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# eddyMOTION 2.0.6.2 Manual

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## Glossary

**FFT** Computes the averaged FFT spectrum of time signal. This returns the FFT results as real and imaginary parts. Wire data to the time signal input to determine the polymorphic instance to use or manually select the instance.

As time domain window eddyMOTION uses a Hanning window which cannot be changed by the user. Averaging parameters is a cluster that defines how this computes the averaging. The specifications of the parameters include the type of averaging, the type of weighting, and the number of averages.

As averaging mode eddyMOTION uses 'No averaging'. As weighting mode eddyMOTION uses 'Exponential'. With the weighting mode Exponential, averaging is continuous. The DC component is removed from the time signal in advance. This is done by subtracting it from each value of the input signal. No further windowing takes place for this process.

The results are expressed invariably in decibels. These statements apply equally for Waterfall and Waterfall RPM. . 2, 5, 6, 10, 11, 12, 13

**Magnescale Digital Gauge** The Magnescale Digital Gauges product use a high-grade magnetic recording and detecting principle. Magnescale Digital Gauges feature high resolution and accuracy, along with environmental, shock and vibration resistance. Sub-micron repeatability and improved torsion resistance comes from an innovative spindle design that enables environmental protection up to IP67 [MC21b].. 2, 15, 16, 19

**TX-Driver** Eddy current sensors are based on an electromagnetic measuring principle. They detect the distance or the change to metal objects without contact, dynamically and extremely accurately. Even fast processes, such as vibrations or oscillations, are precisely recorded.

eddylab's eddy current sensors are ideally suited for use in harsh industrial environments. Due to their physical measuring principle, they remain unaffected by non-conductive media such as water, dust, dirt or oil between the sensor and the measured object. They are resistant to contamination, high temperature and pressure.

The TX electronics which are specially adapted to the sensor calculate an analogue output signal proportional to the distance. In addition, there is a USB and CAN Interface [[eG16]] for reading the data. . 1, 2, 4, 5, 7, 8, 9, 12, 14, 15, 16, 17, 18, 19, 20, 21



Figure 1: Basic module TX1



Figure 2: Basic module TX2

## List of Frequently Asked Questions

# 1 Preface

TX-Driver - References to the glossary of the document are marked in this form.

3 - References to other parts of the document are marked in this form.

# 2 eddyMOTION overview

eddyMOTION is a powerful windows software used in conjunction with the TX-Driver. The targeted area of application is the visualisation and documentation of mechanical motion and the on-site Linearization of eddy current sensors.

## 2.1 eddyMOTION as analysis tool

eddyMOTION is made up as an universal analysis tool for the USB based data stream from the TX-Driver. The requirements in signal analysis can be of various nature – therefore eddyMOTION is structured in several modules. The different modules can be used to monitor fast and slow motion. The measured data can be displayed in the time- and in the frequency domain. The underlying sampling rates are $22.5\,\mathrm{kSa/s}$ in the two-channel version and $38\,\mathrm{kSa/s}$ in the single channel version.

## 2.2 eddyMOTION as configuration tool of the TX-Driver

With eddyMOTION you can configure your TX-Driver as well as create and edit scalings and run system diagnostics. Further information can be found in the section 7.2 .

# 3 Functionality of eddyMOTION

In addition to a configuration tool, eddyMOTION offers:

- the familiar sensor technology functions of an oscilloscope

- a multitude of additional functions for vibration analysis and data recording ( FFT. analysis, data logger, waterfall diagram)

- a calibration and linearization function, with which eddy current sensors can be traceably calibrated

The TX-Driver also contains a CAN-Bus interface. A description to this interface is given in the document 'eddyCAN-Protocol'. The CAN -Bus is not related to eddyMOTION – except for the definition of the baudrate and node-id.

## 3.1 Analysis module Oscilloscope

Sampled data is displayed with basic measurements in the style of a classical Oscilloscope.

- single- and dual-channel Oscilloscope. Samplingrates: $38\,\mathrm{kSa/s}$ (single); $22.5\,\mathrm{kSa/s}$ (dual)

- AC/DC-coupling

- variable time base $14\,\text{ms}...5\,\text{s}$

- scalable Y-axis & autoscale function

- user-defined trigger level, hysteresis and pre-trigger, trigger source, falling and rising edge

- essential measurements on dynamic data can be taken: amplitude, frequency, max & min values

- data export as image (bmp) and text file

## 3.2 Analysis module FFT

Fast-Fourier transformation. Spectral analysis of mechanical motion. Analysis of fundamental oscillation and harmonics.

- visualisation of the frequency spectrum up to $19\,\text{kHz}$ (single-channel); $11.25\,\text{kHz}$ (dual-channel)

- threshold value for frequency detection can be selected

- detection of frequencies and amplitudes

- scalable frequency axis

- data export as image (bmp) and text file

## 3.3 Analysis module Waterfall

The Waterfall is a classical FFT. expanded with a time axis.

- spectrum like the two-dimensional FFT. expanded with a time axis

- scalable frequency axis

- 3D-view can be rotated

- movable analysis plane along the time axis

- detection of frequencies and amplitudes within the analysis plane

- export as image

## 3.4 Linearization

The Waterfall is a classical FFT. expanded with a time axis.

