

Product catalogue MagHyst® (2024)

The MagHyst® measuring system from Ilmenauer Mechatronik GmbH comprises various device families, software products and accessories to cover a wide range of applications. The following pages briefly introduce the various products and describe their possible applications.

For specific applications, we would be happy to work with you in Order to develop a customised solution for your measurement task. Please do not hesitate to contact us.

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1. MagHyst® automation

The MagHyst® automation devices are intended for use in production systems when similar measurement tasks are carried out many times with short cycle times. The possible connection to a PLC with the aid of various field bus systems simplifies integration into existing or newly designed systems and the magnetic measurement opens new ways of assessing and improving the product and production quality.

The slim and stable control and evaluation software is designed with a focus on simple operation without requiring special expertise. Various software tools also allow adjustments to the measurement and evaluation parameters or further analysis after the measurements.

The use of internet protocols and network connections enables a wide range of set-up scenarios, including worldwide production monitoring at different locations, as well as complete traceability of the entire measurement process.

1.1. Hardware products

Listed below are all the physical products available exclusively in connection with MagHyst® automation. These are supplemented by the general accessory products listed in section 3.

MagHyst® automation measuring device



The MagHyst® automation measuring device is designed for the measurement of electromagnetic actuators and components. The device family includes different versions that differ in terms of their measuring range.

The unit is mounted in a 19" rack-mount housing with 3 height units and is designed for installation in a corresponding control cabinet. A corresponding external housing is available as an accessory to make it more difficult for dirt and liquids to penetrate. For applications where the unit is not installed in a control cabinet, a closed desktop housing is available as an alternative.

The specific configuration of the device must be adapted to the measuring task and is usually project-specific. This guarantees high measuring accuracy with the shortest possible measuring time. If there are requirements that lie outside the available measuring ranges, we will be happy to prepare a quotation with regard to an appropriate adaptation.

We always recommend the purchase of a replacement unit to bridge possible downtimes - as well as maintenance times. As a maintenance interval, we recommend having the unit checked and, if necessary, adjusted by Ilmenauer Mechatronik GmbH once a year.

As an alternative to a separate replacement unit, we also offer an annual maintenance contract (see p. 16) with provision of a replacement unit during calibration and in the event of a unit failure.

Preconfigured PC hardware

The PC hardware for the MagHyst[®] automation measuring device includes a complete computer in a 19-inch rack housing with 4 height units, including a touchscreen monitor with VESA mount and input devices.

A current MS Windows operating system is used as the operating system and the computing and storage capacity is designed in such a way that sufficient capacity is available for the intended number of measurements. The measurement data is stored on hard disks separate from the operating system and all data is protected internally on the PC via RAID1 (mirroring) against loss due to hard disk failure.

All additionally ordered hardware and software components are delivered pre-installed and fully configured. The installation in a production plant or a control cabinet as well as the wiring are the only remaining work after delivery for commissioning at the customer's site.

On request, the PC hardware can also be installed in a desktop PC housing. It is also possible to use a PC provided by the customer to control the MagHyst[®]. If necessary, simply coordinate this with us.

Fieldbus interface

Various bus systems are available for the integration of a MagHyst[®] automation into a plant control system. In all cases, the respective interface is integrated in the control PC with the aid of a Hilscher installation card which is used from the MagHyst[®] automation software with the aid of an OPC server.

Available bus systems include:

- Profinet
- Profibus
- CC-Link

Other interfaces are possible on request.

4-port measuring channel multiplexer for sequential measuring of several measuring objects

The MagHyst[®] automation measuring device offers a single measuring channel as standard and can thus control and measure a measuring object simultaneously. With the help of a measuring channel multiplexer, it is possible to divide this one measuring channel into up to 4 measuring objects and to measure them one after the other without having to switch over manually.

This is advantageous, for example, for endurance tests. While an external control realises a large number of control cycles for several measurement objects in parallel, the multiplexer can

be used to disconnect a single measurement object from the external control and measure it with MagHyst® automation according to a defined sequence. After the measurement, the measurement object is reconnected to the external control and another measurement object is connected to the MagHyst® automation measurement channel.

The multiplexer is designed so that several of them can be combined to increase the number of available channels.

Hand scanner extension

Many magnetic actuators and components are provided with a unique identification number in the form of a QR code, DMC or bar code.

Our MagHyst® automation software for manual measuring stations enables the integration of a scanner to record this identification number as an identification feature of a measurement and to trigger a measurement on request. This means that even large numbers of actuators can be conveniently measured by hand in a short time and the measurement results can always be assigned to the respective measurement object afterwards.

Adapted measuring adapters

As a rule, you can measure finished electromagnets with our MagHyst® automation without any further accessories. However, this has the disadvantage that only the entire magnet can be measured. can be measured and faults in components or groups of components can only be late in the production process. This can lead to higher costs and more time-consuming work. lead.

Would you like to have ferromagnetic components of your actuator already in the incoming goods or partially assembled assemblies test, this is possible with the help of corresponding measuring adapters .



