



INTERNATIONAL

Update Note

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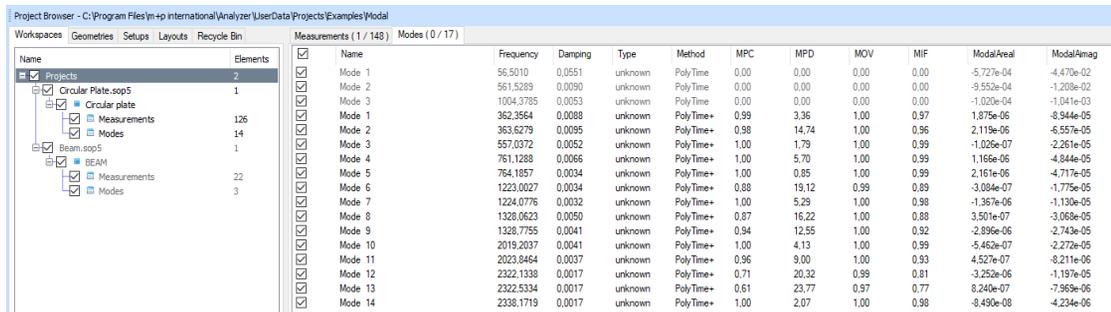
# m+p Analyzer

## Revision 5.2



- Enhanced Project Browser
- New Acquisition Configuration Windows
- Improved 2D Chart
- Reference Traces in 2D Single- and Multi-Chart
- Template Projects
- Trigger Level Tool for Automatic Adjustment of Trigger Settings
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- 1- and 2-Plane Balancing
- Customer-Specific Add-Ins
- Empirical Mode Decomposition, Hilbert-Huang Transform for Analysis of Nonlinear Systems
- Impedance Tube Testing

## Enhanced Project Browser



| Name    | Frequency | Damping | Type    | Method    | MPC  | MPD   | MOV  | MIF  | ModalAreal | ModalAmag  |
|---------|-----------|---------|---------|-----------|------|-------|------|------|------------|------------|
| Mode 1  | 56.5010   | 0.0551  | unknown | PolyTime  | 0.00 | 0.00  | 0.00 | 0.00 | -5.727e-04 | -4.470e-02 |
| Mode 2  | 561.5289  | 0.0090  | unknown | PolyTime  | 0.00 | 0.00  | 0.00 | 0.00 | -9.552e-04 | -1.203e-02 |
| Mode 3  | 1004.3785 | 0.0053  | unknown | PolyTime  | 0.00 | 0.00  | 0.00 | 0.00 | -1.020e-04 | -1.041e-03 |
| Mode 1  | 362.3564  | 0.0088  | unknown | PolyTime+ | 0.99 | 3.36  | 1.00 | 0.97 | 1.875e-06  | -8.944e-05 |
| Mode 2  | 363.6279  | 0.0095  | unknown | PolyTime+ | 0.98 | 14.74 | 1.00 | 0.96 | 2.119e-06  | -8.557e-05 |
| Mode 3  | 557.0372  | 0.0052  | unknown | PolyTime+ | 1.00 | 1.79  | 1.00 | 0.99 | -1.026e-07 | -2.261e-05 |
| Mode 4  | 751.1288  | 0.0066  | unknown | PolyTime+ | 1.00 | 5.70  | 1.00 | 0.99 | 1.166e-06  | -4.844e-05 |
| Mode 5  | 764.1857  | 0.0034  | unknown | PolyTime+ | 1.00 | 0.85  | 1.00 | 0.99 | 2.161e-06  | -4.717e-05 |
| Mode 6  | 1223.0027 | 0.0034  | unknown | PolyTime+ | 0.88 | 19.12 | 0.99 | 0.89 | -3.084e-07 | -1.775e-05 |
| Mode 7  | 1224.0776 | 0.0032  | unknown | PolyTime+ | 1.00 | 5.29  | 1.00 | 0.98 | -1.367e-06 | -1.130e-05 |
| Mode 8  | 1328.0623 | 0.0050  | unknown | PolyTime+ | 0.87 | 16.22 | 1.00 | 0.88 | 3.501e-07  | -3.068e-05 |
| Mode 9  | 1328.7755 | 0.0041  | unknown | PolyTime+ | 0.94 | 12.55 | 1.00 | 0.92 | -2.896e-06 | -2.743e-05 |
| Mode 10 | 2019.2037 | 0.0041  | unknown | PolyTime+ | 1.00 | 4.13  | 1.00 | 0.99 | -5.462e-07 | -2.272e-05 |
| Mode 11 | 2023.8464 | 0.0037  | unknown | PolyTime+ | 0.96 | 9.00  | 1.00 | 0.93 | 4.527e-07  | -8.211e-06 |
| Mode 12 | 2322.1338 | 0.0017  | unknown | PolyTime+ | 0.71 | 20.32 | 0.99 | 0.81 | -3.252e-06 | -1.197e-05 |
| Mode 13 | 2322.5334 | 0.0017  | unknown | PolyTime+ | 0.61 | 23.77 | 0.97 | 0.77 | 8.240e-07  | -7.969e-06 |
| Mode 14 | 2338.1719 | 0.0017  | unknown | PolyTime+ | 1.00 | 2.07  | 1.00 | 0.98 | -8.490e-08 | -4.234e-06 |

