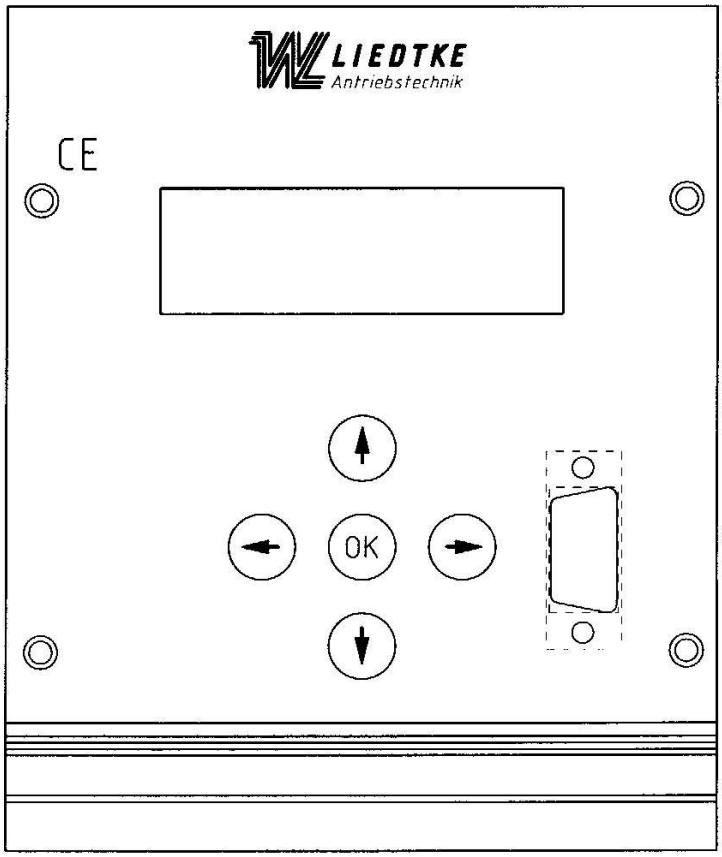
LIEDTKE *Magnetpulverkupplungen und -bremsen* *GmbH & Co. KG*
Boecklerstrasse 1 D-31789 Hameln Tel.: +49 5151 9889-0
e-mail: liedtke@liedtke-antriebstechnik.de Fax: +49 5151 67312

Operating manual and adjustment instruction

Digital Measuring Amplifier LP24



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Appendix:
- Functional scheme
- Terminal diagram

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Important Safety Instructions

The device may only be installed and connected by an electrically skilled person with the aid of this manual. National standards and safety regulations must be observed (see DIN V VDE V 0100534... or IEC 60364-5 534:...).
The device must be checked for external damage prior to installation. If any damage or other defects are detected in this check, the device must not be installed. Its use is only permitted within the limits shown and stated in these manual. The device and the equipment connected to can be destroyed by loads exceeding the values stated.
Opening or otherwise tampering with the device invalidates the warranty.

The manufacturer does not take over any responsibility for any consequences resulting from incorrect or negligent installation, change of existing parameters of the devices or the false combination with peripheral components.

A device-independent power shutdown must be guaranteed.
Fuses may only be replaced by fuses of the same type.
The operation of the device is only permitted with connected protective conductor.

For reference and actual signals you have to use shielded cable.
To this please also note the hints for an EMC-proper installation.

In the devices are used components which are sensitive to electrostatic discharges. During the operation, installation and maintenance, measures have to be taken in order to avoid electrostatic discharges.

Attention:
As a basic principle the device has to be made dead before any contact.
In case of non-observance there is the possibility of an electrical shock.

1. Product description Digital Measuring Amplifier LP24

The Digital Measuring Amplifier LP24 serves for the amplification of low voltage signals in the range of only few mV.

It is structured specially for the connection of instrument transformers as load cells, traction bearings or torque measurement with integrated ohmic resistance bridge (Wheatstone-bridge). The resistance bridge is supplied by a short-circuit proof constant voltage sources.

The handling and programming is made by either the foil keys of the front panel or by the provided programming software for Windows®.

The Measuring Amplifier consists of two separate channels that are prompted by separate converters. The measurement takes place simultaneously on both channels.
The signal of the measurement converter does not match the ground (GND). Each measuring channel has a zero point alignment as well as an amplifier adjustment in the range of V = 1...2000.

The Digital Measuring Amplifier LP24 supplies three different output signals:

1. **The direct amplified bridge signal**
2. **The positive action of this bridge signal**
3. **The amount of this signal**

These analogues amounts are shown on the LC-Display in the front panel.

The analogue Exit (Main) can be set up that is gives an output of one of these Signals. This analogue value is shown in the LC- Display. Besides that the signal of both measuring bridges is released at two more outputs.

The output signal ranging from 0 to +10 V can be released by the integrated U-I-converter, also as current signal of 0…20 mA or 4…20 mA. The integrated active attenuation provides a stable output signal of 0...10V, as well as the signal for the attachment of a 1 mA- measuring instrument.

2. Connecting

The Digital Measuring Amplifier LP 24 needs a supply voltage of 24 VDC at the connecting terminals 30a/c (-) and 32a/c (+), The protective earth conductor is connected to terminal 28a/c. A protective circuit prevents the destruction of the measuring amplifier in the case of false polarization.
For the usage with 230 VAC an external voltage supply with approximately 1 A secondary nominal /rated current is necessary. (An adequate device is optionally available)

Measuring transducer are connected to the terminals 2a (S+), 4a (S-), 6a (UB-) and 8a (UB+) resp. 2c, 4c, 6c and 8c according to the terminal diagram.