- spectrum like the two-dimensional FFT. expanded with a time axis

- scalable frequency axis

- 3D-view can be rotated

- movable analysis plane along the time axis

- detection of frequencies and amplitudes within the analysis plane

• export as image

# 4 Installation

## 4.1 System requirements

For the correct use of eddyMOTION the following minimum requirements have to be set:

| # | Hardware | Parameterization |
|---|---|---|
| 1 | CPU | x86-compatible processor from 1 GHz |
| 2 | Main memory | 1 GB or more, 4 GB recommended |
| 3 | Hard disk | space 1 GB free space, of which at least 500 MB on the system partition |
| 4 | Graphics card | color depth from 24 or 32 bit (True Color) |
| 5 | Screen resolution | from 1024x768, multiple external monitors supported |

Table 1: System requirements hardware eddyMOTION

| # | Operating system | variant |
|---|---|---|
| 1 | Windows 10 | 32 Bit |
| 2 | Windows 10 | 64 Bit (as 32 bit application) |

Table 2: System requirements operating system eddyMOTION

The use of the software eddyMOTION under the operating systems Windows 7, 8 and 11 is at your own risk. eddylab does not provide support for this.

## 4.2 Installation steps

The installation of eddyMOTION is done under Microsoft Windows.

**Note**
*For the Installation and the first start of eddyMOTION you need administrator rights on your computer.*

**Note**
*Uninstall previous eddyMOTION versions [e.g., eddyLab 2.0.6] before installing the current version. Under no circumstances should you install into a directory where an earlier version of eddyMOTION is installed.*

**Note**
*During the Installation of eddyMOTION it is advisable to deactivate virus scanners and the firewall.*

1. The ZIP loaded from our homepage is to be unpacked in a temporary folder. The following description refers to this unpacked directory structure.

2. Connect the TX-Driver to a power-supply.

3. Connect the Device to your PC via USB: two cases are possible

- The PC is connected to the internet. A ⌗TX-Driver⌗ is connected to the PC for the first time. This will cause the case described in FAQ case ⌗1⌗. Continue with step 4.

- The PC is not connected to the internet. An eddylab-device will be detected and the 'Found new Hardware Wizard' will prompt you for the Device-Driver. Continue with step 4.

4. Select the directory 'D2XXsigned' to install or update the driver. After an successful installation of the ⌗TX-Driver⌗, the lights 'power' and 'usb' should be on continuously.

5. Run the 'setup.exe' in eddyMOTION 2.0.6.2 Installer and follow the instructions. Question if asked: 'Disable Windows Fast Startup'. The fast startup introduced in Microsoft Windows 8 may cause problems with installing or removing hardware. eddylab recommends to set the checkbox.

6. The program will guide you through the installation. The installation is carried out for all users of the PC (Directory for eddyMOTION 'Program Files (x86)').

7. Your system now contains the new shortcut entry in the Start Menu>Programs>eddyMOTION 2.0.6.2 ... >eddyMOTION 2.0.6.2 ... .

## 4.3 Export files

All export files created by the software are stored in the public documents folder under '\ Users \ Public \ Documents \ eddylab Data' saved.

## 5 How to Use

### 5.1 User Interface

When loaded your screen should look like in figure ⌗3⌗.



Figure 3: eddyMOTION after Startup

When connected to the USB – eddyMOTION will automatically establish a connection to the ⌗TX-Driver.⌗ Four LEDs indicate the connection state (see figure ⌗4⌗).

Figure 4: Connection state

**USB** indicates a connected and powered TX-Driver. **Init** indicates initialisation. **Ready** indicates the finished initialisation. **Data** indicates an active data stream in all analysis modes. By default, the startup-mode is the Oscilloscope like shown in figure 3 – Other modes can be accessed from the menu bar under 'Application'.

## 5.2 Context Help

A context help is given for most of the functionality. The context help can be activated in the menu bar.

## 6 Analysis features

### 6.1 Oscilloscope

Data is displayed in the style of a classical Oscilloscope. Before measurements are taken consider the following aspects:

- Set the appropriate timescale (**Duration**). The range is $14\,\mathrm{ms}...5\,\mathrm{s}$.

- For sinusoidal data (in particular for small scales on a dual-channel-device) – consider using **AC-Coupling**.

- By default, the trigger-mode is set to 'auto'. In this mode data is displayed regardless whether a trigger is detected or not. For non-periodic motion (like a closing valve) it might be desirable to capture a single sequence. For this purpose, set the trigger-mode to 'normal' – data will only be displayed if a trigger is detected.
  The *Triggerlevel* can either be set manually or with the **Autoset Trigger**-function. Autosetting the trigger adjusts the trigger level and the vertical scale.