New project browser structure

In m+p Analyzer Revision 5.2 you will find our enhanced project browser offering data comparisons across several projects and providing grouping, filtering as well as sorting functions.

The tree view in the left part of the browser reflects the structure of all open projects and their workspaces. Single measurements and modes are visible in the list view in the right part of the browser, so that the browser structure is clear and tidy.

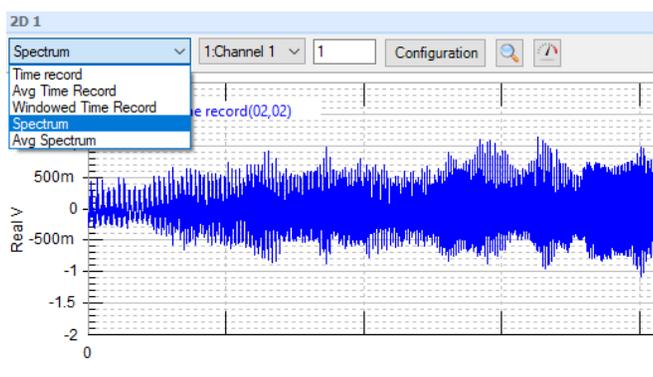
With a double-click on a measurement or mode, it will be opened in the appropriate chart. All chart properties can be modified as usual.

## New Acquisition Configuration Windows

We have reimplemented our Acquisition Configuration windows using the latest software development technologies to make the configuration simpler, more intuitive and faster. Keeping the user interface close to the previous version simplifies orientation. Although this is already a big step it will not be the last one. Some features like an improved transducer selection dialog are already available.

Along with these changes we have improved the Setup toolbar and the handling of advanced features like meta data, filtering and resampling which can now be enabled directly from the Acquisition Configuration windows.

## Improved 2D Chart



Selecting the measurement function for online display

The new 2D chart offers online switching between the recorded measurement functions, so that you can monitor all relevant data sets online.

The 2D chart capability is not limited to the display of time data. m+p Analyzer's real-time FFT feature allows for online display of different metrics calculated from measurement data. This includes real-time spectra of windowed time signals, histograms, auto- and cross-correlations, power spectral densities, auto- and cross-power spectra and frequency response functions.