The terminals l0a/c are the 0V- reference for analogue signals; 12a provides a reference voltage 10VDC, approximately 10mA. The terminals 16a, 18a and 20a are analogue inputs (0...10V) for the setpoint value, the U-I- converter and the active attenuation. The analogue output signals are available at the terminals 2c to 22c. The controller release takes place via a high- signal at the terminal 22a; signal at the terminals 24s and 26a store and delete measured values, actual and saved respectively. The terminals 24c and 26c are programmable in/ outputs of the processor. These can as free data logger read in analogue signals of 0... l OV or 0...24VDC and release 24V- digital signals (not potential-free) respectively.

Attention: When running the Digital Measuring Amplifier with Zener barriers the Digital Measuring Amplifier must be ground lifted. The Zener barriers by STAHL Co. according to our drawing-no. 4.1421 are recommended. (Type 9002/77-093-040-001 for measuring signal, Type 9002/10-187-270-001 for supply)

2.1 Hints for an EMC-suitable installation

In order to observe the electromagnetic compatibility please note the appropriate guidelines and instructions.
This applies especially to:
- installation
- earthing
- filtration
- shielding

The next user is responsible for the observance of the EMC- guideline in case of industrial use.
If all components / plant components meet the CE- immunity requirement, then no electromagnetic impairments have to be expected.

Wiring tips:
The test leads should be performed with screened cables. The cross section is to be adjusted to the length of the lines. The calculation basis is an electric current of 15 mA with a value of resistance of 390 ohm. The lines should not be passed parallel to the motor lines.

3. Putting into operation and adjustment instruction

3.1 Preparing start-up

Before switching on the supply voltage it must be checked, whether the Digital Measuring Amplifier is connected correctly.
When the supply voltage is activated, the display shows the starting image.

All upcoming adjustments and programming can be done by either using the keys of the device or with the help of the software (see chapter 4).
In the following part is the description of the adjustments using the device.

The **OK**-key opens the editor modus (press the OK-key 4sec.), confirms the choice and opens the parameter input. To get to the different menu levels use the keys ◄ ► (◄ can also be used for the interruption of a procedure.) The different menu items can be chosen via the keys ▲▼. The actual choice is marked on the display with a ► sign on the left side; an **E** appears when the parameter input is opened. Parameter values can now be changed using the ◄ ► keys. The arrow on the bottom shows a skip into the next picture or starting image right. ↗
The display goes back to the starting image when pressing the arrow for approximately 20 sec.

3.2 Adjustment of the zero point

The adjustment can be done automatically as well as manually.
For the adjustment of the zero point the measuring systems are to be relieved mechanically. The measuring system should get checked if it is assembled correctly. (Tightness etc.)
For an automatic adjustment choose the menu *ALIGNMENT -> AUTOMATIC -> ZERO POINT*. The adjustment is done on both channels.
For the manual adjustment choose the menu *ALIGNMENT-> MANUELL -> ZERO POINT*. Press **OK**, **E** appears in the left side of the display, adjust the parameter value with ◄ ► and confirm with **OK**.

3.3 Adjustment of the amplification

If the loading of the measuring roll cannot be calculated exactly, then we recommend to calibrate the measuring system by putting weights on the measuring roll. To do so, conduct a belt webbing, following the run of the product, centric above the measuring roll and load it with weights up to the maximum tractive force. When measuring both sides, thus each force measurer takes up half of the load. Repeat the adjustment of the zero point and the amplifier alternately until no more deviations can be observed. To adjust the zero point, relieve the load on the measuring roll. A high measuring accuracy can be obtained if the measuring system is calibrated by putting weights on the measuring roll.

The measuring system is prepared the ways described above to produce a relevant measuring signal. At the formation of the totals of both measuring signals, an addition following this formula is performed:

$$\frac{\text{channel A}}{2} + \frac{\text{channel B}}{2} = F_{comp}$$

A formation of both totals following the formula has the advantage, that in case of a breakdown of one measuring system one can switch to a one-sided measurement with a constant output voltage (no tension decrease). The formula for addition is then automatically deleted and the signal of the particular channel is directly released.

For an automatic adjustment choose the menu *ALIGNMENT -> AUTOMATIC -> AMPLIFICATION*. The adjustment is done on both channels.

For the manual adjustment choose the menu ALIGNMENT-> MANUELL -> AMPLIFICATION. Press **OK**, **E** appears in the left side of the display, adjust the parameter value with ◄ ► and confirm with **OK**.

The processor adjusts the measurement signal to +10V. Hence it is important that with the load of the measuring system a positive change in voltage occurs.
Then test the adjustment of the zero point and the amplification once again and if necessary align it again.

3.4 Adjustment of the PID-Controller

Not yet available

3.5 Adjustment of the output value

This menu point has the submenus

1. Filter: This parameter causes an average determination at unsteady actual values. Here the attenuation of the output signal can be adjusted. (Time setting in ms)

2. Scaling: Here the value is set that corresponds to the maximum output value of 10V/20mA. (Force in N)

3. Signal: Here is set, which analogue value in the display is shown and lines up at the analogue output respectively. (bridge circuit signal/ positive signal/ amount of channel A+B/A/B)

3.6 Configuration of the optional inputs, U-I- converter

Alignment of the optional inputs
The optional inputs (terminal 18a and 20a) can be adjusted to different signals with jumpers on the main circuit board. There is the possibility to either *read* in an analogue signal of 0...10V or 0...24V or to *release* a potential-afflicted 24 VDC signal.

Adjustment of the Jumper	Option 1 (18a)		Option 2 (20a)	
	JP1	JP3	JP2	JP4
Analogue input signal 0...10V	1	2	1	2
Analogue input signal 0...24V	2	3	2	3
Digital output signal 24VDC	3	1	3	1

Alignment U-I-converter
The initial value of the electricity signal can be adjusted with a jumper at the exit of the U-I- converter.