**Measurements** can be taken from the displayed data. For periodic motion, the *frequency* and the *amplitude* can be measured. Figure 5 shows the AC-coupled signal of a triggered tuning-fork which oscillates at a frequency of $440.3\,\mathrm{Hz}$. The Min/Max values are $-212.3\,\mathrm{\mu m}$ and $122\,\mathrm{\mu m}$.
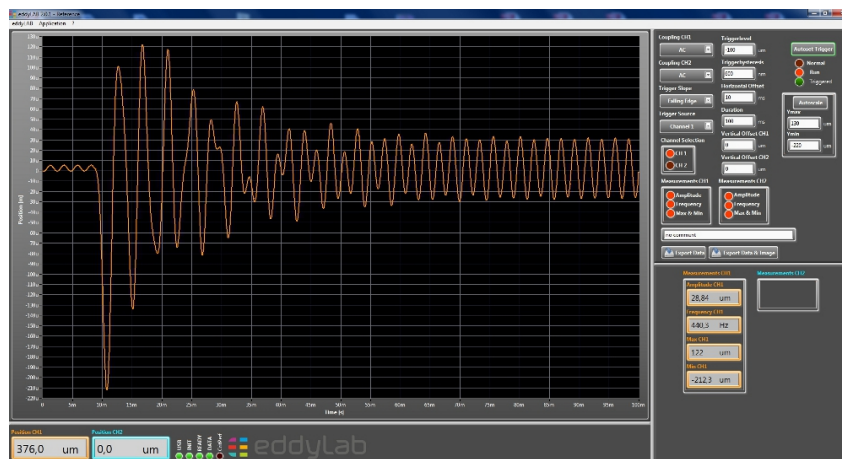
Figure 5: The AC-coupled Position of a tuning-fork

**Documentation** of the displayed data is accomplished easily. **Export Data** writes data to '\ Users \ Public \ Documents \ eddylab Data' in ASCII-Format.

The filename is 'date_time_Oscilloscope_no comment'. In order to distinguish various datasets a user-specific comment can be added instead of **'no comment'**.

Construction 'date' = JJJJMMTT [J=year, M=month, T=day]

Construction 'time' = hhmmss [h=hour, m=minute, s=second]

**Export Data & Image** adds a bitmap-image of the measured data, BMP format.

## 6.2 FFT

The signal's spectrum can be obtained from the FFT. . The maximum scale on the frequency axis can be set with **Fmax**. Figure 6 is the FFT. of a tuning-fork at a frequency of 440.2 Hz with multiples at 880 Hz, 1321 Hz, 1761 Hz and 2201 Hz.
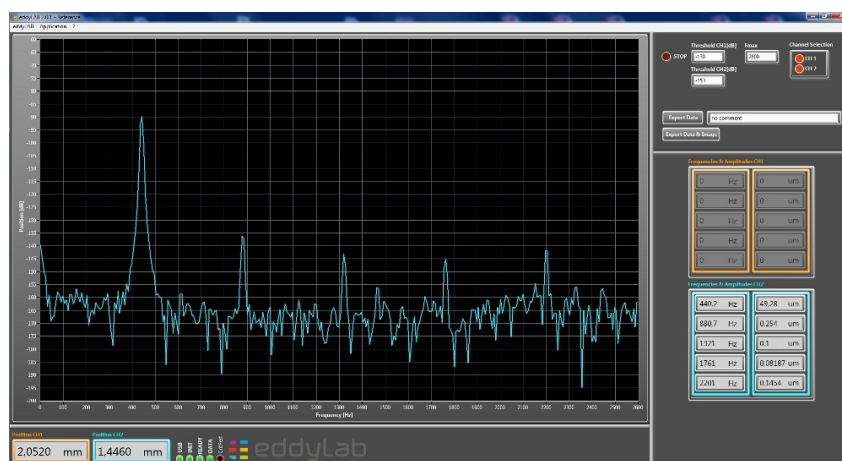


Figure 6: FFT. of a tuning-fork

**Measurements** can be taken from the spectrum. Therefore, the lower threshold for frequency detection may be varied from the default value of $-130\,\text{dB}$. Depending on the actual sensor and the cut-off frequency of the system – raising or lowering the threshold value will either exclude noise or increase the resolution for frequency-measurements.

**Documentation** is handled in the same way like in the oscilloscope-mode. **Export Data** writes data to '\ Users \ Public \ Documents \ eddylab Data' in ASCII-Format.

The filename is 'date_time_FFT_no comment'. In order to distinguish various datasets a user-specific comment can be added instead of **'no comment'**.
Construction 'date' = JJJJMMTT [J=year, M=month, T=day]
Construction 'time' = hhmmss [h=hour, m=minute, s=second]

**Export Data & Image** adds a bitmap-image of the measured data, BMP format.

### 6.3 Waterfall

The FFT. (see section 6.2 ) is expanded with a time axis. The 3D-plot provides a new view to your spectrum as it can be observed over time. The third axis emphasizes small peaks above the noise floor. These small peaks can easily be missed in a 2D-plot in particular when these small peaks emerge and disappear over time. Figure 7 illustrates this effect clearly. The Waterfall shows the spectrum of a tuning fork for $28\,\text{s}$ after triggering it. The plot obviously shows that the oscillations at $881\,\text{Hz}$ and $1320\,\text{Hz}$ disappear and re-emerge over time. Same as with the known FFT. – the maximum scale on the frequency axis can be set with **Fmax**.
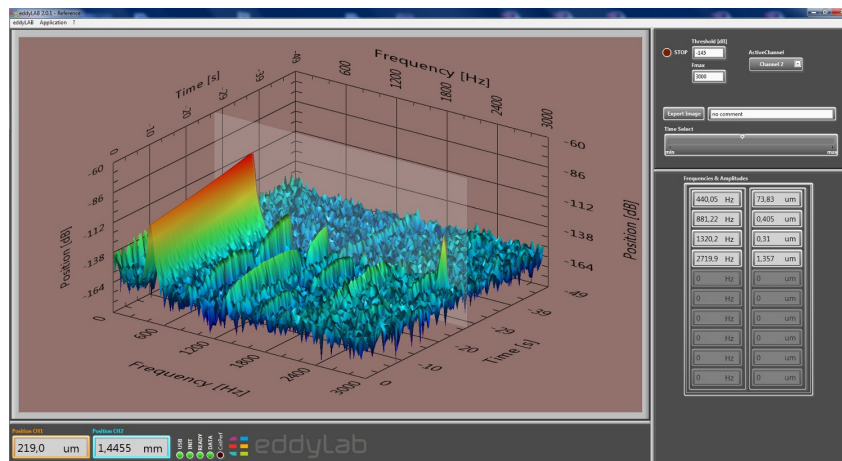