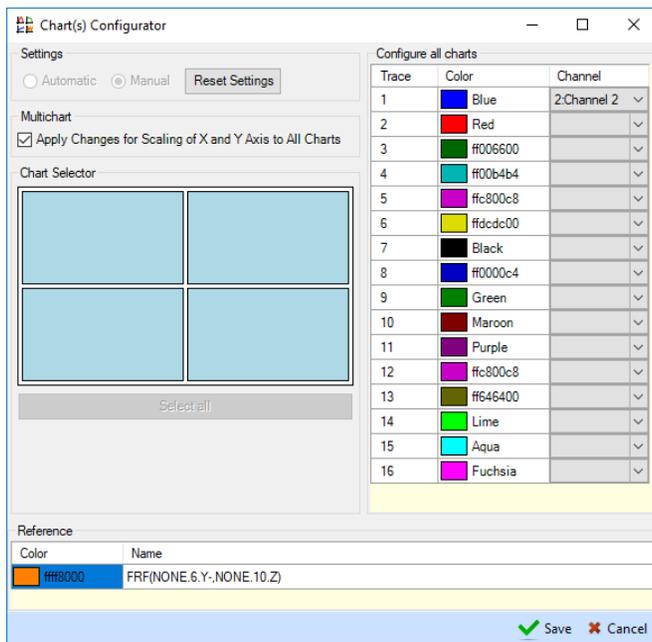
Charts can be configured to show a secondary axis on the right-hand side with independent scaling, which streamlines acquisition of data with different units, e.g. acceleration [g] and force [N].

## Reference Traces in 2D Single- and Multi-Chart

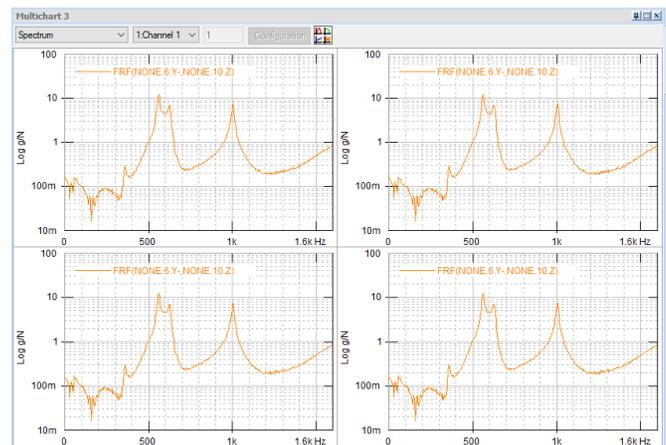
Reference traces may be overlaid in the 2D chart to compare previously acquired results to the currently acquired data in real time. Besides showing recorded measurements as a reference, this feature is also useful to display upper and lower limits for data in time or frequency domain.

A click on the Configuration button opens the Chart(s) Configurator window. In the lower part of the window you will find the Reference section. Drag and drop the desired reference measurement into this section and define its colour and chart position in the multi-chart.

Tip: Reference traces may be added quickly by holding the Alt key while dragging and dropping a measurement into the chart.



Chart(s) Configurator window with reference trace defined for all four charts



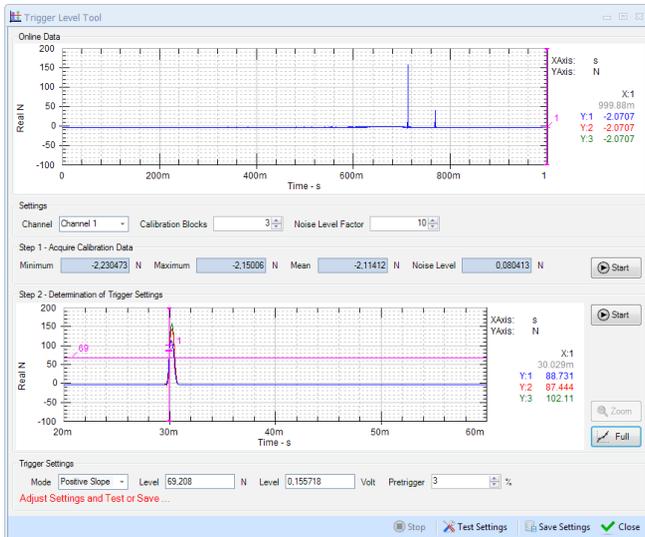
2D multi-chart with reference trace in every chart