Adjustment of the Jumper	JP7	JP8
Analogue signal 0...20mA	1-2	1-2
Analogue signal 4...20mA	2-3	2-3

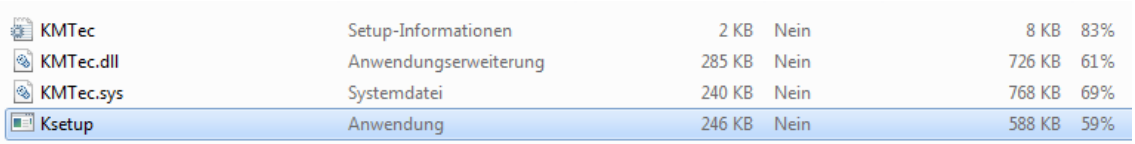
4. Programming software for Windows©

Requirements for the system:
Operating system Windows 98/2000/XP/Vista/Windows 7 (32 bit version), serial connection (RS- 232), USB –RS232 only with delivered interface, free hard- disc storage unit, keyboard, mouse

Note:
The connection to the USB- Port of a computer via a USB- serial- adapter is only possible with the USB-RS232 interface which includes this delivery!

Installation:

Before installation the software LP24 first install the USB Driver/ Ksetup which you find on the CD.



After that you can start the installation of LP24

The serial connection between the Digital Measuring Amplifier LP24 and the computer has to be established before the ignition of the program.

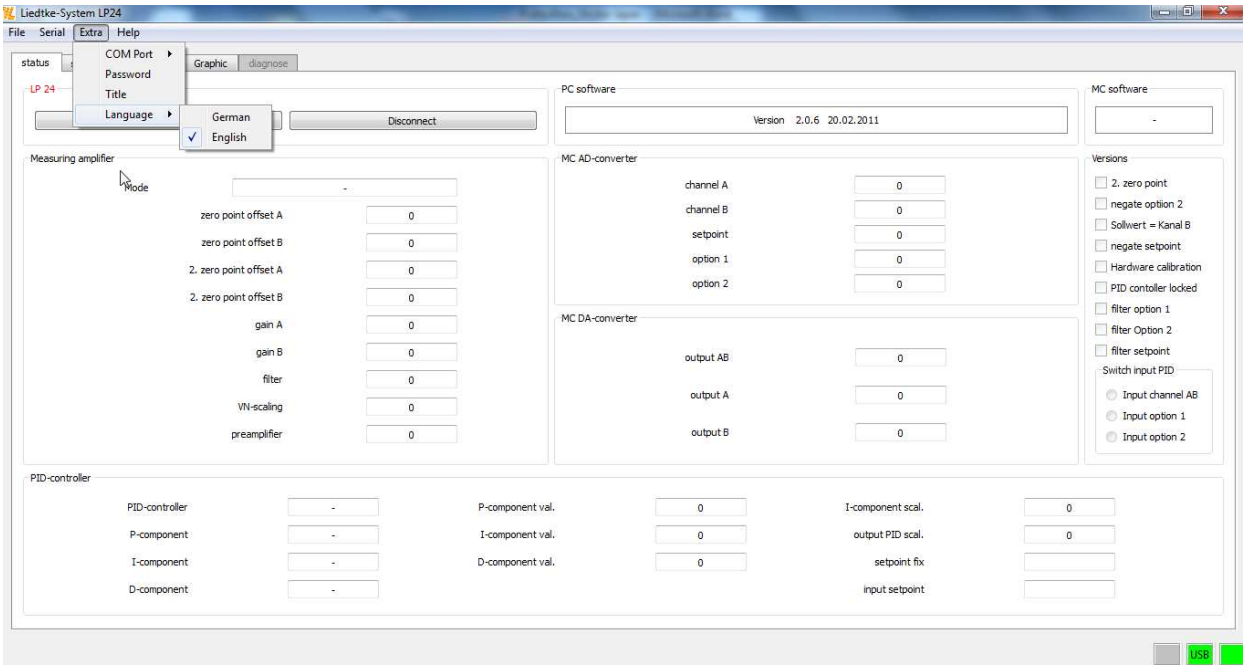
Functions like *read*, *save as*, *print* etc. can be selected via the pull- down menus of the program window (*Data, serial, Extras*).

The menu pages and their functions are described in the following paragraphs.

Language

Adjustment language

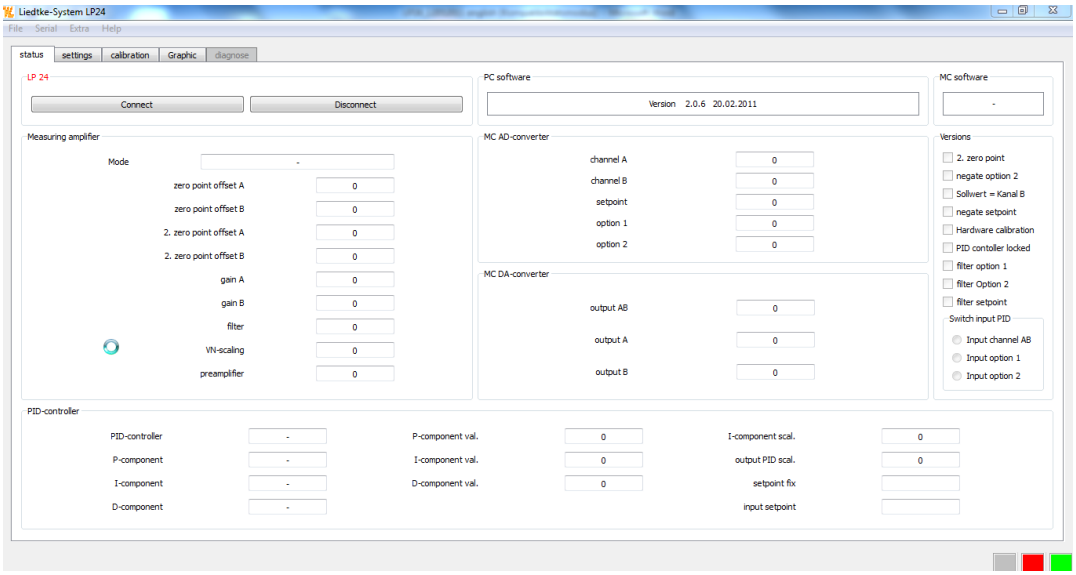
Start up the PC Software LP24 the first step should be the adjustment of the language english:



After adjustment of language it is necessary tu restart program.

