



# Operating manual

Encoder Diagnostic Unit

Type: EDU 100

**Read the operating manual before use and other types of work!  
Keep for future reference!**

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## 1 General information

### 1.1 Information on the operating manual

This operating manual provides important information on working with the Encoder Diagnostic Unit EDU 100. In the following document it shall be referred to as the EDU 100. It must be read carefully before beginning any work and observed.

Furthermore, local accident prevention regulations and general safety regulations applicable in the area where the EDU 100 is used must be observed.

### 1.2 Scope of delivery

The scope of delivery includes the EDU 100, transport case, protective cover, connection adapter, 2 connection cables, USB cable, USB-C adapter, mains adapter, 3 x AA NiMH rechargeable batteries and the operating manual.

### 1.3 Explanation of symbols

Warning information is designated in this operating manual using symbols. Information is preceded by signal words which express the extent of the danger involved. Always comply with these notices, and use caution to avoid accidents, personal injury and property damage.



**WARNING!**

Indicates a potentially hazardous situation that could lead to death or severe injury if it is not avoided.



**CAUTION!**

Indicates a potentially hazardous situation that could lead to minor or slight injuries if it is not avoided.



**CAUTION!**

Indicates a potentially hazardous situation that could lead to property damage if it is not avoided.



**NOTE!**

Emphasises useful tips and recommendations, and provides information useful for efficient, smooth operation.



**DANGER!**

**Mortal danger due to electric current!**

Indicates a life-threatening situation caused by electric current. Failure to observe the safety information may result in serious injuries or death. Work may only be carried out by an electrician.

## 1.4 Warranty and liability


Only the “General Terms and Conditions” of Johannes Hübner Fabrik elektrischer Maschinen GmbH apply. These will be provided to the operator at the latest when the order is confirmed or when the contract is concluded. All warranty and liability claims for personal injury and property damage are excluded, and the operator's operating permit will be null and void if one or more of the following apply:

- Failure to observe the operating manual.
- Improper use of the EDU 100.
- Incorrect use of the EDU 100.
- Operating the EDU 100 despite technical defects.
- Independently carrying out mechanical or electrical modifications to the EDU 100.
- Independently carrying out repairs.
- Catastrophes due to external interference or force majeure.
- Use of non-qualified personnel.
- Opening the EDU 100.

## 1.5 Organisational measures

- The operating manual must always be stored easily within reach in the area where the EDU 100 is used.
- In addition to the operating manual, general statutory and other binding regulations on accident prevention and environmental protection must be observed. Operators must be trained on these regulations.
- Applicable national, local, and system-specific provisions and requirements must be observed.
- The operator is obligated to inform personnel of special operating considerations and requirements.
- The type plate and any prohibitions or notice signs adhered to the EDU 100 must always be legible.
- Repairs may only be carried out by the manufacturer, or by an agency or individual authorised by the manufacturer.

## 1.6 Copyright protection

	<p><b>NOTE!</b></p> <p>Content information, texts, drawings, images, and other illustrations are copyright protected and subject to industrial property rights. Copying of any kind not associated with use of the EDU 100 is prohibited without a written declaration from the manufacturer. Violations will result in claims for damages.</p>
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## 1.7 Warranty provisions

Warranty provisions are outlined in the manufacturer's General Delivery Conditions.

## 1.8 Customer service

Contact persons are available by phone, fax, or e-mail for technical questions. See the manufacturer's address on page 2.

## 2 Basic safety information

	<p><b>DANGER!</b></p> <p>This section provides an overview of all significant safety aspects necessary to protect personnel and ensure safe, fault-free operation of the EDU 100. Failure to observe this information may result in significant danger.</p>
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### 2.1 Responsibility of the operator

The EDU 100 is used in commercial areas. The operator of the EDU 100, therefore, is subject to statutory occupational safety requirements and the safety, accident prevention and environmental regulations applicable to the areas in which the EDU 100 is used.

### 2.2 Selecting and qualifying personnel; basic obligations

- All work with the EDU 100 may be carried out only by qualified personnel. Qualified personnel are personnel with the training, experience, and instruction, as well as expertise on relevant standards, specifications, accident prevention regulations and operating circumstances necessary to carry out the required work, and who have been authorised to do so by the persons responsible for the safety of the system. They are able to identify and avoid potential hazards.
- In addition, please see standards VDE 0105-100 and IEC 364 for the definition of “qualified personnel” (reference, e.g. Beuth Verlag GmbH, VDE-Verlag GmbH)
- Responsibilities for connection and operation must be clearly defined. Personnel who are receiving instruction or training must be supervised.

### 2.3 Proper use


The EDU 100 is intended for checking and temporarily monitoring incremental encoders. For this purpose, the EDU 100 can be connected directly to an incremental encoder, or it can be connected between the encoder and the controller. A connection adapter and two corresponding connection cables are supplied for this purpose.


It is also possible to supply the incremental encoder to be tested with voltage via the EDU 100 if it is powered via the mains adapter supplied.

#### **Proper use also includes:**



- observing all information in this operating manual.
- observing type plates and any prohibition or information signs
- observing the operating manual of the machine or system manufacturer.
- operating the EDU 100 within the limits stipulated in the technical data
- not engaging in improper use.


## 2.4 Improper use

	<p><b>Warning:</b></p> <p>This device is not intended for use in residential areas and cannot ensure adequate protection of radio reception in such environments.</p>
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	<p><b>WARNING!</b></p> <p>Danger of death, physical injury and property damage due to improper use of the EDU 100!</p> <p>In particular, the following uses are prohibited:</p> <ul style="list-style-type: none"> <li>• Use in environments with an explosive atmosphere.</li> <li>• Use in environments with radioactive radiation.</li> <li>• Use for medical purposes.</li> </ul>
---	---

## 2.5 Safety information

 	<p><b>WARNING! ATTENTION! NOTE!</b></p> <p>Destruction, damage or impact to the function of the EDU 100!</p> <ul style="list-style-type: none"> <li>• Only complete wiring work and only connect or disconnect electrical connections when powered down.</li> <li>• Review any potential hazards due to interactions with other systems and devices currently installed in the surrounding area, or which are to be installed. The user is responsible for taking relevant measures.</li> <li>• A defective EDU 100 may not be operated.</li> <li>• Opening the EDU 100 is prohibited.</li> <li>• The type plates specify the technical properties of the EDU 100. If a type plate is no longer legible, or if a type plate is missing entirely, the EDU 100 may not be operated. Contact Hübner Service (see page 2).</li> </ul>
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	<p><b>NOTE!</b></p> <p><b>Disposal:</b></p> <p>If the EDU 100 needs to be disposed after its service life, applicable national regulations must be observed.</p>
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### 3 Technical data

#### 3.1 Type plate

The following image shows an example of a type plate.