## Template Projects

For increased flexibility and shorter test setup times in recurring test situations, it is now possible to define and import template projects. Define all necessary settings for the frequent test including layout, test setup and test configuration and save these settings to a template project. This project can then be loaded for the next test session which shortens setup times enormously. You can develop the perfect test setup for your primary testing applications, save and open it as template project for the next session.

Any existing project can serve as a template for a new project. By using the Open Template function a copy of the chosen project will be created as a basis for your work.

## Trigger Level Tool for Automatic Adjustment of Trigger Settings



Trigger settings are determined and will be saved

The Trigger Level Tool is a valuable addition for a convenient definition of the trigger level, e.g. in impact tests, as it provides an automatic adjustment of trigger settings.

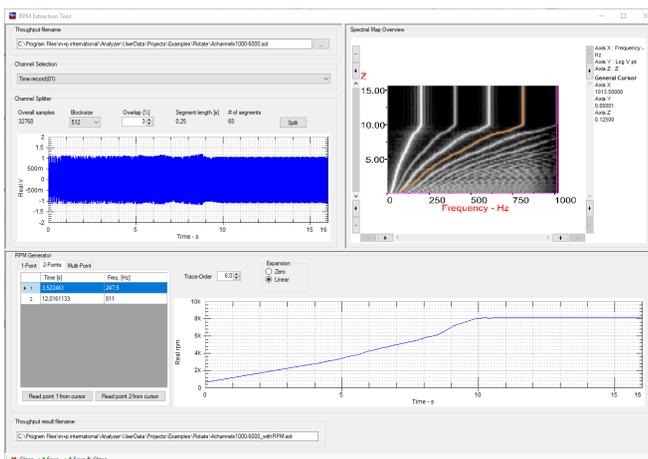
In a first step, the noise floor on the transducer is established in the calibration procedure. In a second step, you can impact the structure with the hammer and the Trigger Level Tool will calculate the appropriate trigger settings from the overlaid impact data. If needed, you can manually adjust the trigger level value or define a pre-trigger and the system will be ready to use for impact testing.

## RPM Extractor

When post-processing data from rotating machinery, the current RPM is required in many applications (e.g. order tracking). If a tachometer signal is not available or not accurate, it cannot be used for your evaluations; however, it is possible to extract an RPM signal from your time record data using the m+p Analyzer's new RPM Extractor.

The RPM Extractor window displays the time records of the throughput file. Choose one to perform the extraction process. A signal showing clear components at the RPM frequency or at least one of its harmonics is an appropriate choice to extract the RPM.

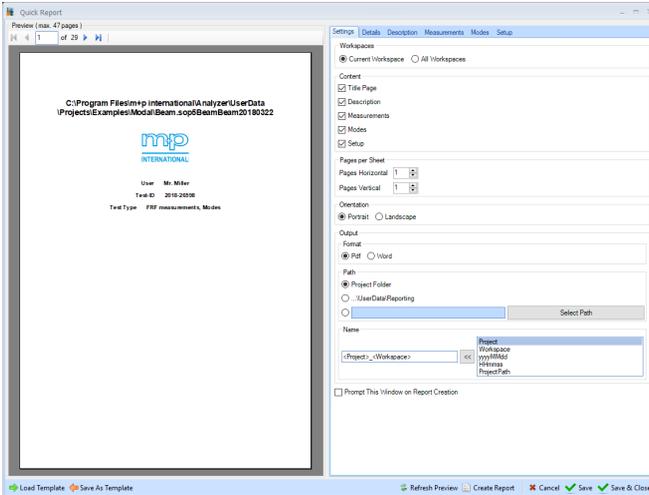
The chosen signal from the throughput file will be split into segments according to the chosen block size and overlap factor in [%]. The window section states the resulting segment length in [s] and number of segments. With a click on the Split button the Spectral Map Overview will be calculated and shown in the colour map to the right. The bright lines represent the significant parts of the signal. At least one of these parts needs to be related to the machine's RPM (or one of its harmonics) to allow an extraction of the RPM signal. One clear line covering the complete time range (vertical axis) is required.