4.1 Status

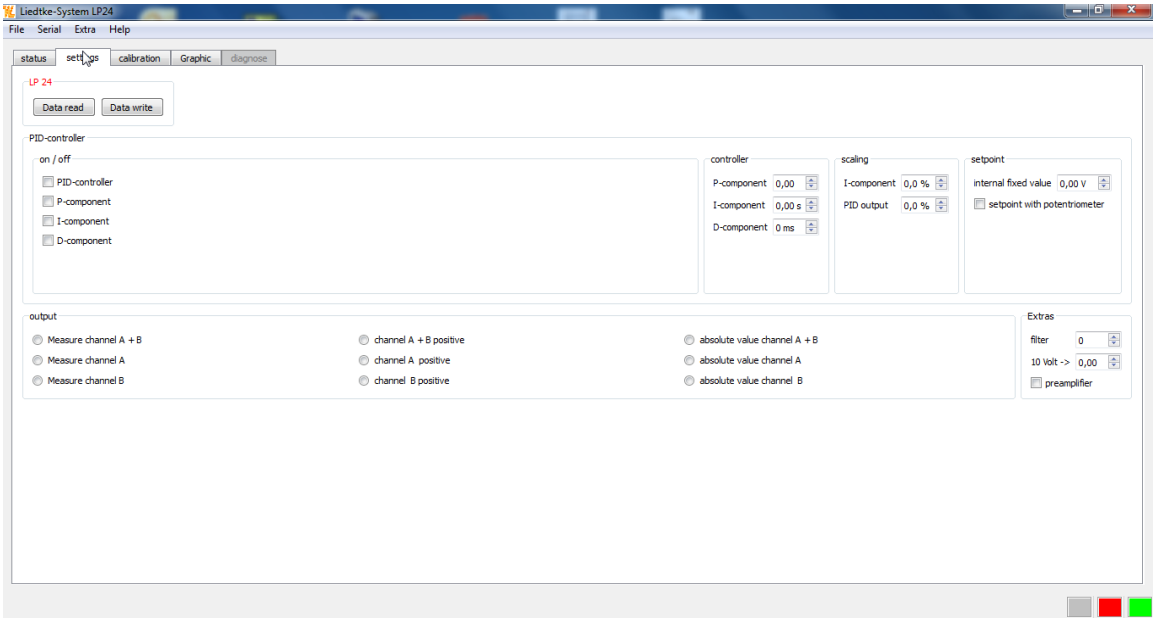
This page serves to display the data of the Digital Measuring Amplifier LP24.
Fist of all choose CONNECTION to build up the online connection. Now all the values generated by the Digital Measuring Amplifier LP24 can be seen online.



The status LED's at the bottom left of the window indicated the status of the driver, port and online connection. All three indicators are green while the connection exists.
MC- software: State of the version of the processor in the measuring amplifier
PC- Software: Stand of the version of the PC program
The switch DISCONNECT stops the online connection.

4.2 Settings

Here the presetting of the Digital Measuring Amplifier LP24 is conducted.
At first read the actual settings from the LP24 with the switch READ DATA. The online connection needs to be established.



Output value: Here is set, which analogue value is to be shown on the display and Lined up at the analogue output respectively. (bridge circuit signal /positive signal/ amount of the channel A+B/A/B)

Filter: This parameter causes an average determination at unsteady actual vatues. Here the attenuation of the output signal is adjusted. (Time setting in ms)

Calculation/ Scaling: Here the value corresponding to the maximum initial value of 10V/20mA is set. (Force in N) see Chapter 3.5

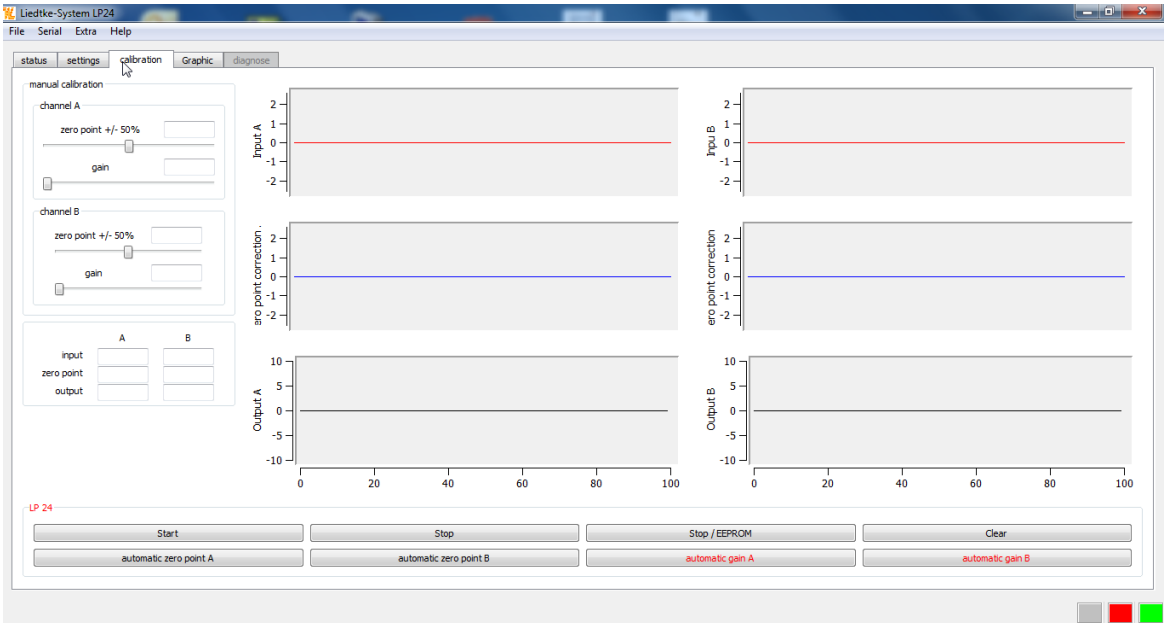
Pre-amplifier: Activate when little measurement signal occur.