Figure 7: Waterfall of a tuning-fork

**Measurements** can be taken from the spectrum. The measurements are taken in the **analysis plane**. The analysis plane detects frequencies with their corresponding amplitudes like in the FFT. The lower threshold for frequency detection may be adjusted to fit the application.

**Documentation** of the displayed data is accomplished with **Export Image**.

The filename is 'date_time_Waterfall_no comment'. In order to distinguish various datasets a user-specific comment can be added instead of **'no comment'**.
Construction 'date' = JJJJMMTT [J=year, M=month, T=day]
Construction 'time' = hhmmss [h=hour, m=minute, s=second]

## 6.4 Waterfall RPM

**This function is only available in conjunction with a rotational incremental encoder. This encoder has to be connected to the** $\boxed{\textbf{TX-Driver}}$ **and must be mounted on the shaft of interest.**
Analogous to the time-based Waterfall – the Waterfall RPM is the $\boxed{\text{FFT.}}$ with a third axis. This axis is the rotational speed of a rotating shaft. The correlation of rotational speed and $\boxed{\text{FFT.}}$ results in a characteristic 3D-plot. The plot may characterize the state of a rotating system depending on loads, oil-pressure, wear and similar aspects. This admits comparisons of the same system at different times under varying conditions. Figure $\boxed{9}$ is the Waterfall RPM of a shaft with a resonance frequency of 6000 rpm. The amplitude peaks along the ascending and descending path of the rotational speed. Same as with the known $\boxed{\text{FFT.}}$ – the maximum scale on the frequency axis can be set with **Fmax**. **Rpm max** and **min** set the borders of the rpm axis.
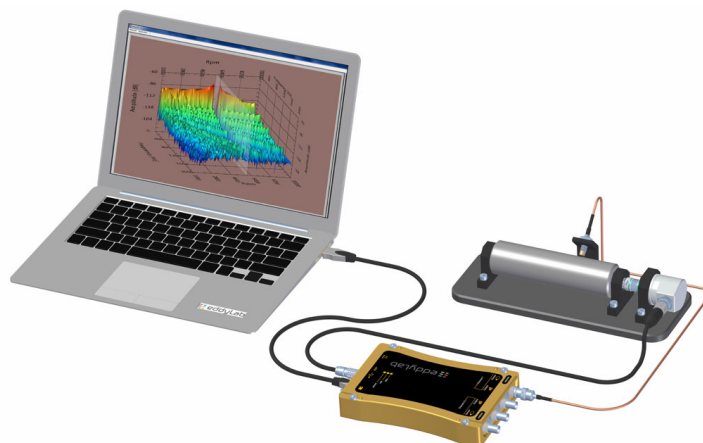


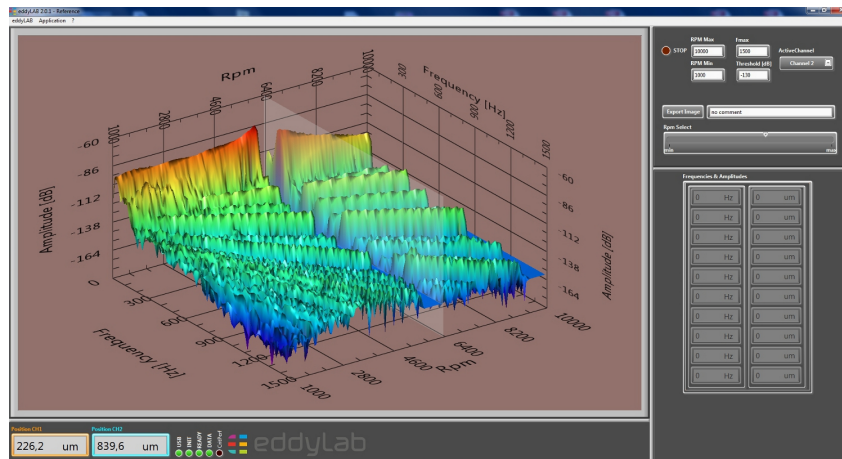Figure 8: Waterfall RPM hardware setting

Figure 9: Waterfall RPM of an overcritical rotating shaft

**Measurements**   can be taken from the spectrum in identical fashion to the Waterfall.

**Documentation**   of the displayed data is accomplished with **Export Image**, JPG format.

The filename is 'date_time_WaterfallRpm_no comment'. In order to distinguish various datasets, user-specific comment can be added instead of **'no comment'**.
Construction 'date' = JJJJMMTT [J=year, M=month, T=day]
Construction 'time' = hhmmss [h=hour, m=minute, s=second]

## 6.5  Datalogger

A Datalogger can be configured in order to observe slow mechanical motion over wide ranges of time. A typical example would be temperature induced movement or a tensile test. **Start logger** writes data to disc.