2-Point extraction mode

The RPM Extractor offers three options to determine the RPM signal. Use 1-Point, 2-Point or Multi-Point mode to define the RPM trace needed for the extraction. With Multi-Point mode, a manual mode is available which allows RPM extraction even when only signals with inferior quality or many interfering components are present.

## Reporting Tool



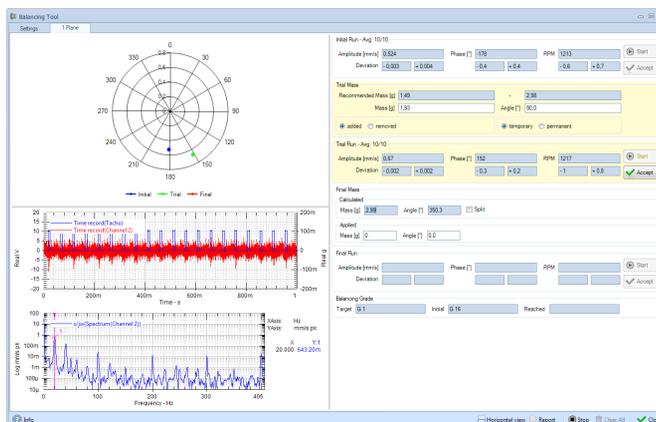
Reporting Tool - general settings

Once you defined the content and the layout of your regular reports, you can use the Reporting Tool for generating a report with one click from the project's or workspace's context menu. This is an easy and convenient way of doing regular reporting on recurrent testing tasks. The Reporting Tool applies to all available measurement types including reporting of modes and shapes.

## Flexible Channel Allocation

This feature allows the usage of any hardware channels in a high-channel count instrument even with a limited number of software channels licensed. Where previously only the first hardware channels according to the number of licensed software channels were available, it is now possible to select an arbitrary combination of channels. This allows e. g. to combine four analog input channels (A810) with four bridge channels (BR810) when the licence is limited to eight software channels.

## 1- and 2-Plane Balancing



Trial run for calculating the balancing masses

Balancing is important for ensuring a long service life of rotating machinery by reducing the periodic forces resulting from static or dynamic imbalance. These forces are perpendicular to the axis of rotation and cause vibrations, which might result in long-term defects or - in the worst case - in immediate damages.

Our Balancing Tool helps you to correct unbalances in your rotating machinery in one or two planes by measuring the vibrations and calculating balancing masses to be mounted at certain positions. This operational balancing procedure ensures a long service life of the rotating machine parts concerned.

The balancing procedure requires a baseline measurement of the machine vibration followed by a measurement with a known trial mass fixed to the rotor. After these measurements are completed, the correction mass and its position are calculated and displayed. Mount these masses and execute the final run to verify the correction.