PID-controller: The access is possible with enabled PID- controller
(Description is not yet available)

Using the switch WRITE DATA carries out the transfer of the values into the memory of the Digital Measuring Amplifier LP24.

4.3 Alignment

In this window the alignment of the measurement device is carried out



Automatic alignment:

1. Relieve the measuring system; choose START, and then AUTO. ZERO POINT. The zero point is adjusted.
2. Load the measuring system with the maximum Load, and then choose AUTOM. AMPLIFYING

The amplifier is set.
The actual values are displayed as graphic and numeric values.

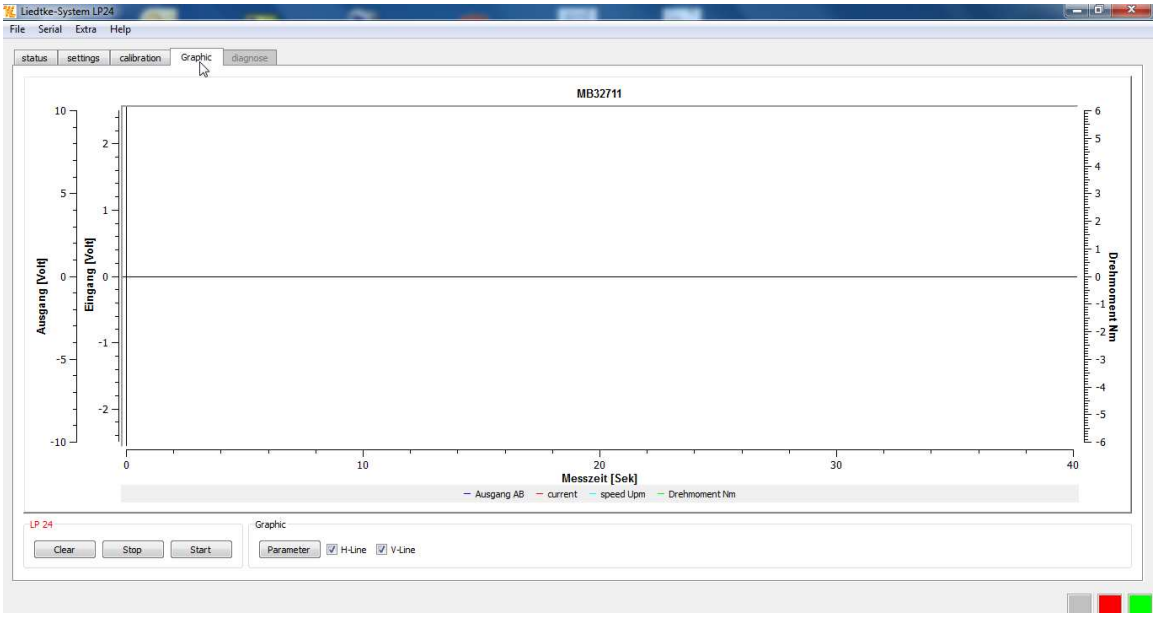
Manual alignment:

The parameters can be changed as you like by the sliding controls in the upper left part of the window, also after the automatic alignment.

With STOP the process is interrupted.
To end the alignments choose STOP/EEPROM. Thereby the Settings are transferred to the memory of the Digital Measuring Amplifier LP24.
With CLEAR the display values are reset.

4.4 Graphic

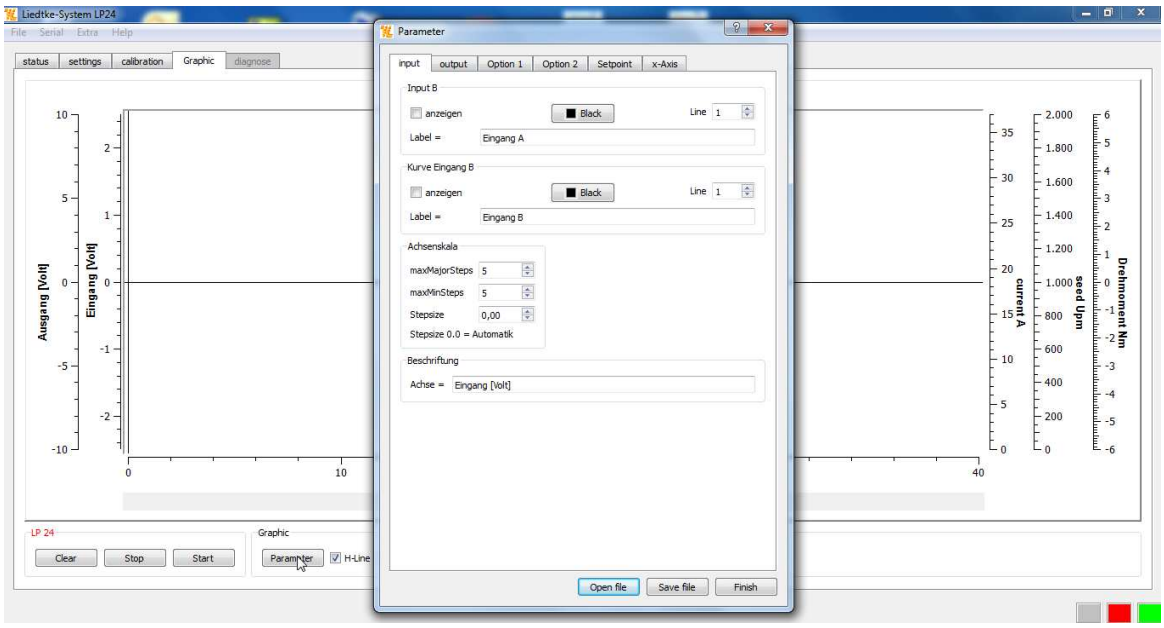
This is the protocol modus for the evaluation of all analogue signals. Shown on the right side are the three analogue input signals (setpoint value, option 1 and 2) and on the left side the scales of the chosen output values.

