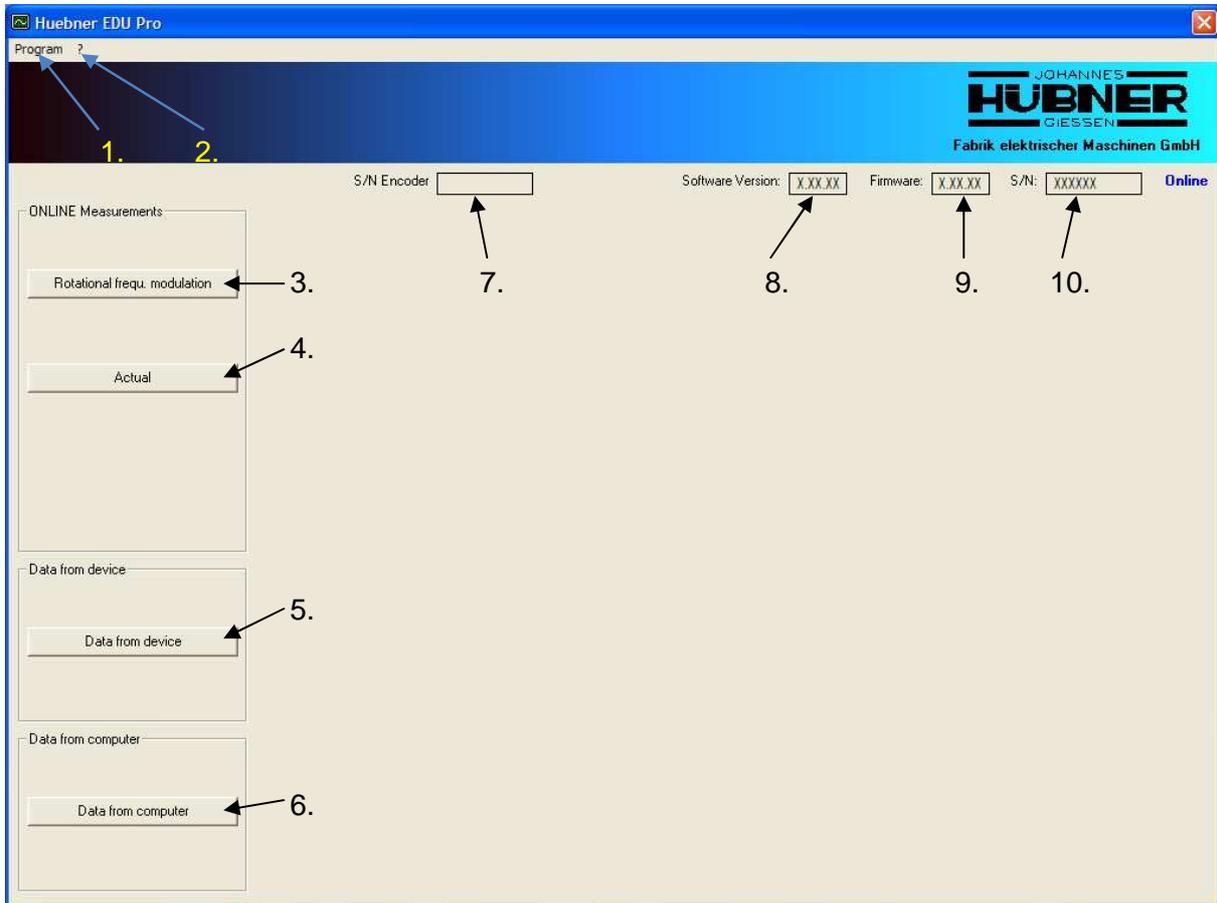


Fig. 12: Window of the program after start

1. – Opening menu “Program”. Continue Fig. 13.
2. – Opening menu “Info”. Continue Fig. 19.
3. – Button „Rotational frequency modulation“ (Online measurement). Continue Fig. 14.
4. – Button „Actual“ (Online measurement). Continue Fig. 15.
5. – Button “Data from device”. Continue Fig. 16.
6. – Button “Data from computer”. Continue Fig. 18.
7. – Serial number of encoder will be displayed if entered.
8. – Software version will be displayed.
9. – Firmware version of the EDU100 will be displayed.
10. – Serial number of the EDU100 will be displayed.