The type plate is located on the back of the EDU 100 under the protective sleeve.

Type plate information:

- Manufacturer
- Type, year of construction
- CE mark
- Serial number (S/N)
- Supply voltage
- ID number

#### 3.2 EDU 100 electrical and mechanical data

Supply voltage	12V...30VDC
Power consumption (normal operation)	135mA
Power consumption (charging mode)	400mA
Battery	3 x AA (max. 2100mAh)
Signal amplitude	0V...30VDC
Max. input frequency	see chapter 6

The EDU 100 is categorised in Group 1 and Class A in accordance with EN 55011 and is only intended for use in an industrial environment.

## **4 First steps**

To take the EDU 100 into operation, the rechargeable batteries must be in the device and charged or the device must be supplied with power via the mains adapter.

### **4.1 Switching on/off**

To switch the device on, the **ON/OFF** button must be pressed down for approx. 2 seconds. If the display lights up and the Hübner logo appears, the device is ready for operation.

To switch the device off, the **ON/OFF** button must also be pressed down for approx. 2 seconds.

### **4.2 Initial start**

#### **4.2.1 Language selection**

When the device is started up for the first time, the user is asked to select a language. The default setting is English.

If the selection is skipped, the user will be prompted to select the language again the next time the device is started.

The language can also be changed later on in the Settings menu (see chapter 5.4.1 Settings - language).

#### **4.2.2 Time / date**

The device features a real-time clock. This clock continues working even when the device is switched off. The requirement is that the batteries are charged and inserted in the device.

If the device has been without voltage, the user is prompted to set the time and date after switching on.

The entry can be skipped and changed later on in the Settings menu (see chapter 5.4.2 / 5.4.3 Settings - time / date)

### 4.3 Main menu

The main menu is displayed when the device has been started. The display elements 1-4 at the top of the display are also visible in all other menus.

- 1 Shows the current date
- 2 Shows the connection status (see chapter 4.3.1)
- 3 Shows the battery status (see chapter 4.3.2)
- 4 Shows the current time

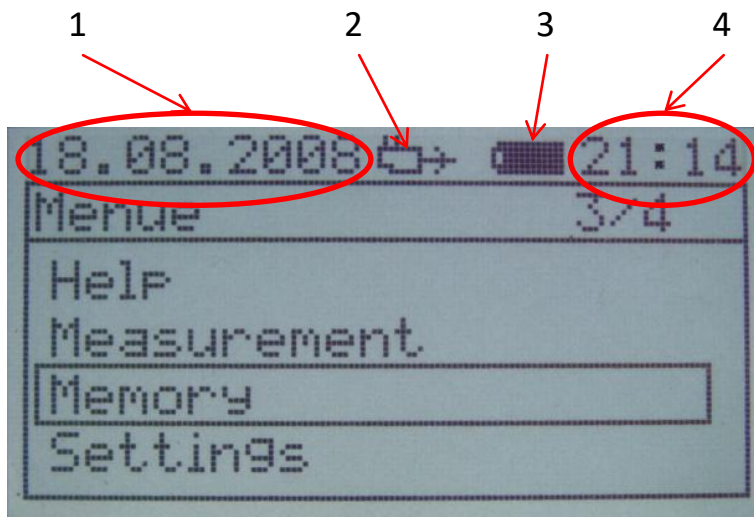


Fig. 1: Home screen

### 4.3.1 Connection status

As depicted in Fig. 1, the connection status is indicated under point 2. The following icons can be displayed there:

- EDU 100 is being powered by the mains adapter

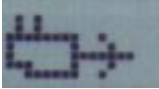


Fig. 2: Mains adapter icon

- EDU 100 is supplying the encoder to be tested with voltage

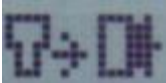


Fig. 3: EDU 100 is powering the encoder

- EDU 100 is being powered by the encoder

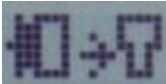


Fig. 4: Encoder is powering the EDU 100

- No external supply connected



Fig. 5: No external supply

### 4.3.2 Battery status

As depicted in Fig. 1, the battery status is indicated under point 3.  
The following icons can be displayed there:

- No battery available.



Fig. 6 No battery

- Charge state of battery

Full.



Empty



Fig. 7: Battery charge state

- Battery is being charged. The icon changes constantly from “empty” to “full.”



Fig. 8 Charging the battery

#### 4.4 Menu control

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

- 1 Which menu you are currently in
- 2 Status line (see chapter 4.3)
- 3 Entry on which the cursor is positioned and max. number of entries in the menu
- 4 Cursor

In all menus, the cursor is moved using the arrow keys **↑** and **↓**. A menu point is selected with **ENTER**. You can go one step back into the previous menu by pressing **ESC**.

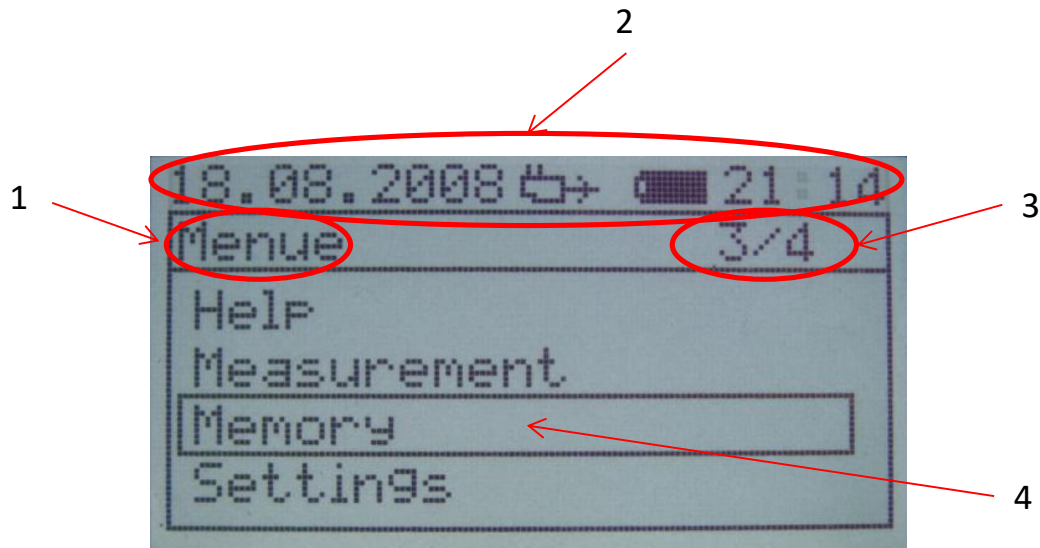


Fig. 9 Main menu

## 4.5 Input fields

There are 3 types of entry prompts.