The sampling rate ranges from $100\,\text{ms}...10\,\text{s}$. The timescale in the display ranges from $1\,\text{min}...60\,\text{min}$.

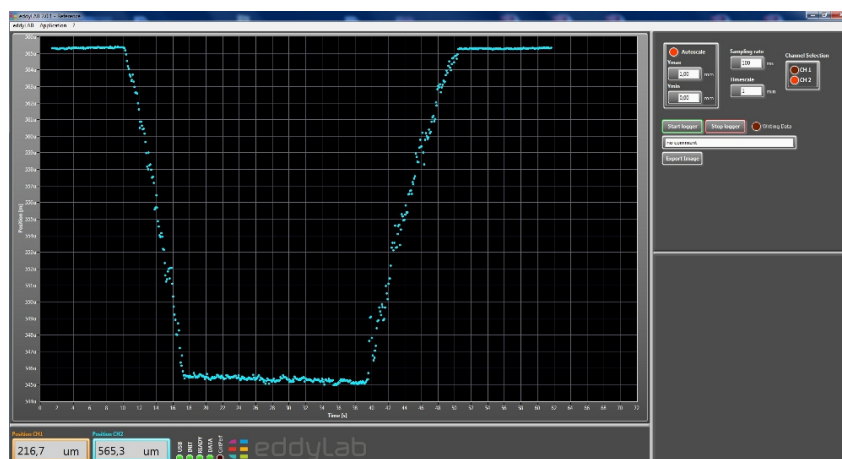Same as with the Oscilloscope and the FFT. an image can be exported, BMP format.



Figure 10: Slow mechanical motion displayed with the Datalogger

**Start logger** writes data to '\ Users \ Public \ Documents \ eddylab Data' in ASCII-Format.

The filename is 'date_time_Log_no comment'. In order to distinguish various datasets a user-specific comment can be added instead of **'no comment'**.
Construction 'date' = JJJJMMTT [J=year, M=month, T=day]
Construction 'time' = hhmmss [h=hour, m=minute, s=second]

**Export Image** adds a bitmap-image of the measured data, BMP format.

## 7 Advanced Device Configuration

### 7.1 Linearization and Referencing

This section puts emphasis on one of the most important features on the TX-Driver. A well-known issue when it comes to eddy current measurements is the strong sensitivity to varying target material and pre-attenuation. The accuracy of eddy current sensors is a strong function of the material they are looking at. The maximum scaling error under varying material can be 20 % or more. The linearity error can be 7 % or more.

Another severe error source affecting the accuracy is pre-attenuation. This effect has to be taken in account when the sensor is mounted in narrow gaps and holes. The reason of this error is given with the shape of the sensing electromagnetic field. The basic idea of the sensor is to measure in one dimension with an electromagnetic field. If the shape of the field 'collides' with an object other than the target – the measured result will be incorrect. This effect is called pre-attenuation. The error due to pre-attenuation is hard to predict – but in most cases higher than expected. Figure 11 reflects the typical error behaviour on eddy current systems (red dotted line).
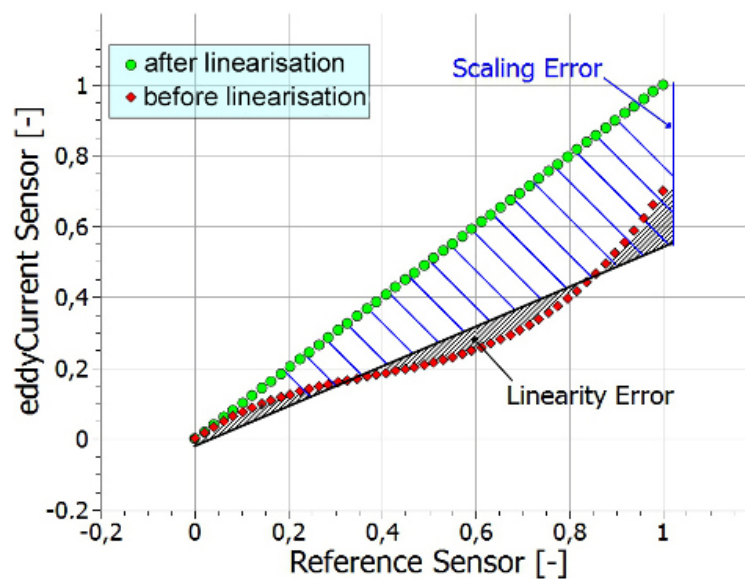


Figure 11: Illustration of typical errors on eddy current systems

The TX-Driver in conjunction with eddyMOTION resolves these issues with an integrated Lineariza-

tion procedure. The backbone of the method is an interface to a linear encoder on the TX-Driver. This encoder is used as a reference signal. The reference can be used to either prove the accuracy of the sensor or to linearise the sensor. The reference system is directly connected to the TX-Driver and therefore admits a traceable calibration. The interface on the TX-Driver also contains a power supply. All in all – the TX-Driver is capable of referencing its own sensors on-site.