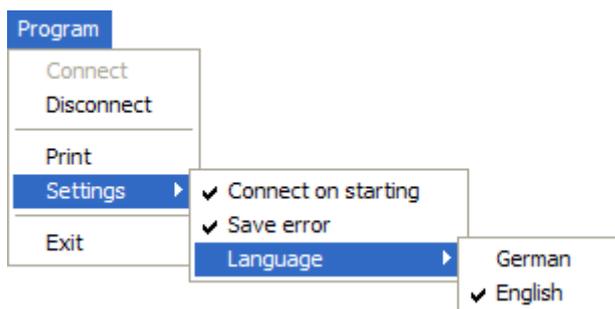


Fig. 13: Menu program

Connect: Start communication with EDU100.

Disconnect: Stop communication with EDU100.

Settings: Program settings.

Connect on starting: On each program start communication with EDU100 is starting.

Save error: Errors will be saved in the file Errors_<Datum>.log.
The file is located in the install folder of the
“Huebner EDU Pro“ – Software.

Language: Selection of language.

German: German language.

English: English language.

Exit: Closing the program.

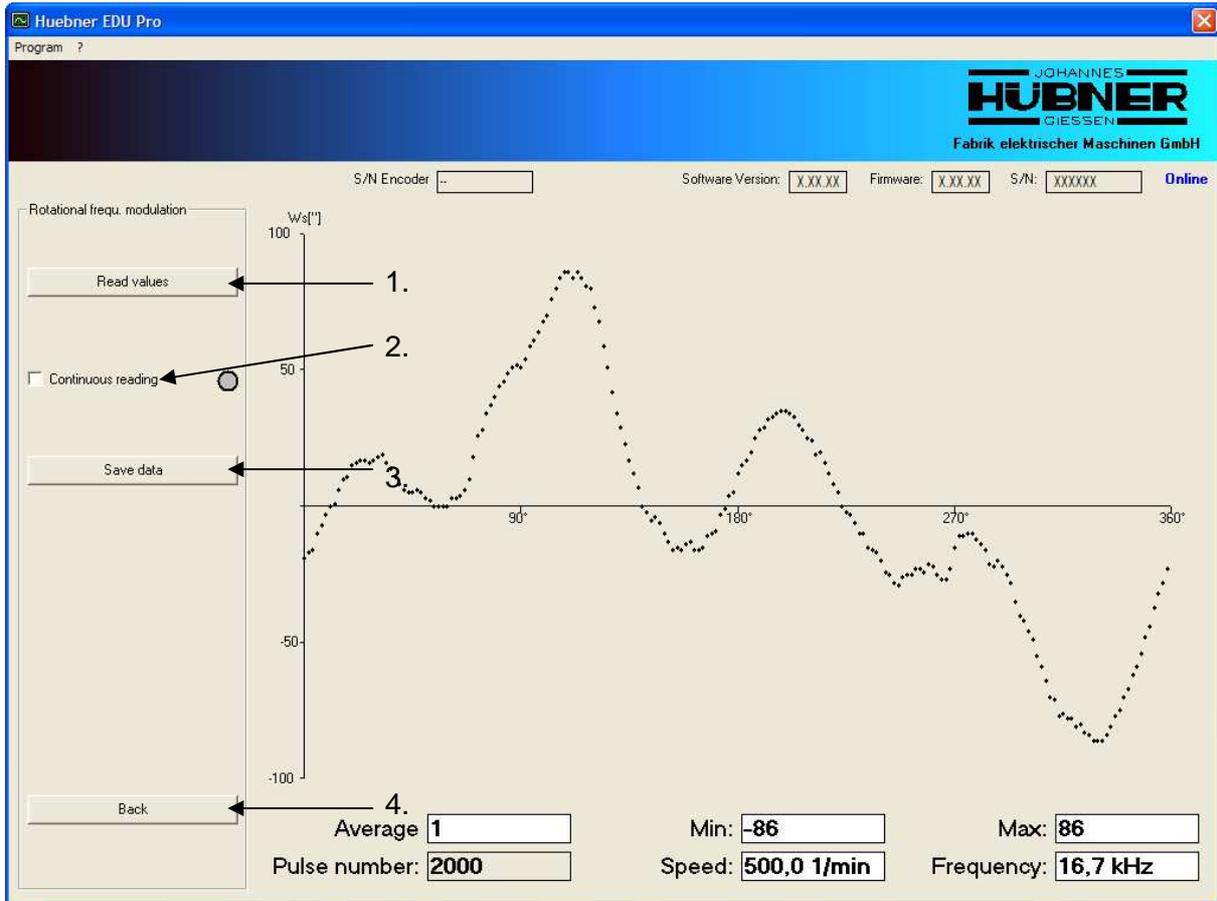


Fig. 14: Rotational frequency modulation

1. – Start reading and display.
2. – Check box for continuous or single reading.
3. – Values will be saved on PC.
4. – Back to the previous menu