### 4.5.1 Entry of texts (file names)

You get different characters by pressing a button several times. The assignment of buttons is shown in table 1.

After entering a character, the cursor jumps one position to the right to the next free position after approx. 2 seconds.

You can use **SHIFT** to change between capitals and lower-case letters.

The cursor can be moved by using ← and →.

The last character is deleted by pressing **DEL**. If the cursor is in the middle of the text, all characters from the cursor to the right are deleted.

The entry is accepted with **ENTER**.

**ESC** is used to discard the entry.

Button	Number of actuations				
	1	2	3	4	5
1	Space	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 assignment

#### **4.5.2 Entry of numbers (serial numbers, number of pulses)**

The required numbers can be entered using the keypad.

After entering a number, the cursor jumps one position to the right to the next free position.

The cursor can be moved by using ← and →.

By pressing **DEL**, the last character is deleted. If the cursor is in the middle of the text, all characters from the cursor to the right are deleted.

#### **4.5.3 Input - change (time, date)**

The input field already has a default value. The required numbers can be entered at the position of the cursor using the keypad.

← and → can be used to change between the window if there are several input windows.

The entry is checked for plausibility here. If an invalid value is entered, the entered value is discarded and the initial value is restored.



## 5 Menu structure

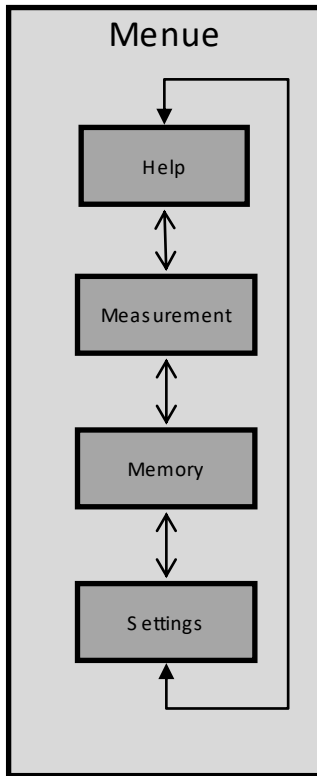


Fig. 10: Main menu structure

### 5.1 Help

The connection diagram for connecting the device to an encoder can be found here.

## 5.2 Measurements

The procedure shown in Fig. 11 is always carried out first.

### 1 **Note**

The encoder must rotate for the basic check, otherwise the basic settings cannot be made.

### 2 **Enter the name of the measurement**

A name for the measurement can be entered here. This entry can be skipped by pressing **ENTER**.

### 3 **Enter the encoder serial number**

The serial number of the encoder can be entered here. This entry can be skipped by pressing **ENTER**.

### 4 **Checking the encoder and EDU 100 basic settings.**

The following is checked:

- Supply voltage
- Current consumption (the signals must be looped through, or the encoder must be powered via the EDU 100)
- Which tracks are connected (0°, 0°inv, 90°, 90°inv, N, Ninv)
- If the output frequency does not exceed 100Khz, the amplitude is measured.
- If there is no zero pulse, the number of pulses must be entered. Otherwise, this is determined automatically.

Each part of the measurement can be skipped by pressing **ENTER**. Measurements can be aborted with **ESC**.

### 5 **Test record**

The results of this check are displayed in tabular form at the end.

The **ENTER** button takes you to the measurement menu.

The **X1** button can be used to repeat the measurement.

The **ESC** button takes you back to the main menu

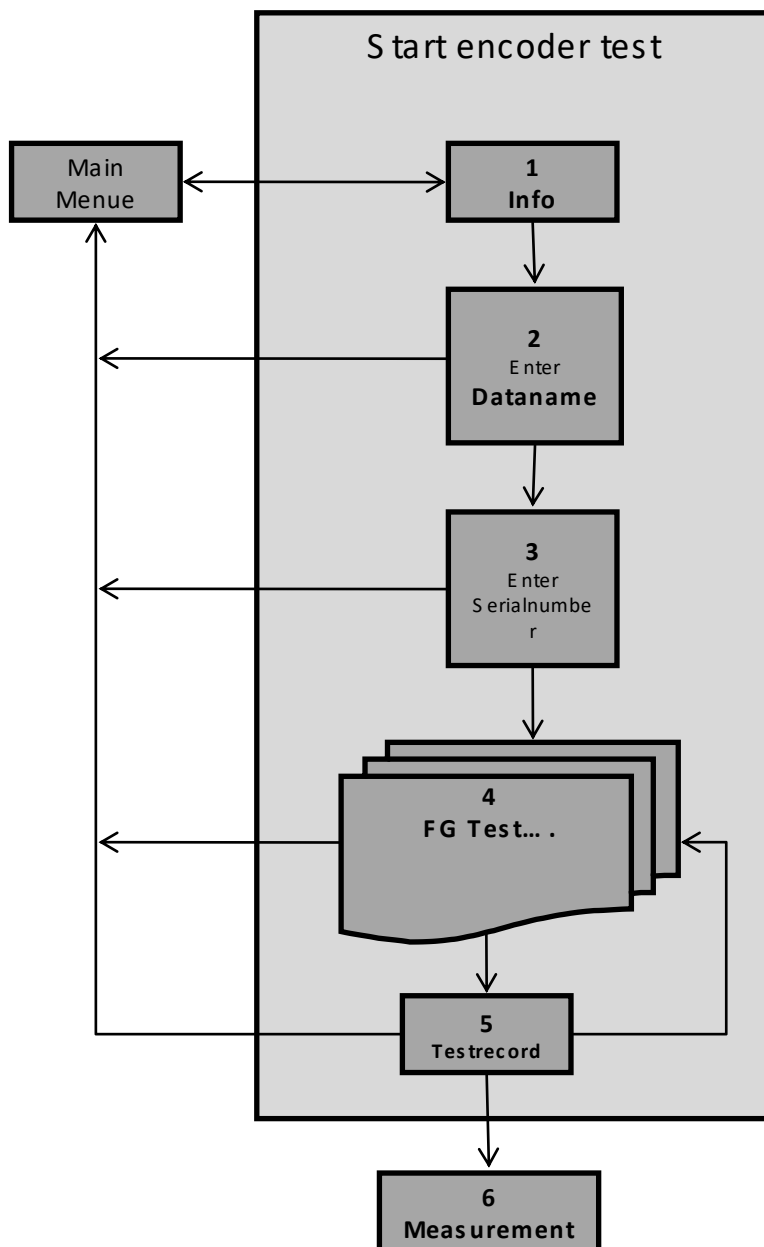


Fig. 11: Start measurement procedure

### 5.2.1 Measurement menu

See chapter 6 for the explanation of individual measurements.