The reference system ( Magnescale Digital Gauge DK-Series [[MC21a]]) has a resolution of 100 nm and an accuracy of 0.5 μm over 10 mm. The clamping diameter is 8 mm. Hence the DK-Series is a system that can easily be mounted in a plenitude of applications. Furthermore we provide a small linear stage with a micrometer screw (Figure 12 ). The stage has a slot for the linear encoder, a prism shaped socket for eddy current sensors and a quick release socket for different targets. The minimum target size is 50x50 *mm* and the maximum is 70x70 *mm*. We recommend a target thickness of 5 mm.
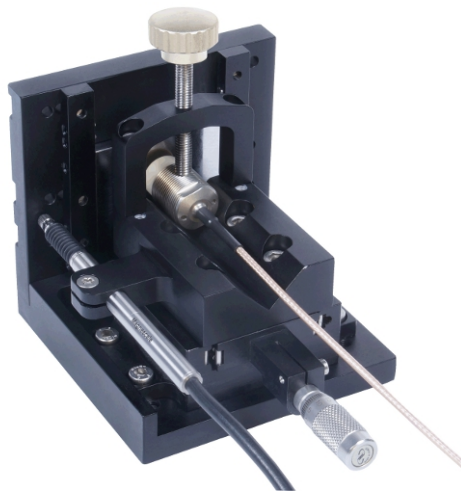


Figure 12: Portable linear stage with a linear encoder ( Magnescale Digital Gauge [[MC21a]]) - eddy current sensor and a target with the dimensions 50x50x5 *mm*

### 7.1.1 Linearization and Referencing in practice

The requirements to linearize or reference a sensor are as follows:

- The TX-Driver with reference input and a USB connection to a PC with a windows operating system.

- An incremental linear encoder. We recommend to use Magnescale Digital Gauge DK-Series [[MC21a]].

- eddyMOTION *Reference* 2.0.6.2

- A setup or method that aligns the eddy current sensor with the linear encoder. Remember to consider pre-attenuation effects. If your sensor will be mounted in a constricted environment you need to consider this environment for the Linearization. This can be achieved in two ways. The sensor is either linearized within the desired area of application. This procedure is only possible if the target can be moved or actuated. If the target cannot be moved in the application (this might be the

case in applications that measure on fixed shafts) it is required to linearize the sensor in a dummy version of the pre-attenuating environment.
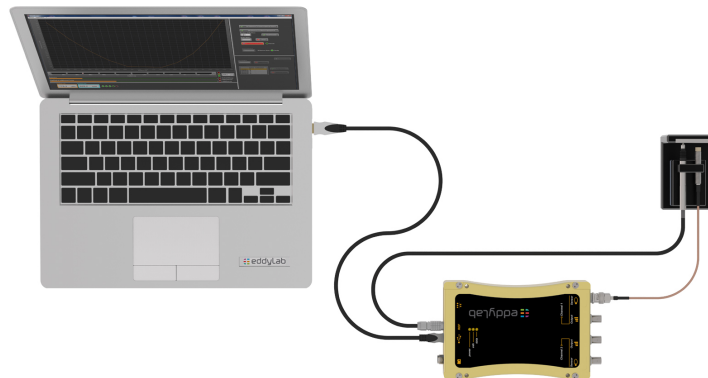


Figure 13: Setup for the Linearization on-site

**The Linearization module in eddyMOTION** can be accessed from the menu bar under application. The module will only be loaded if the TX-Driver is connected to an incremental linear encoder ( Magnescale Digital Gauge DK-Series [[MC21a]]). Furthermore, the reference input needs to be configured for linear encoders (this is the default setting). An error message will be shown if the interface is configured for rotary encoders. The rotary/linear option can be set in Configuration under application from the menu bar.

**eddyMOTION contains a context help.** This context help is activated from the menu bar under '**?**'. Click the buttons to get more information.

The Linearization module is split up in two modes:

- The actual **linearization mode**

- and the **prove mode**.

The default mode after loading all parameters from the TX-Driver and the LED **'TX System State'** switched from **'Busy'** to **'Ready'** – is the prove mode.

**The prove mode** is used to show up the absolute error over a user-defined measuring range. This feature admits a traceable calibration. First of all, the procedure to prove a sensor requires the definition of the begin and the end of the measuring range and the desired number of positions to be proved (Buttons: Set Reference To Measuring range Begin; -End; Number of Positions). Based on this definition eddyMOTION suggests a set of equidistant positions that need to be taken over with the 'Add Current Position' button. The new position will only be added if it is located within a certain range based on the generated positions. If the traffic lights indicate orange or green a position can be taken over. Once finished a chart with the absolute error is shown (see figure 14 ).
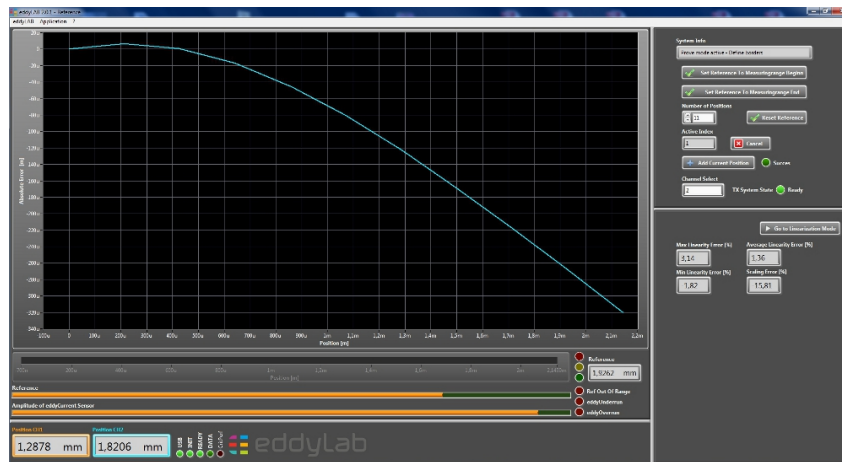
Figure 14: Error chart of an eddy current sensor measuring on a target other than calibrated

The maximum absolute error is $320\,\mu m$ in our example. The bottom right window also shows other error definitions like the linearity and the scaling error. The logical consequence from this result is a method to correct this error. The method is the Linearization .