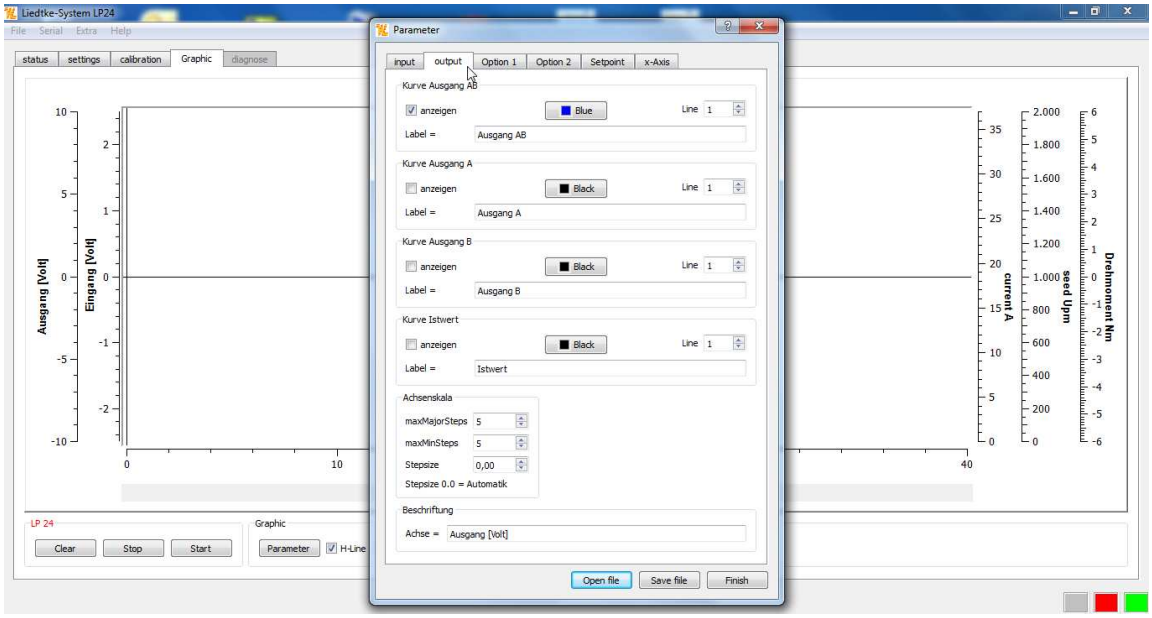


Press START, then the logging starts; STOP ends this process.
With CLEAR the data in the display is deleted.

PARAMETERS

With SET PARAMETERS the window with the choices of parameters opens up. On the left the desired display values can be chosen, the colour of the line can be changed. The labelling, scaling and the zero point of the y-axes on the right can be respectively adjusted. With the sliding control 'measurement values' the splitting of the x-axis changes. In the array 'header' the labelling of the diagram can be carried out. BACK closes the window and the data is saved.





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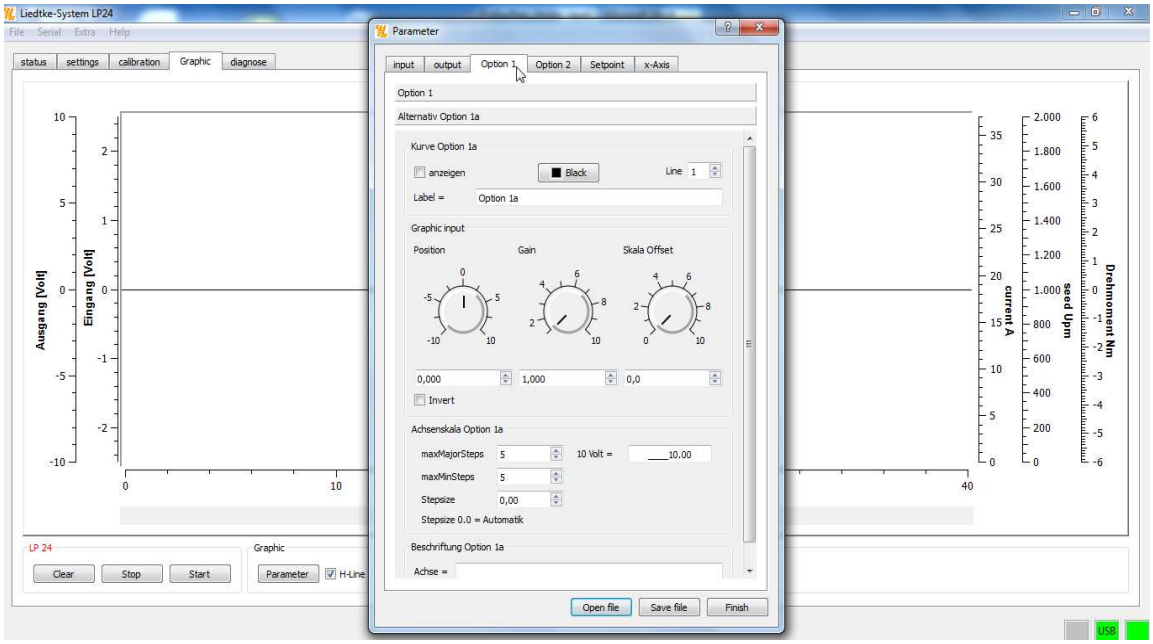