## 5.3 Memory

### 5.3.1 Memory status

The free memory still available in per cent and the number of files (measurement series) in the memory are displayed here.

All data in the memory can be deleted by pressing **DEL**.

### 5.3.2 Data overview

All data saved in the device is listed here.

The file names are displayed in the left column and the storage date, storage time and the file type (aktm = current, drsm = rotary frequency modulation) of the respective file are displayed in the right column.

By pressing the buttons **↑** and **↓**, the cursor can be moved through the overview.

The selected file is displayed by pressing **ENTER**. **ESC** takes you back to the file overview.

The selected file is deleted by pressing **DEL**.

## **5.4 Settings**

### **5.4.1 Language**

Selection of language:

You can change between languages by pressing the **UP** and **DOWN** buttons.

By pressing **ENTER**, the marked language is accepted and stored in the device.

The selected can be aborted with **ESC**.

### **5.4.2 Time**

The time can be set here.

### **5.4.3 Date**

The date can be set here.

### **5.4.4 FG\_Ub -> EDU 100**

Here you can activate a setting so that the supply voltage of the connected encoder is used to power the EDU 100.

For this, the ED100 must be connected to an encoder, which is being powered.

The EDU 100 must not be supplied via the plug-in mains adapter.

The supply is automatically deactivated if the encoder is disconnected from the EDU 100.

### **5.4.5 EDU\_Ub -> FG**

Here you can activate a setting so that the supply voltage of the EDU 100 is used to power an encoder.

To be able to supply an encoder, the EDU 100 must be powered via the plug-in mains adapter. The encoder must be connected and may not be powered.

The supply is automatically deactivated if the encoder is disconnected from the EDU 100.

### **5.4.6 System info**

The EDU 100 information is displayed here.

## 6 Measurements

Please note that the measurement and basic setting (see chapter 5.2) only work properly up to an input frequency of approx. 100KHz. At higher frequencies, the signal amplitudes may be measured incorrectly!

### 6.1 Current

During these measurements, the signals from the encoder are continuously analysed and the results are displayed.

The **X1** button can be used to save the measurement.

The following properties are displayed:

- **Name**  
If assigned.
- **Number of pulses**  
Measured once only on initial start and then displayed as information.
- **Speed [rpm]**  
A positive value corresponds to a clockwise direction.  
A negative value corresponds to a counter-clockwise direction.  
The direction of rotation can only be recognised when the 0° and 90° tracks are connected!
- **Frequency [Hz] or [KHz]**
- **Supply voltage [V]**
- **Power consumption [mA]**  
Only possible with looped-through signals or with supply via the hand-held meter.

The following values are falsified in the event of large speed changes.

- **Symmetry deviation 0° track [error in %]**  
Only possible up to 150KHz input frequency.
- **Symmetry deviation 90° track [error in %]**  
Only possible with connection of the 0° and 90° track.  
Only possible up to 150KHz input frequency.
- **Phase deviation [error in %]**  
Only possible with connection of the 0° and 90° track!  
Only possible up to 150KHz input frequency.
- **Error monitoring**  
The device monitors the 0° and 90° tracks for errors (one of the two tracks fails or direction of rotation errors).  
If an error occurs, this is recorded and displayed.  
The following messages can appear:

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

The error can be acknowledged with **ENTER** .

If a significant change in speed occurs or the direction of rotation is changed, an error may be displayed even if there is no error.

## 6.2 Rotational frequency modulation

In the rotational frequency modulation, the pulse width deviation is recorded within one revolution and specified as a deviation in angular seconds. This measurement can provide information about the mounting accuracy of the encoder.

For this measurement, it is imperative that the encoder to be tested runs at a constant speed, otherwise the measurement result will be falsified. The accuracy of this measurement increases with higher speed and higher mass moment of inertia (motor), as this reduces the speed fluctuations of the system.

## 6.3 PC measurement

If this option is selected, the control and display of the measurements are transferred to the PC. Now all measurements can be carried out with the EDU 100 software.

To establish a connection between the PC and EDU 100, the USB cable must be connected, and the EDU 100 must then be switched on.