## Customer-Specific Add-Ins

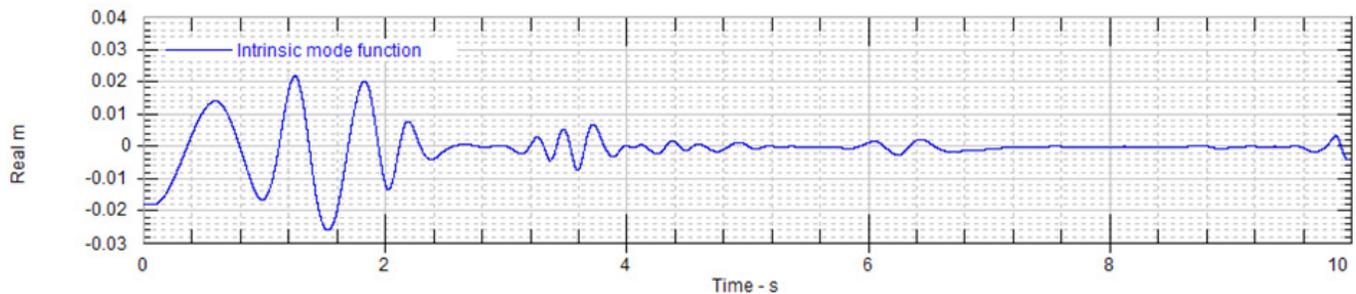
m+p international listens to customers and is eager to meet your specific requirements. Therefore, we have included an add-in functionality to our software. Customer-specific tools can now easily be added and appear in the Add-In section of the Tools menu. Some general applications are also included in this section, such as Compare Measurements or Remove DC-Offset. Other applications are only available on the purchase of the corresponding license.

Check the Add-In Info in the Tools menu to get an overview of all available add-ins, with a short description of inputs, outputs and required licenses.

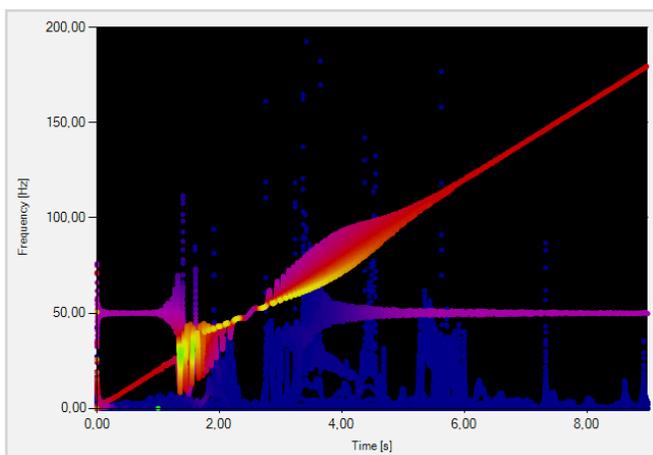
## Empirical Mode Decomposition, Hilbert-Huang Transform for Analysis of Nonlinear Systems

The Hilbert-Huang Transform (HHT) is part of the new nonlinear signal analysis package for m+p Analyzer. It helps engineers to analyze nonlinear and nonstationary phenomena by performing a time-frequency analysis on an input signal, resulting in a plot of amplitude over frequency and time.

As opposed to classic Fourier analysis, this approach is adaptive, deriving a transformation basis directly from the data. The resulting intrinsic mode functions each represent a simple oscillatory mode with a variable amplitude and frequency.



Typical intrinsic mode function: number of zero crossings equals number of extrema; amplitude and frequency vary over time



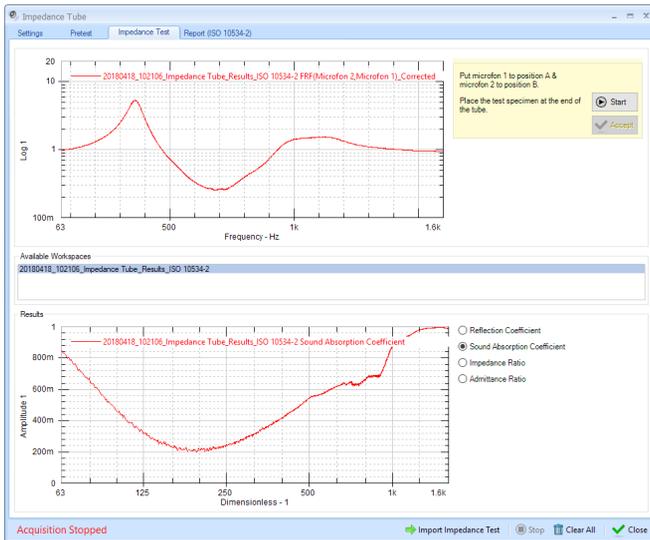
Typical result of a Hilbert-Huang Transform