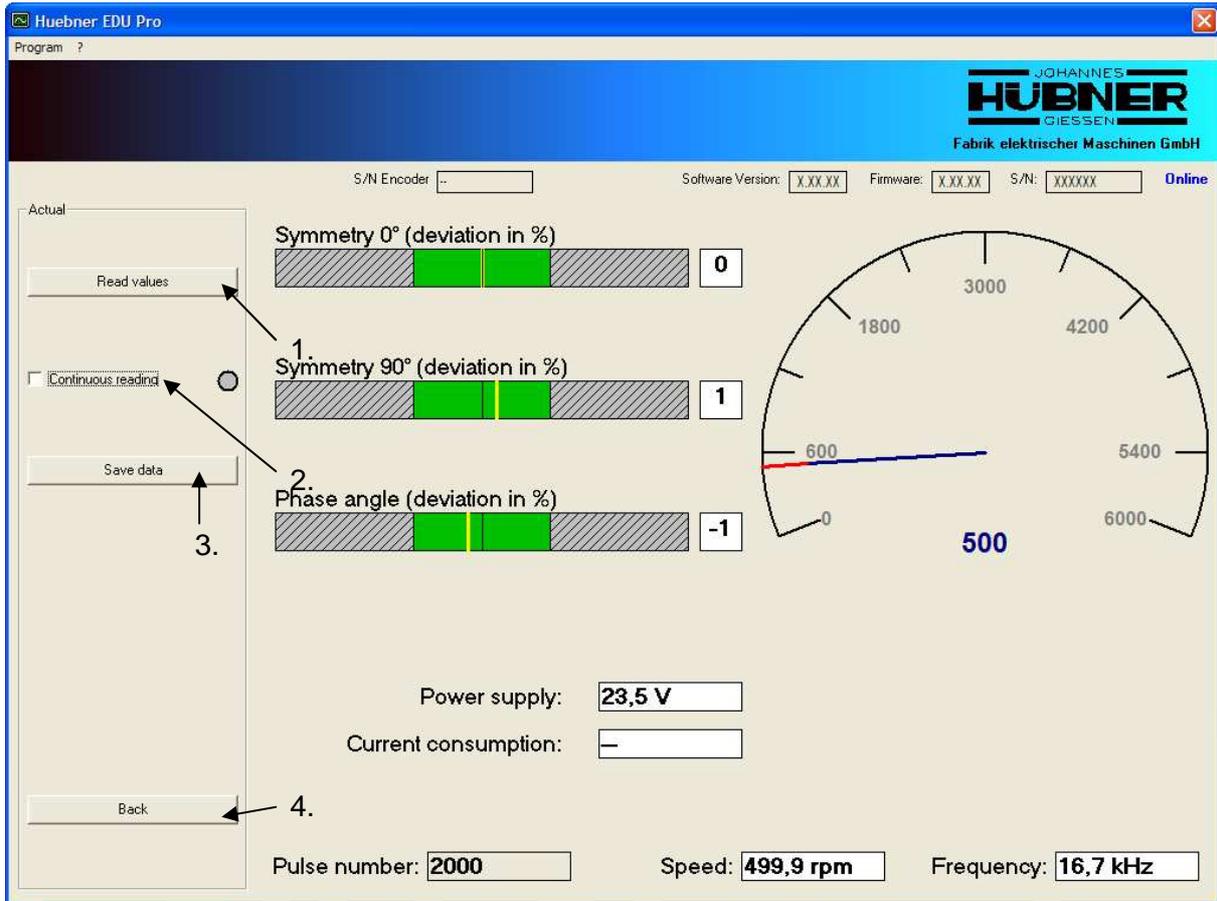


Fig. 15: Actual

1. – Start reading and display.
2. – Check box for continuous or single reading.
3. – Values will be saved on PC.
4. – Back to the previous menu