### 6.3.1 EDU 100 software

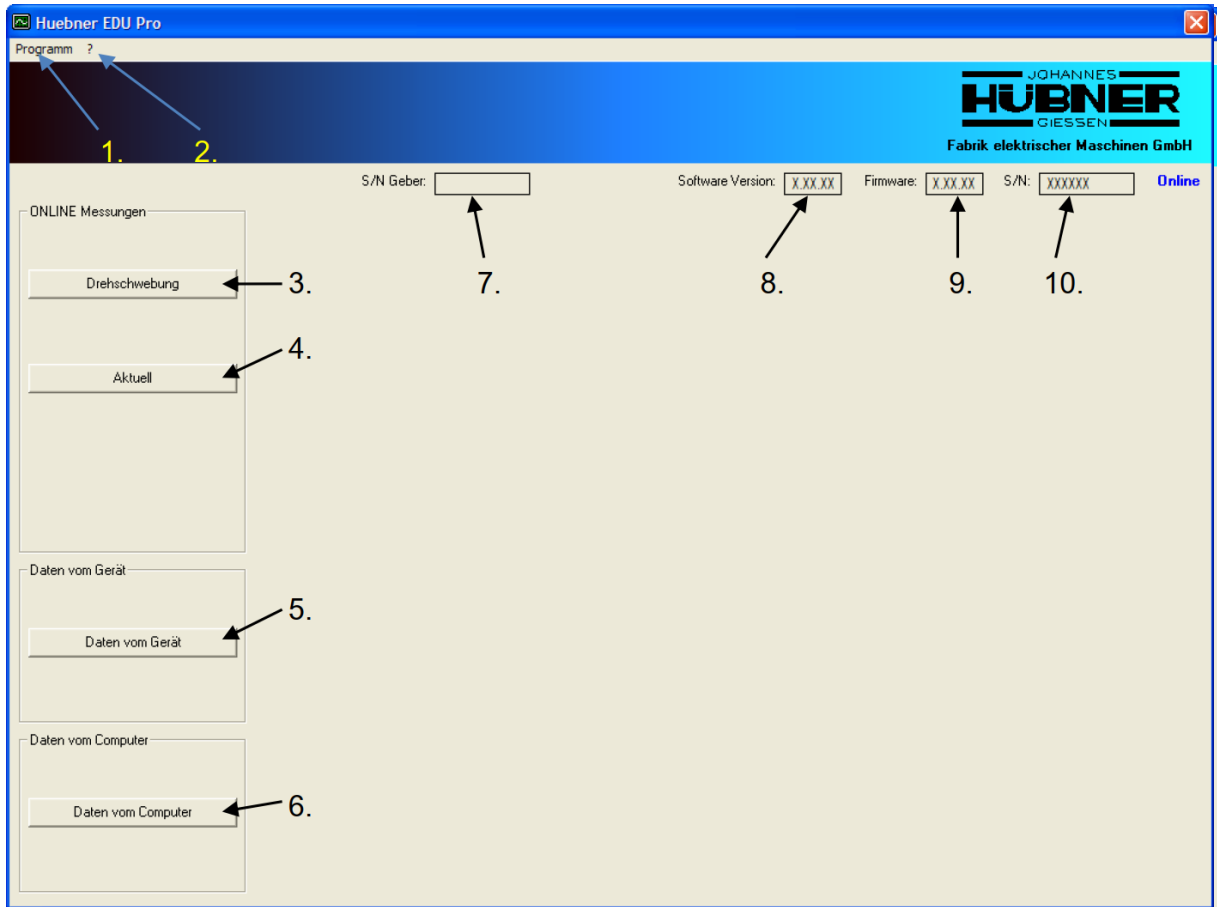


Fig. 12: Program window after start

1. – “Program” menu call. Continue Fig. 13.
2. – “Info” menu call. Continue Fig. 19.
3. – “Rotational frequency modulation” button (ONLINE measurements). Continue Fig. 14.
4. – “Current” button (ONLINE measurements). Continue Fig. 15.
5. – “Data from device” button. Continue Fig. 16.
6. – “Data from computer” button. Continue Fig. 18.
7. – The encoder serial number is displayed here, if available.
8. – The software version is displayed here.
9. – The EDU 100 version is displayed here.
10. – The EDU 100 serial number is displayed here.



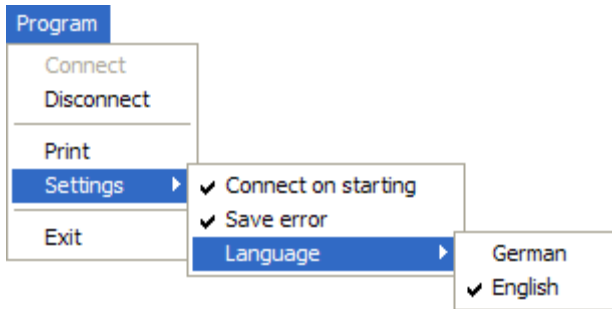


Fig. 13: Menu bar

Establish connection: Starts making a connection.

End connection: Finishes the connection.

Settings: Settings for the program.

Connect on start: An attempt is made to establish a connection on every start.

Language: Language of program.

Save error: Errors are saved in the Errors\_<Datum>.log file.  
The file is located in the installation directory of the  
“Huebner EDU Pro” – software.

German: German language.

English: English language.

End: Ends the program.

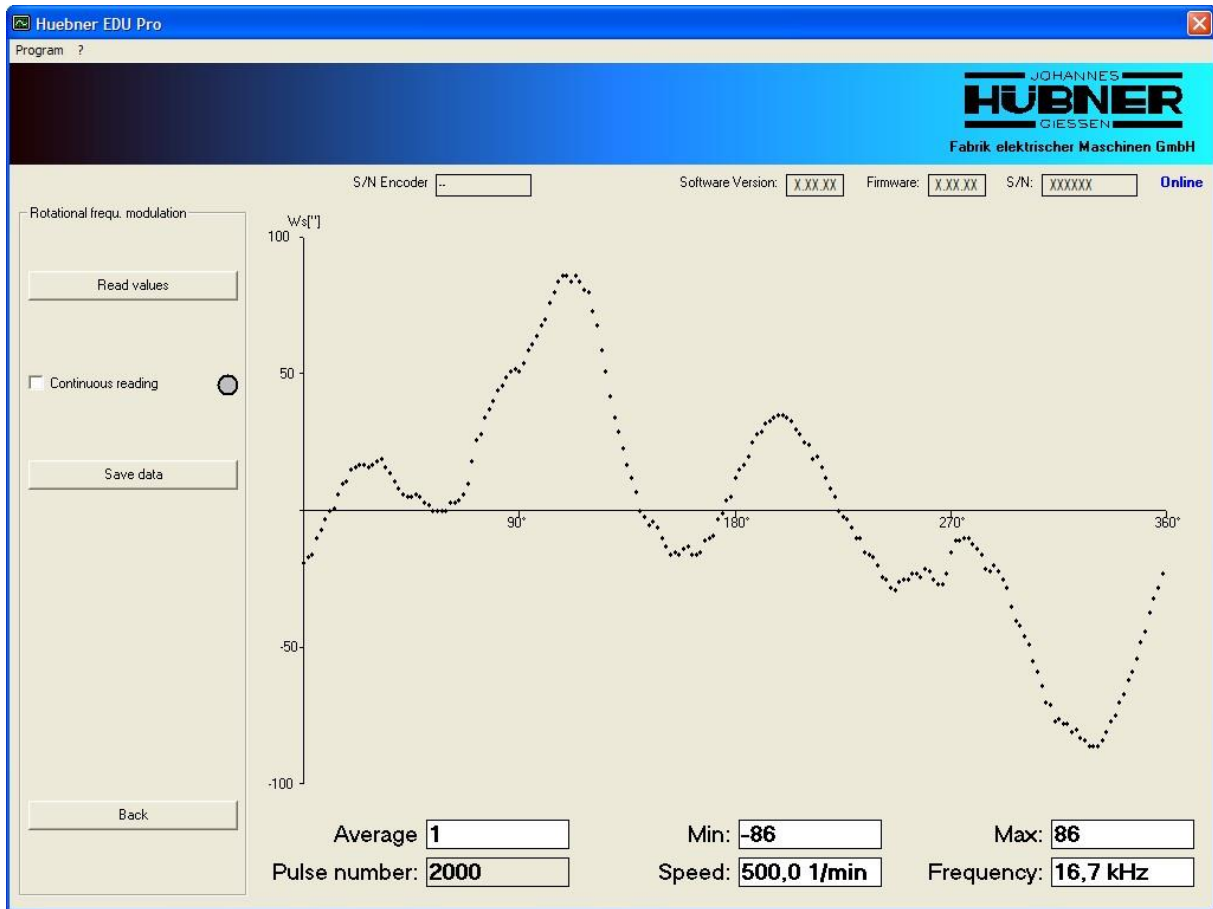


Fig. 14: Rotational frequency modulation

1. – To read and display values.
2. – Values are (not) continuously read.
3. – Values are saved.
4. – Returns to the previous menu, meaning that the values are hidden.