The Hilbert-Huang Transform was introduced by Huang et al. in 1998 and consists of a two-step process: First, the input signal is decomposed into intrinsic mode functions by means of an empirical mode decomposition. These intrinsic mode functions yield more physical meaningful results than classic Fourier analysis when a Hilbert transform is applied in a second step: From each intrinsic mode function, the frequency and amplitude content is extracted and displayed in a plot of amplitude over frequency and time.

## Impedance Tube Testing

Our new optional software package covering impedance tube measurements offers the calculation of important acoustic characteristics of materials such as absorption coefficient, reflection coefficient, acoustic impedance and transmission loss coefficients.

The measurements comply to three international standards (ISO 10534-2, ASTM E2611-12 and ASTM E2611-17).



Test run measuring and calculating the sound absorption coefficient

The measurement process is split into four steps presented as tabs: On the settings page, basic settings such as the test standard and the impedance tube dimensions are prescribed. Afterwards, a pre-test is performed to establish the signal-to-noise ratio, the appropriate volume of the speaker and the calibration coefficients for microphone mismatch correction. After this setup procedure you may perform repeated impedance tests on different test specimen. The measurement results are displayed online and the desired acoustic coefficients are calculated. All results can be gathered in a report, including the test setup, the test results and test specific information.

## Many Other New Features

A number of other enhancements include features such as:

- Auto-hide browser during acquisition
- Auto-create overview file for recorders
- Use Enter key in browser to view data
- Data in charts are available for all channels/function types after stop of measurement
- All chart formats (2D charts/animation/waterfall) can be saved and loaded
- Default formats can be defined for all chart types (2D charts/animation/waterfall)
- Same axis scaling for all charts in a 2D multi-chart
- Throughput sequencing for scheduled recordings
- Display of detected hardware in hardware setup
- Transducer table: direct link to Microsoft Excel, so that it can easily be edited
- Offset adjustment of the Calibration Tool is also available in scope mode
- Import multiple Universal files into one workspace
- Tacho can be enabled in Stepped Sine mode
- Support of spectrum high frequency cards

This Update Note provides you with an overview of the most significant product modifications and enhancements in m+p Analyzer Revision 5.2. These together with many other smaller improvements make the m+p Analyzer even more powerful and user-friendly.

This new software revision has resulted primarily from the close and valuable cooperation with you, our customers. We optimize the m+p Analyzer continuously. Therefore, if you have any suggestions that could further improve our product offering for your application, please let us know.

**m+p Analyzer 5.2** is available now providing you with even greater efficiency and ease of use.

Please do not hesitate to contact us for further information.

**Germany**  
m+p international Mess- und  
Rechnertechnik GmbH  
Phone: (+49) (0)511 856030  
Fax: (+49) (0)511 8560310  
sales.de@mpihome.com

**USA**  
m+p international, inc.  
Phone: (+1) 973 239 3005  
Fax: (+1) 973 239 2858  
sales.na@mpihome.com

**United Kingdom**  
m+p international (UK) Ltd  
Phone: (+44) (0)1420 521222  
Fax: (+44) (0)1420 521223  
sales.uk@mpihome.com

**France**  
m+p international Sarl  
Phone: (+33) (0)130 157874  
Fax: (+33) (0)139 769627  
sales.fr@mpihome.com

**China**  
Beijing Representative Office  
of m+p international  
Phone: (+86) 10 8283 8698  
Fax: (+86) 10 8283 8998  
sales.cn@mpihome.com

[www.mpihome.com](http://www.mpihome.com)

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