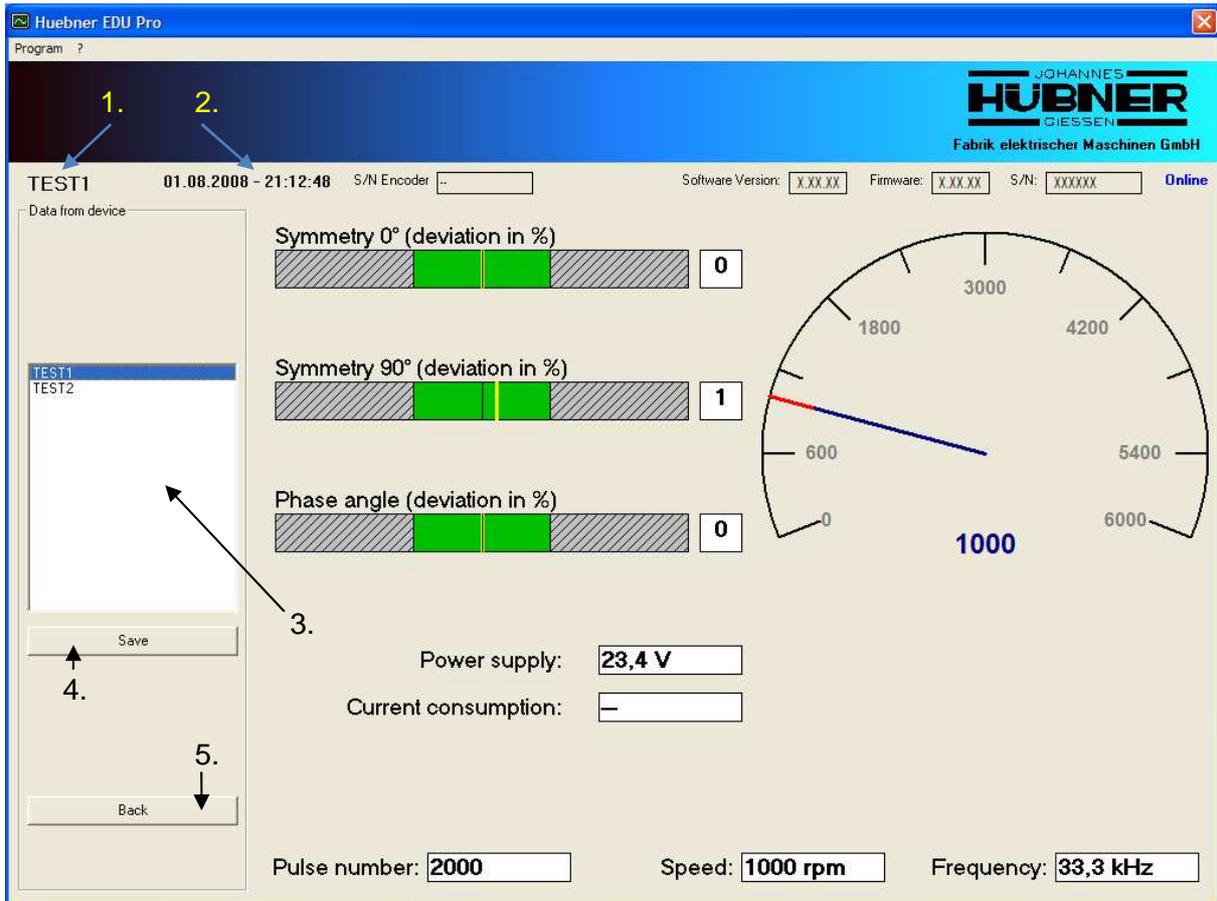


Fig. 16: Files of the EDU100 memory

1. – Name of selected file.
2. – Creation time of selected file.
3. – List of all files in the EDU100. Selected and displayed by double click.
4. – Values will be saved on PC.
5. – Back to the previous menu