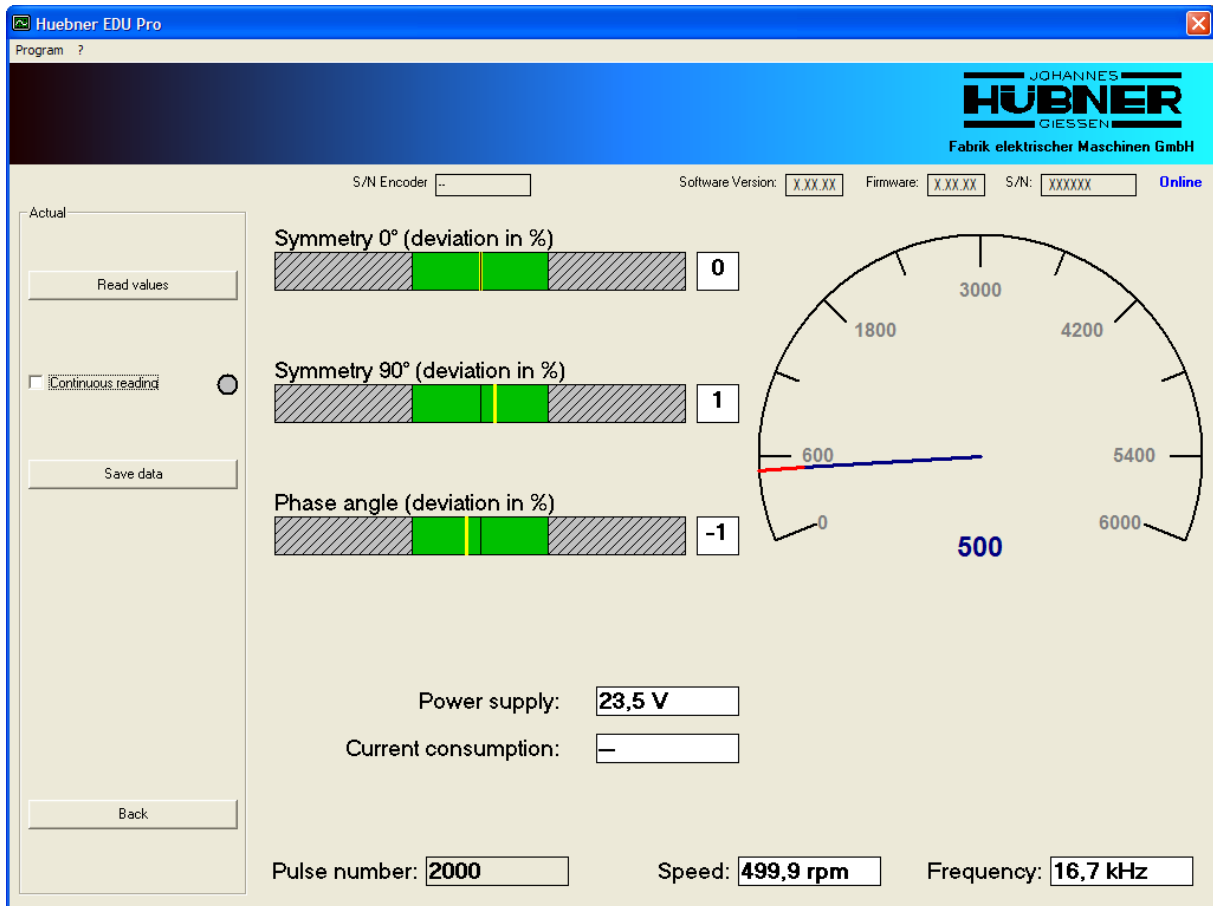


Fig. 15: Current

1. – To read and display values.
2. – Values are (not) continuously read.
3. – Values are saved.
4. – Returns to the previous menu, meaning that the values are hidden.