**'Go to Linearization Mode'**   in the bottom right window switches to the Linearization mode. If the accuracy was proved as a previous step – eddyMOTION will ask the question: *'There is a curve in memory from the previous run. Do you want to adapt the data to linearize the sensor?'* This feature facilitates the entire procedure significantly. After pressing **'Yes'** the data that is available from proving the accuracy will be used to linearize the sensor. Therefore, the data will be written to the TX-Driver. The **'TX System State'** LED will indicate **'Busy'** while data is written to the TX-Driver.
Once written – the LED will indicate **'Ready'** and the table in the bottom right window will indicate a new user-defined curve in passive state with channel of origin (see figure 15 ).
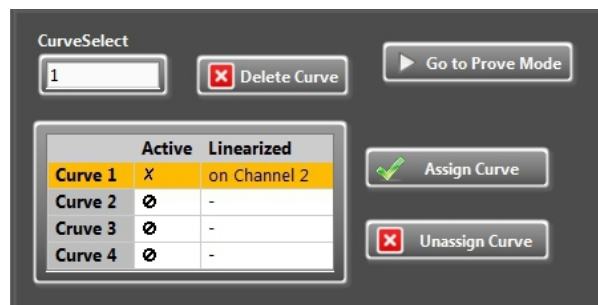


Figure 15: Number of available curves on the TX-Driver – the origin and the active or passive state

The curve becomes valid by assigning it (button **'Assign Curve'**). This initiates a reboot of the TX-Driver and the 'TX System State' will be **'Busy'** again. Additionally, eddyMOTION will go on to the prove mode in order to check if the Linearization was successful. After repeating the prove procedure two error curves will be shown like in figure 16 . The resulting error in our example is almost negligible.
If the accuracy was not proved as a previous step – the data for the Linearization has to be acquired. Unsurprisingly – this procedure is identical to the prove procedure. After the user-defined positions

are taken over the curve is written to the ⌷TX-Driver.⌷ Activate the curve by assigning it. If a curve is needless – delete it (button **Delete Curve**). A curve can only be deleted if it is not active – therefore, a curve must be unassigned before it can be deleted.
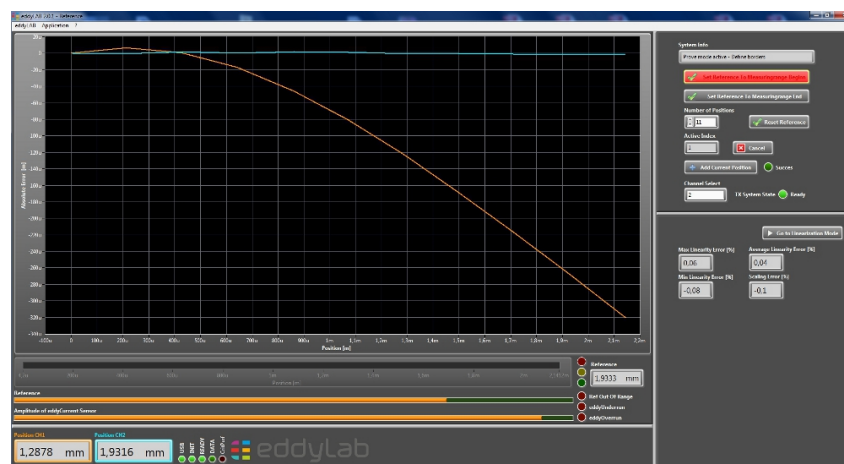


Figure 16: Error chart of an eddy current sensor before and after Linearization

## 7.2  The basic Device Configuration

The device Configuration can be accessed from the menu bar under application. The available parameters are listed with short explanations. Modify these pararmeters with a double click on the middle column.



Figure 17: The Configuration window

**A lowpass filter:**   on the ⌷TX-Driver⌷ can be defined. The selected cut-off frequency should be higher than the highest frequency in your expected spectrum. Otherwise, the measured amplitudes will be attenuated. For near static or static measurements set the cut-off frequency to its lowest value – this will increase the resolution.

**The start-up mode:**   can be defined. This option can be used to define the kind of operation after power-on. This is in particular interesting for the CAN -Bus.

> **ⓘ Note**
>
> *Depending on the configuration, the* $\boxed{\textit{TX-Driver}}$ *also provides a USB and CAN Interface [[eG16]] for reading out the data. The operation of all these interfaces needs computation time, which becomes the maximum achievable sampling rates. Therefore it is advisable to switch off unused interfaces. The following configurations are offered:*
>
> - *Analog Only*
>
> - *AnalogUsb*
>
> - *AnalogUsb & Encoder*
>
> - *AnalogTriggerUsb*
>
> - *AnalogTriggerUsb & Encoder*
>
> - *AnalogCan*

**The CAN bitrate:** can be defined in eddyMOTION. All nodes on the network need to be configured with the same bitrate. A restart is required after modifying this value to become valid.