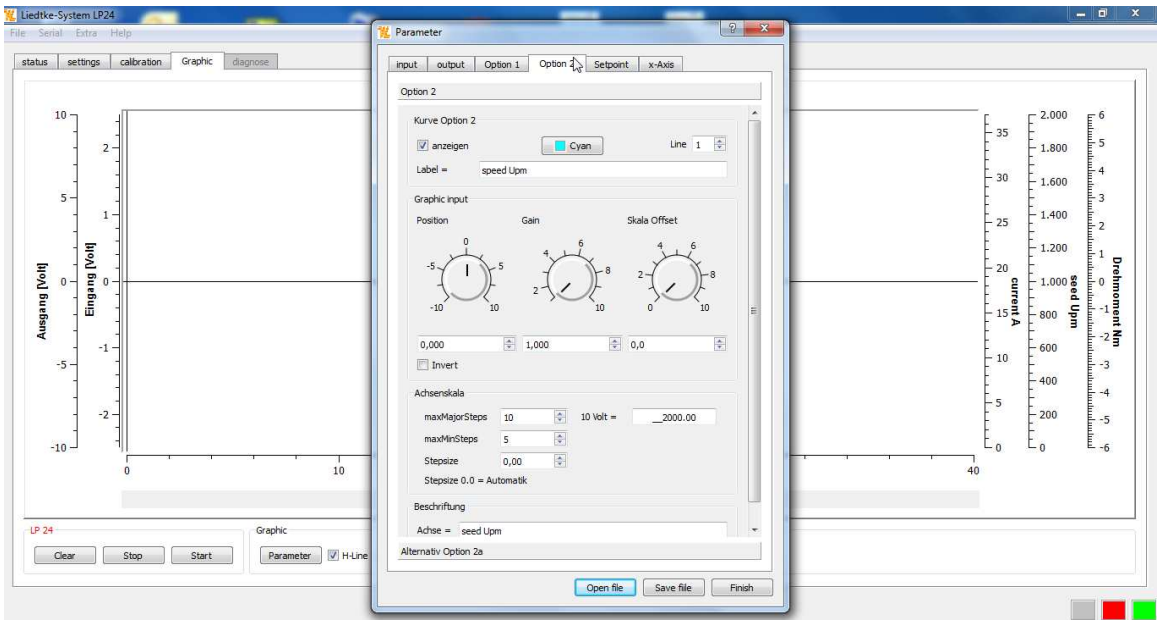

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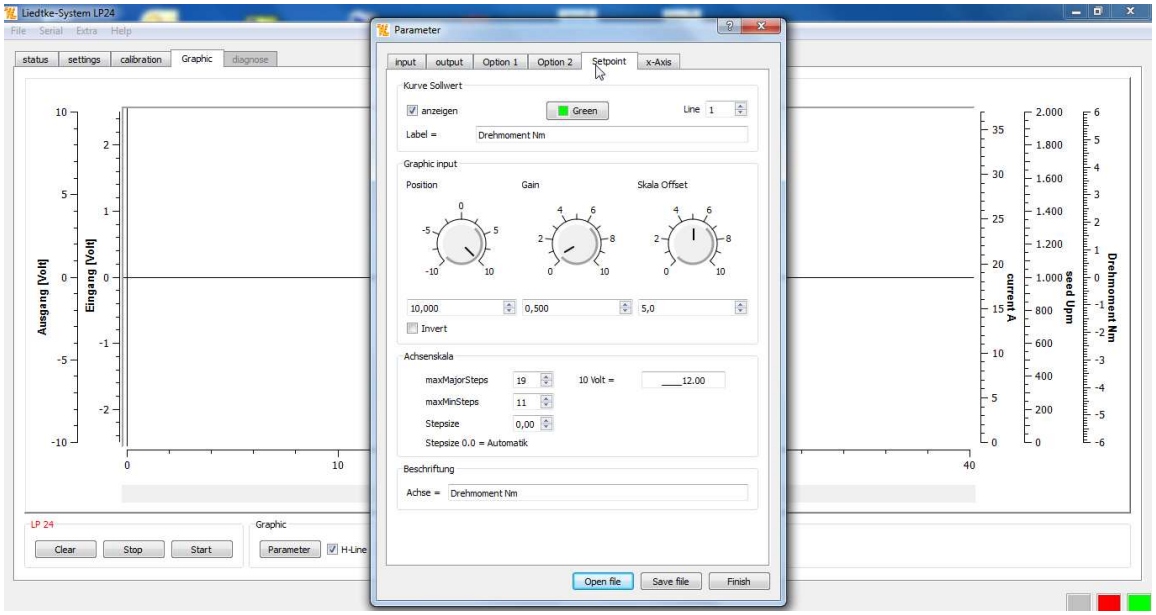
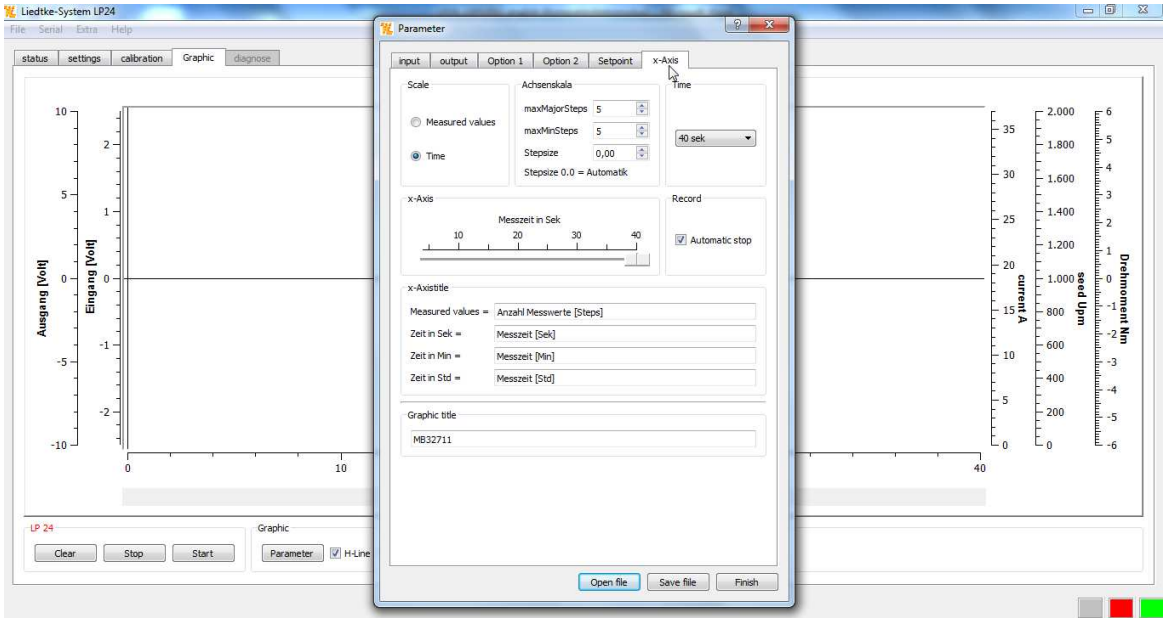