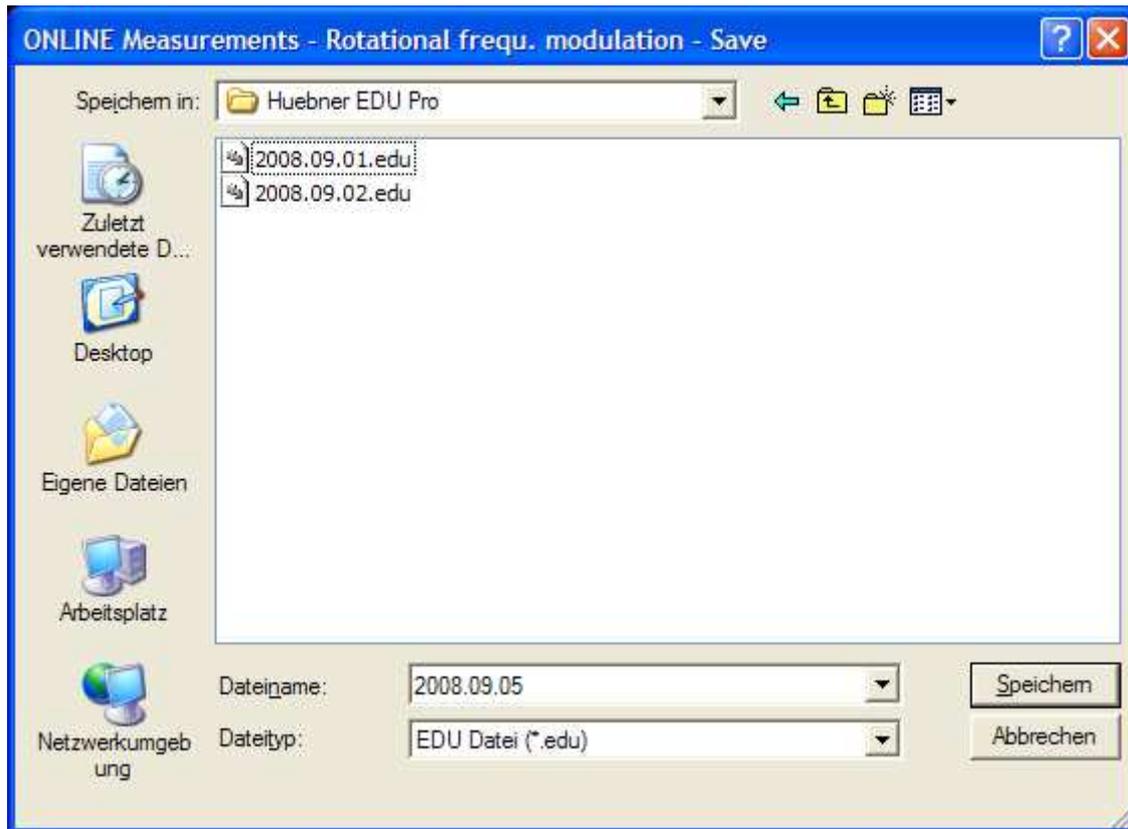


Fig. 17: File selection menu

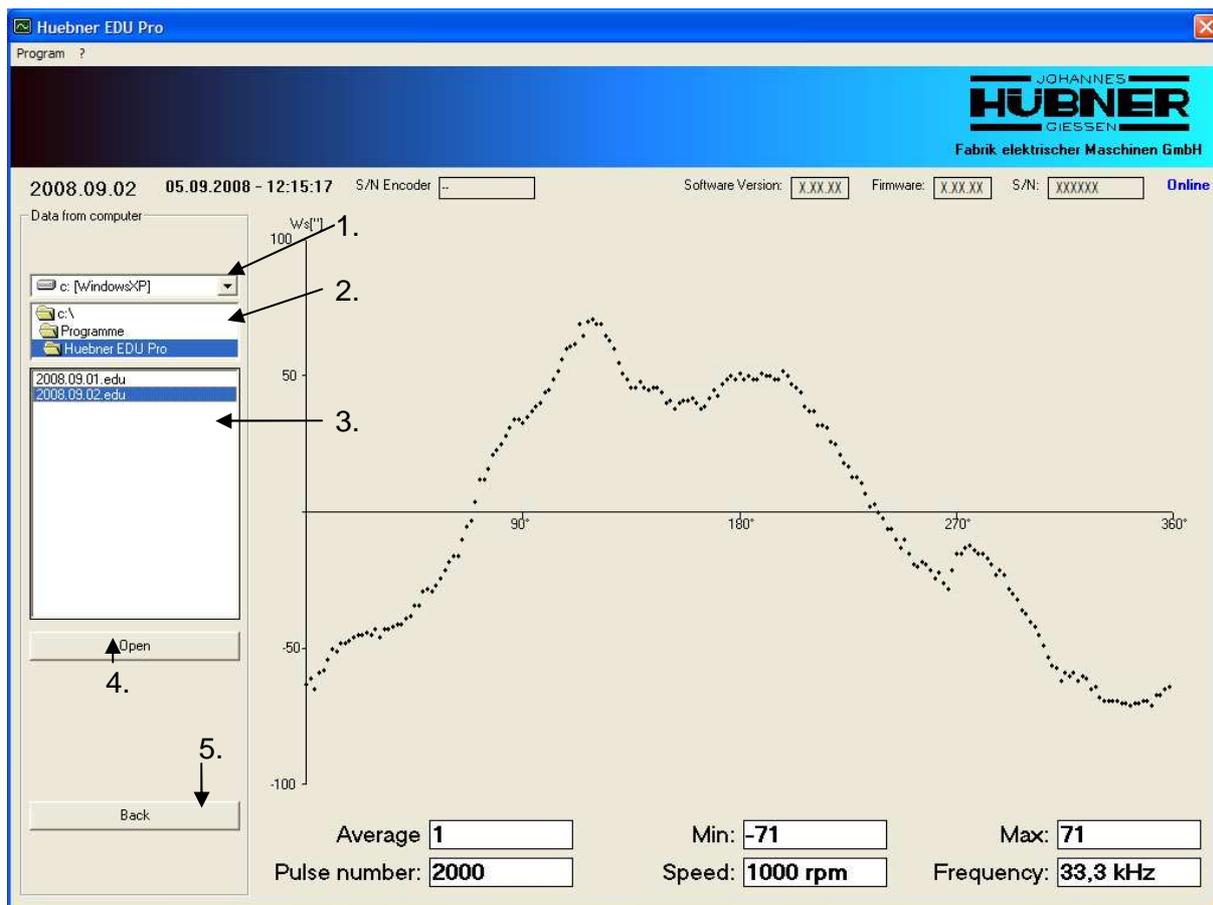


Fig. 18: Data from computer

1. – Drive selection.
2. – Folder selection.
3. – List of all files in the corresponding folder. File selected and displayed by double click
4. – Display the selected file.
5. – Back to the previous menu.