**The Node-ID:** is the unique 7-bit-identifier on the network (value range 1...127). A restart is required after modifying this value to become valid.

**A comparator value:** can be defined for every channel. The value range is 0...1. A comparator value of 0.5 means that the output will be switched at 50 % of the sensor's measuring range. If the sensor's position is above 50 % the output will be high – otherwise low. For single channel devices both comparator values are assigned to one channel. This permits the definition of a low and a high threshold for one channel.

**The encoder type:** configures the encoder interface. If set to rotary encoder – the device assumes a rotary encoder. The linear encoder needs to be set for the Linearization.

**The encoder Resolution:** is the resolution of a linear encoder (4x encoding) in nm. A typical value is 100 nm.

Of interest is this parameter for linearization, capture $\boxed{7.1}$ . How to proceed in order to find a meaningful entry will be described using the example of the $\boxed{\text{Magnescale Digital Gauge}}$ DK-Series [[MC21a]], model DK812SBR. On the manufacturer page, see Figure $\boxed{18}$ , one finds the information, that the model has a maximum resolution of 0.1 μm. This value has to be converted into nm. This would be 100 nm, to be entered for this parameter.

## Specification

| | High-resolution model | High-resolution model | General-purpose resolution model | General-purpose resolution model |
|---|---|---|---|---|
| Model | DK812SAR, DK812SALR, DK81SAFR, DK812SAFLR, DK812SAVR | DK812SBR, DK812SBLR, DK812SBFR, DK812SBFLR, DK812SBVR | DK812SAR5, DK812SALR5, DK812SAFR5, DK812SAFLR5, DK812SAVR5 | DK812SBR5, DK812SBLR5, DK812SBFR5, DK812SBFLR5, DK812SBVR5 |
| Measuring range | 12mm | | | |
| Maximum resolution | 0.1µm | | 0.5µm | |

Figure 18: Magnescale DK maximum resolution

**Counts per Revolution:** defines the number of increments of a rotary encoder (4x encoding). The value range is $1...65\,535$.

**The encoder direction:** can be reversed if desired.

## 7.3 Curve Select

The curve selector can be accessed from the menu bar under application. By default – the TX-Driver is delivered with one curve per channel i.e., one material per channel. Additionally, we provide two more curves per channel by factory if desired. This is a useful option if the materials are known and if no verification (no on-site calibration with the DK-Series) of the overall accuracy is needed. A pre-defined curve becomes valid by assigning it (button **'Assign Curve'**). This initiates a reboot of the TX-Driver and the buttons will be grayed out. After the reboot, the 'Curve-Select' window can be closed and the selected curve will be active. The selected curve will also be active after power-on.

It is important to consider that the achieved overall accuracy cannot be validated with this function.

## 8 FAQ

TX-Driver **- USB status-light on the device is off.**

The internet capable PC - connected to the TX-Driver for the first time - will show 'eddylab is being set up' and 'eddylab is being set up and ready'. However, the USB status-light is off. The device manager indicates the problem with an exclamation point in the hardware-tree.

A device driver is going to be installed automatically through the internet Windows support portal, which is not functional with Windows 10. This problem has to be fixed manually: - First select 'update driver' in the context-menu of the hardware-tree. Next follow steps from chapter 4.2 'Select the directory
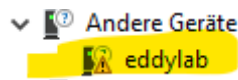
Figure 19: Device-manager with driver problem

'D2XXsigned'.' After the successful Driver-update you will see the figure below in the hardware-tree. The USB status-light should be on continuously.
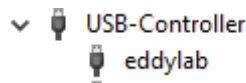


Figure 20: Device Manager with fixed driver issue

Here you can jump back to the 4.2 installation chapter.

**eddyMOTION - 'USB' status-light is off.**

After the start of eddyMOTION the status display of the TX-Driver only shows the 'USB' light on the front panel. All other lights stay off. The TX-Driver can not be used even if the USB status-light is on.



Figure 21: eddyMOTION with driver issue

The problem can be fixed by disconnecting the TX-Driver from the power supply and USB . Reconnect the power supply and USB . Prevent this software issue by avoiding the plug in and plug out of the USB connector.

With an error-free operation the USB and POWER LED of the TX-Driver front panel light up. If only the 'USB' lamp lights up or 'USB' and 'INIT' flash when the software is started, something may be wrong with the device-specific calibration of the TX-Driver . Please contact the eddylab support.

Here you can jump back to the 4.2 installation chapter.

## 9 Revision History

This document was revised to include the following technical change(s).

| # | Area | Additions, Deletions, Modifications |
|---|------|-------------------------------------|
| 1 | OS | Running with Windows 10 |
| 2 | Installer | Selectable installation paths |
| 3 | Software | Storage of log files in public document folder |
| 3 | Firmware | permissible versions: 3.12, 3.14, 3.20, 4.00, 5.00 |

Table 3: Changes made in version 2.0.6.1

## 9.1 eddyMOTION Version 2.0.6.1 / Firmware Version 3.20

### 9.1.1 eddyMOTION

### 9.1.2 Firmware

| # | Area | Additions, Deletions, Modifications |
|---|------|-------------------------------------|
| 1 | — | — |

Table 4: Changes made in version 3.20

## Index

# References

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