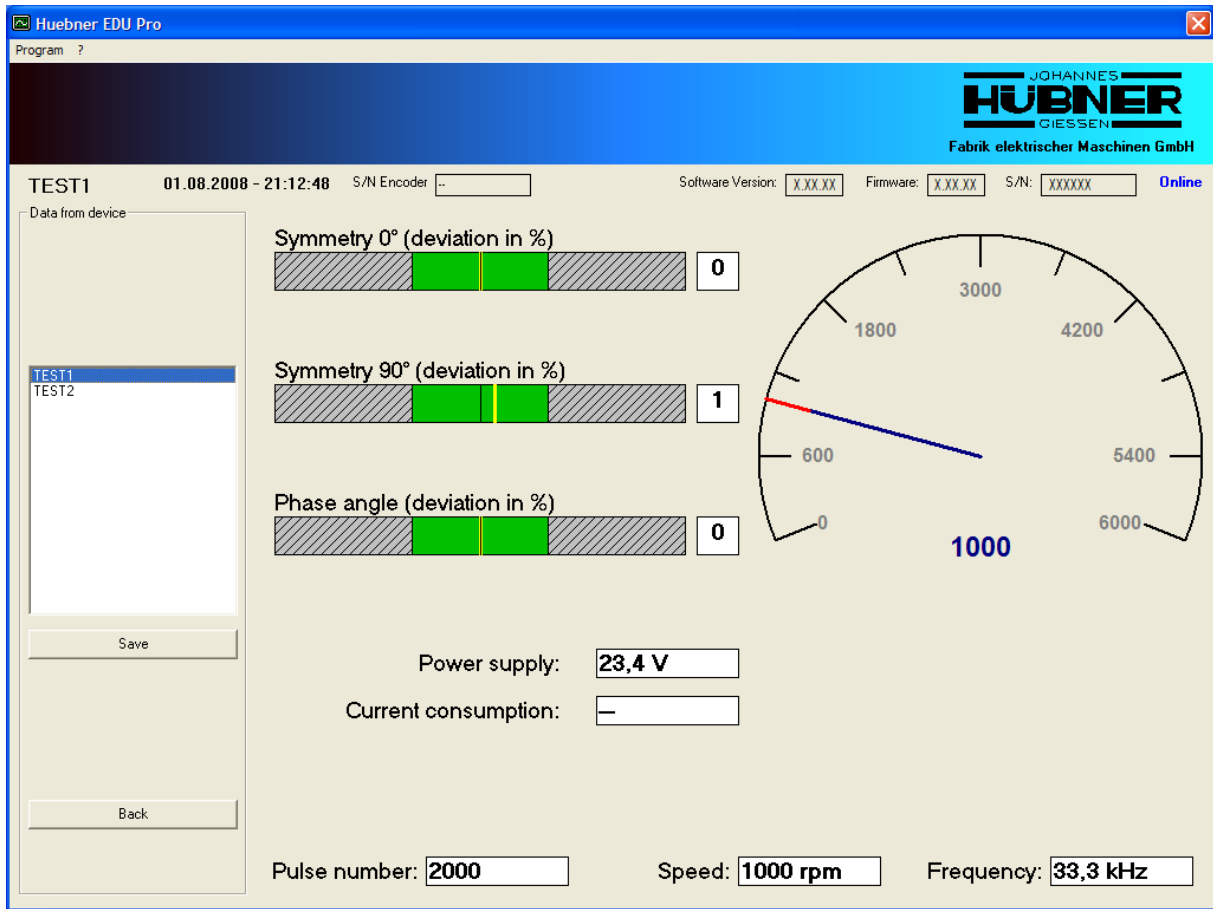


Fig. 16: Data from the EDU100 memory

1. – Name of the file selected by double click.
2. – Memory - date and time.
3. – List of all files available in the hand-held meter. Display with double click.
4. – Values are saved.
5. – Returns to the previous menu, meaning that the values are hidden.