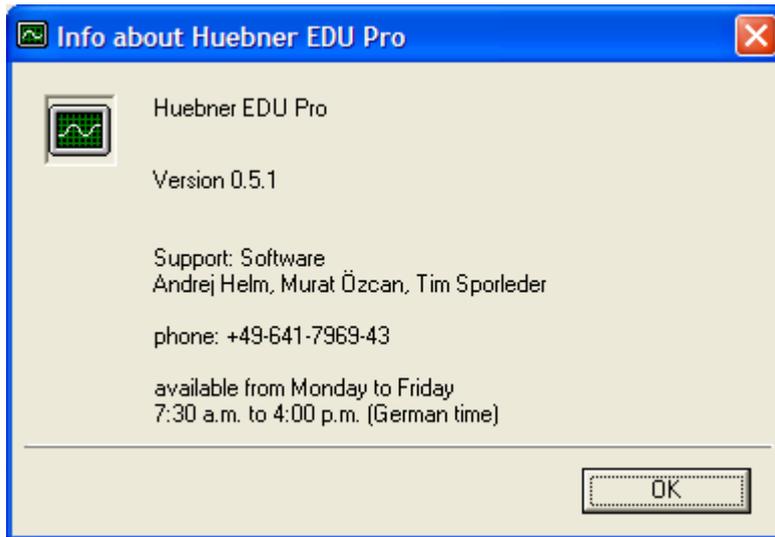


Fig. 19: About

4 Connecting the device

Measurements can be done parallel to the existing installation or the signals can be connected through the EDU100.

➤ **Parallel:**

The encoder connection cable has to be connected with the 15-pin plug 1 to the male contacts of the Y-type adapter and with the flying leads to the encoder.

➤ **Serial:**

At first the existing cable connection between encoder and controller has to be opened.

Then the encoder connection cable has to be connected with the 15-pin plug 1 to the male contacts of the Y-type adapter and with the flying leads to encoder.

The controller connection cable has to be connected with the 15-pin plug 2 to the female contacts of the Y-type adapter and with the flying leads to the controller.

Encoder

Controller



Fig. 20: Connecting

4.1 Cable pinout

colour	Signal
Blue	GND
Red	Ub
Grey	0°
Pink	0°i
Purple	90°
Black	90°i
Yellow	Marker
Brown	Marker i
Green	M (LED)
White	M (LED) i
Red / Blue	R
Pink / Grey	L
Green / Brown	2F
Green / White	4F

Table 2: Cable colour mapping

5 Power supply

The EDU100 can be powered by different supplies:

Wall plug transformer, chargeable batteries (replaceable), encoder or PC.

You have to charge the batteries prior to the first use.

The batteries are charged automatically in the EDU100 if this is powered by the wall plug transformer.

Charging time can be up to 6 hours.

If the EDU 100 is powered by the encoder or the PC the batteries will not be charged.

If the EDU 100 is powered by the batteries and they are almost empty you will get a message and the EDU100 will be switched off to protect the batteries.

If the EDU100 will not be used for a longer period the batteries have to be removed from the EDU100 to prevent them from damage.

6 Technical data

Supply voltage:	12V -30V
Supply current (normal operation):	135 mA
Supply current (charge operation):	350 mA
Rechargeable batteries	3 x AA (max. 2100 mAh)
Signal amplitude:	0V – 30V
Max. Input frequency:	see 3