4.5 Diagnosis

This area is secured by a password. Here the factory settings of the hardware and software can be adjusted. Under EXTRAS -> ENTER PASSWORD the password for this area can be entered. The password can be obtained at LIEDTKE Services.

4.6 Software Installation/ Update

Systemvoraussetzung:	Windows XP
Installation:	Softwareinstallation
Deinstallation/ Update:	Erase the software LP24 under system adjustments Additional erase the driversoftware KMTecDeviceDrive

5. Summaries

5.1 Connections

Terminal	Function	
a-Side		
2a	Input for positive bridge signal channel B	(S+)
4a	Input for negative bridge signal channel B	(S-)
6a	GND for channel B	(UB-)
8a	Constant current feeding for channel B (+5VDC)	(UB+)
10a	GND for electronic	
12a	10 VDC	
14a	Reserve	
16a	Analogue input, setpoint value 0…+10 VDC	
18a	Analogue input, U-I-converter 0…+10 VDC	
20a	Analogue input, active damping 0…+10 VDC	
22a	Controller enable (PID-controller)	
24a	Store	
26a	Reset	
28a	Protective conductor PE	
30a	Voltage supply 24 VDC (-)	
32a	Voltage supply 24 VDC (+)	
c-Side		
2c	Input for positive bridge signal channel A	(S+)
4c	Input for negative bridge signal channel A	(S-)
6c	GND for channel A	(UB-)
8c	Constant current feeding for channel A	(UB+)
10c	GND for electronic	
12c	Analogue output channel A 0…10 VDC	
14c	Analogue output channel B 0…10 VDC	
16c	Analogue output sum signal channel A+B 0…10 VDC	
18c	Analogue output U-I-converter 0(4)…20 mA	
20c	Analogue output active damping 0…+10 VDC (max. 10 mA)	
22c	Analogue output for 1mA measuring instrument	
24c	IO Option 1 (free processor port)	
26c	IO Option 2 (free processor port)	
28c	Protective conductor PE	
30c	Voltage supply 24 VDC (-)	
32c	Voltage supply 24 VDC (+)	

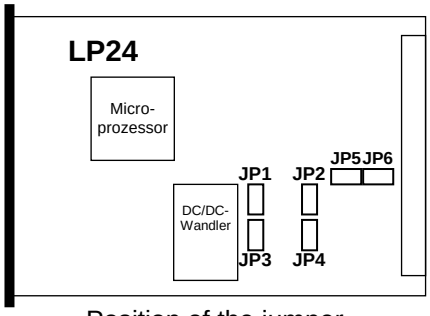
5.2 Technical data

Bridge resistance	120...800Ω
Supply voltage of the bridge	appr. 15 mA or appr. 1 mA
Influence of temperature on bridge feed	< 2,1mV / K
Compensation of resistances	by voltage regulation
Signal amplification	1...2000 (12000)
Input resistance	≥ 1 MΩ
Linearity error	< 0,1 %
Range of measurement frequency	0...5 Hz
Load resistance at voltage output 0...10 V	R > 1 kΩ
Load resistance at current output 0...20 mA	R < 500 Ω
Zero suppression	± 15 mV
Mains connection	24 VDC
Input power	max. 8 VA
Current load switch output option 1+2	max. 20 mA

5.3 Jumper, Potentiometer

Jumper
JP1+3 Adjustment Analogue Input Option 1
JP2+4 Adjustment Analogue Input Option 2
Configuration see Pt. 3.6

JP5+6 Switchover current output
position 1-2 0...20 mA
position 2-3 4...20 mA



Position of the jumper

5.4 Cable RS232

Assignment
TxD Pin 2
RxD Pin 3
GND Pin 6