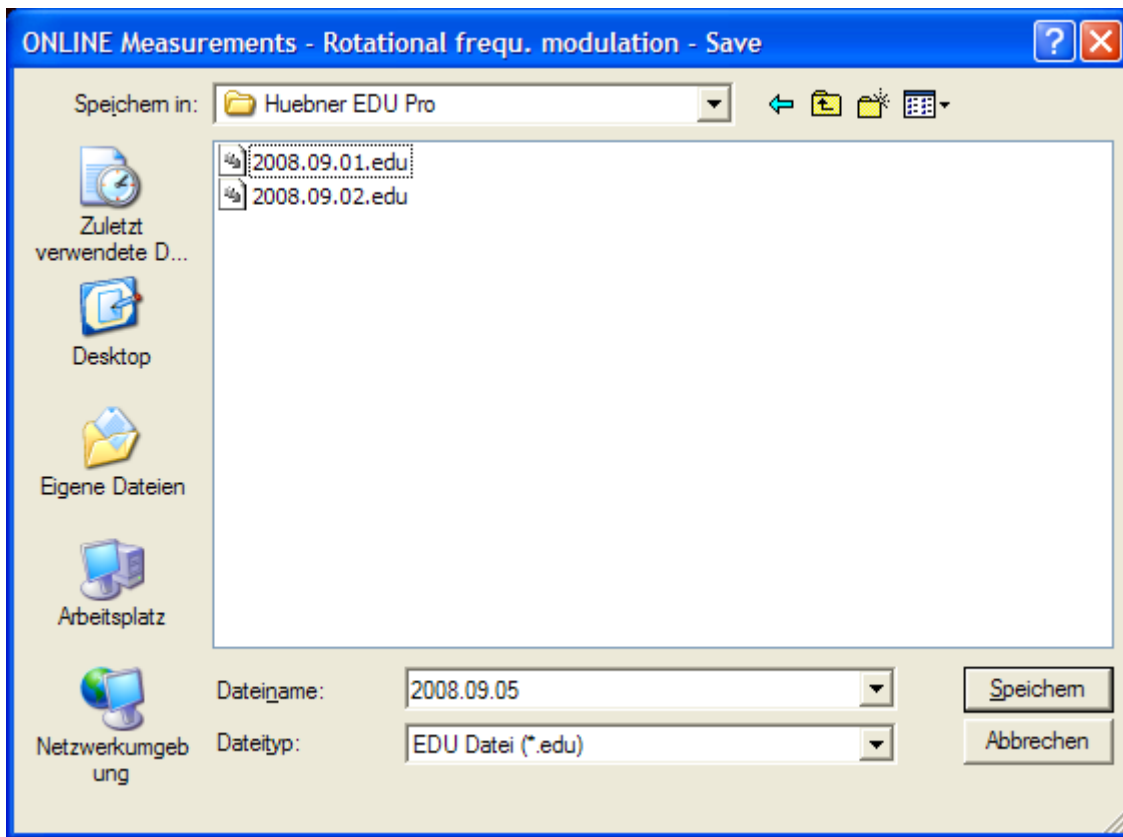


Fig. 17: File selection window

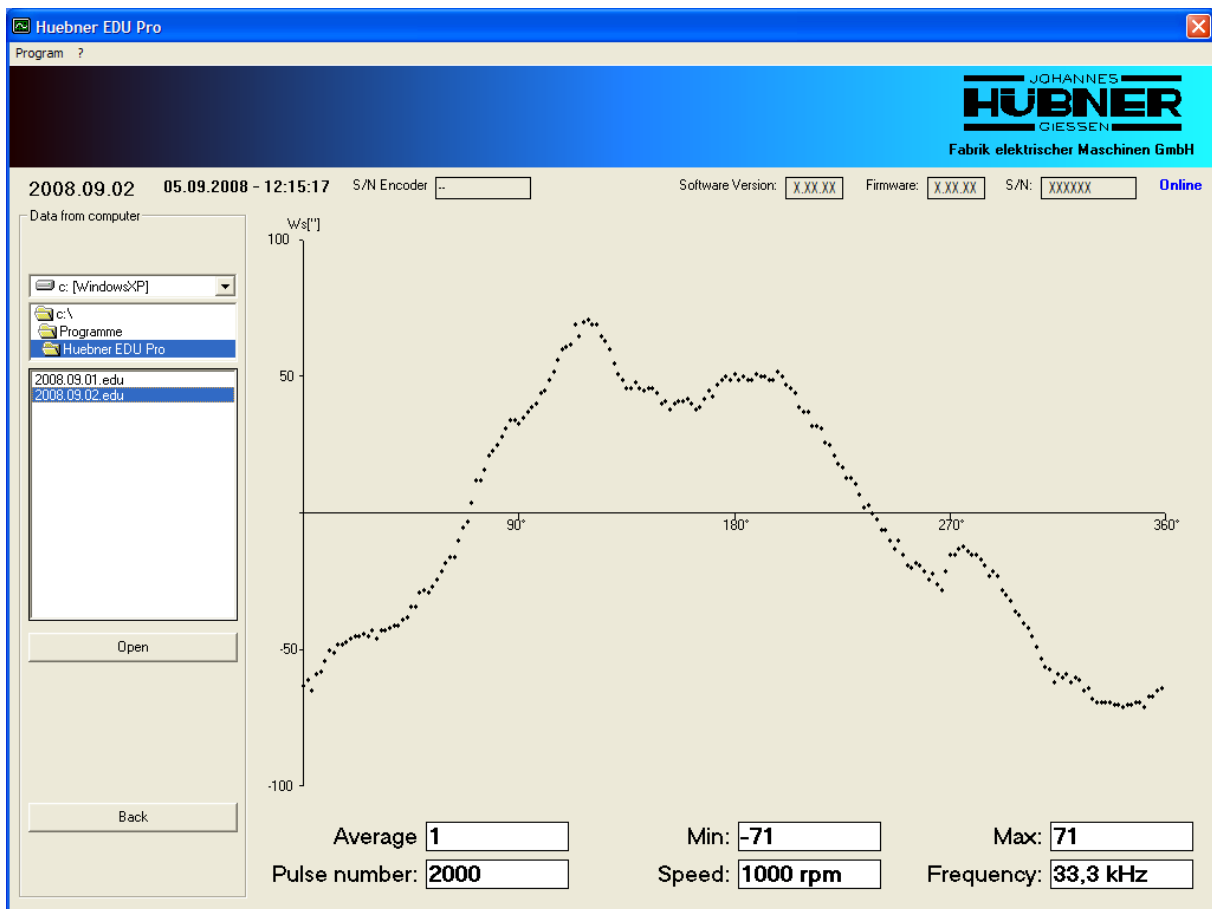


Fig. 18: Data from computer

1. – Name of selected drive (selection of drives).
2. – Path in selected drive.
3. – List of saved \*.edu files. Display with double click.
4. – Display of file selected in the list.
5. – Returns to the previous menu, meaning that the values are hidden.

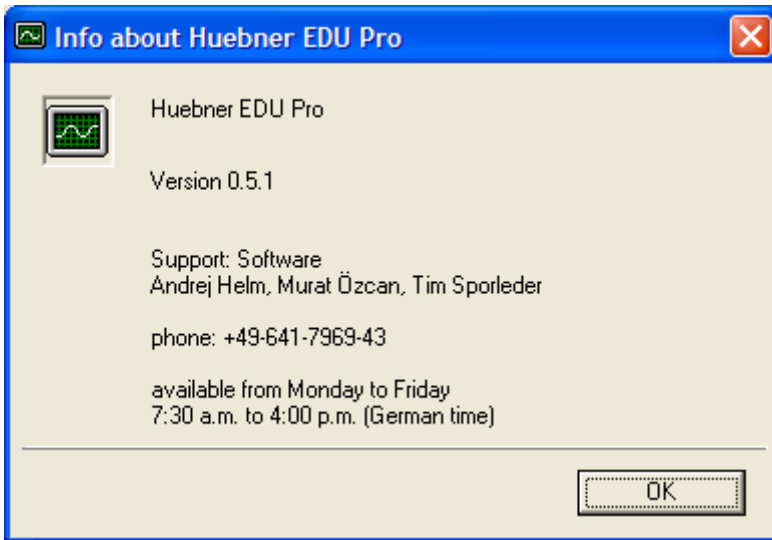


Fig. 19: "About" window

## 7 Device connection

The measurements can be carried out in parallel with the existing evaluation or the signals can be looped through the measuring device.

- **Parallel:**  
To do this, the connection cable (cable with open ends) is connected to plug 1 (pins) of the connection adapter and the encoder.
- **Looping:**  
To do this, the connection cable (cable with open ends) is connected to plug 1 (pins) of the connection adapter and the encoder. The second connection cable is connected to plug 2 (sockets) and the existing evaluation unit.



Fig. 20: Device connection



## 7.1 Cable assignment and use of signals

Colour	Signal	Measurement								
		Basic test				Current				Rotational frequency
		Voltage	Current <sup>1</sup>	Signal amplitude	Number of	Symmetry 0°	Symmetry 90°	Phase position	Monitoring	
Blue	<b>GND</b>	Always required								
Red	<b>Ub</b>									
Grey	<b>0°</b>			X	X	X	X	X	X	X
Pink	<b>0°</b>			O						
Purple	<b>90°</b>			O			X	X	X	
Black	<b>90°</b>			O						
Yellow	<b>N</b>			O	X					O
Brown	<b>N̄</b>			O						
Green	<b>Report</b>	Not currently in use								
White	<b>Report</b>									
Red/blue	<b>R</b>									
Pink/grey	<b>L</b>									
Green/brown	<b>2F</b>									
Green/white	<b>4F</b>									

Table 2: Cable assignment and use of signals

X: Signal required for this measurement

O: Signal is optional for this measurement

<sup>1</sup> Current measurement: Only possible if the encoder is powered via the EDU 100 or the signals are channelled through the EDU 100.

## **7.2 Voltage supply**

The measuring device can be supplied with voltage via a plug-in mains adapter, replaceable rechargeable batteries, or via the supply from the encoder or from the PC.

The batteries must be charged before first use!

The batteries are charged automatically in the device if it is supplied via the mains adapter and the battery voltage is too low.

The charging time can take up to 6 hours.


If the device is powered by the encoder or the PC (USB), the batteries are not charged.

If the device is powered by the batteries and they are almost drained, a message is displayed, and the device is switched off to protect the batteries.

If the device is not used for a longer period of time, the batteries should be removed from the device to protect them.

## 8 Transportation, packaging and storage

### 8.1 Transportation safety information

	<p><b>CAUTION!</b>  <b>Property damage due to improper transportation!</b>            These symbols and information on the packaging must be observed:            Do not throw, danger of breakage.            Protect against wetness</p>
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### 8.2 Incoming goods controlling


The delivery must be checked promptly for transportation damage and to ensure it is complete upon receipt.

If there is transportation damage, the carrier must be informed directly upon delivery (take photos as evidence).

### 8.3 Packaging (disposal)

Packaging will not be taken back and must be disposed of according to applicable statutory specifications and local regulations.

### 8.4 Storing packages (devices)

	<p><b>Protect against wetness!</b>            Protect packages against wetness, store in a dry and dust-free location.</p>
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In case of long storage times (> 6 months), we recommend packaging the devices in protective packaging (with desiccants).

### 8.5 Returning equipment (repair/goodwill/warranty)

Devices that have come into contact with radioactive radiation or materials will not be taken back.

Devices that have come into contact with biological or chemical substances that could be hazardous to health must be decontaminated before they are returned.

A clearance certificate must be enclosed.

### 8.6 Disposal

The manufacturer is not obligated to take back the devices.

The EDU 100 must be treated as special electronic waste and must be disposed of according to specific national law.

Local municipal authorities or speciality disposal companies can provide information on environmentally-appropriate disposal.