1.2. Software products

Our software products for the MagHyst® automation family of devices are tailored to the various application scenarios of the measuring device.

We are happy to implement customer-specific functional extensions to the software according to your specifications. Simply coordinate this with us if necessary.

Operating software for automated measuring station

The software for an automated measuring station offers all the functions required for this in a compact and simple interface, while at the same time optimising for minimum cycle times. The display of measurement results, statistical outputs, history outputs and the targeted retrieval of measurements already taken are among the functions directly accessible to the user. The measurement object-specific evaluation functions working in the background allow a simple good/bad evaluation of the measurement results. The measurement and test specifications for any number of measurement object types are stored in a PostgreSQL database where all measurement results are also stored for later traceability.

The integrated connection to a PLC via a field bus system allows the automated start of measurement and the transmission of results after completion of the measurement process. The selection of a specific measurement and test procedure, the transmission of unique identification numbers, error codes and result values are part of the transmission protocol between MagHyst® software and PLC.

Manual execution of measurements is only possible with this software version in the maintenance mode. This is primarily used to check the functionality of the measuring system and the devices with the help of reference measurement objects. However, it is also possible to carry out this check automatically, provided that the reference measurement objects (masters) are supplied automatically.

Operating software for manual measuring station

The software for use at a manual measuring station is functionally almost identical to that for an automated measuring station. Only the module for communication with the PLC is not available. Measurements can therefore only be triggered manually by key combination, clicking on a button by mouse or by touch screen. The selection of the measurement and test specification to be applied for the measurement must be done manually before the measurement starts. Unique identification numbers for the respective measurement can be entered manually.

A hand-held measuring station can be advantageously supplemented with a hand-held scanner if the objects to be inspected have a corresponding ID code. In this case, the ID can be conveniently read, and the measurement triggered directly.

Software interface (DLL)

The software-only interface in the form of a DLL file provides an easy-to-use API for integrating a custom application to control a MagHyst® automation meter into your overall system. The DLL provides basic functions for controlling the meter and can be used if a customer's own software is to take over the remaining functions such as evaluating and storing the measurement results and communicating with a PLC.

The interface allows the parameters of a measurement job to be transferred and sent to the MagHyst® measuring device. As a result of the measurement, the measurement curves are returned in physical quantities. Further processing of the data is the responsibility of the customer software.

Result Explorer

The measurement results of all measurements performed with MagHyst® automation are stored in a PostgreSQL database. The Result Explorer provides you with a tool to selectively display a larger number of measurements with their curves and results from all data sets and to export them in various file formats. This enables you to analyse the measurement results with your own external means and to perform statistical analyses, for example.

Parameter Editor (SME Tool)

The parameter editor is used to edit predefined measurement and test specifications and to make a fine adjustment of the evaluation limits. The parameters of the measurement can be adjusted in the same way as the evaluation criteria used for the good /bad assessment.

It is important here that existing measurement and test specifications are not functionally changed, but that copies are created which generally replace the original measurement and test specifications. This ensures that the measurement and test specification used for each measurement performed remains available in the follow-up. t.

Due to the network-based structure with the database as the storage location, the Parameter Editor can be used at the office workstation with appropriate licensing and does not have to run on the station computer in the manufacturing plant at the production site.

MagHyst® planner

The MagHyst® planner is a software tool for automating measurement sequences such as endurance tests. Several MagHyst® automation devices can be addressed, as well as several MagHyst® multiplexers.

In addition to parallelised endurance tests of multiple actuators, the software also enables, for example, the measurement of an actuator with a previously defined measurement sequence, which can consist of several measurements.

2. MagHyst® modular

The MagHyst® modular devices and associated software are designed for flexible use in the field of development. Each measuring process can be completely parameterised individually. Determining optimal measurement parameters, determining magnetic properties of semi-finished products with the help of measurement adapters as well as the detailed analysis of parameter variations are among the most important applications. In addition, the comparative measurement of smaller quantities is conveniently possible, which is helpful in the area of complaint processing or for random sample checks.

2.1. Hardware products

MagHyst® modular basic unit



The MagHyst® modular devices are subdivided according to the respective measuring range, similar to the devices of the automation family. Within a measuring range, however, the modular devices offer greater flexibility with regard to the parameterisation of a measurement and thus allow a wider range of measurement objects to be measured. The modular design enables to exchange individual assemblies so that several measuring ranges can be covered with one basic device by simply exchanging modules.

The base unit consists of a communication module, a main module and an analogue power supply module.

Main module

The main module is the heart of the MagHyst® modular. It contains the output stage, the controller and the measuring electronics. To enable high-precision measurement of the connected electromagnets and measuring objects, the main module is optimised for one measuring range at a time.

Measurement shunt	Measurement object resistance	Voltage	Power
0,2 Ω	1.8 Ω - 64 Ω	≤ 32 V	≤ 15 A
0,1 Ω	0.9 Ω - 32 Ω	≤ 32 V	≤ 15 A
0,05 Ω	0.3 Ω - 10 Ω	≤ 32 V	≤ 15 A

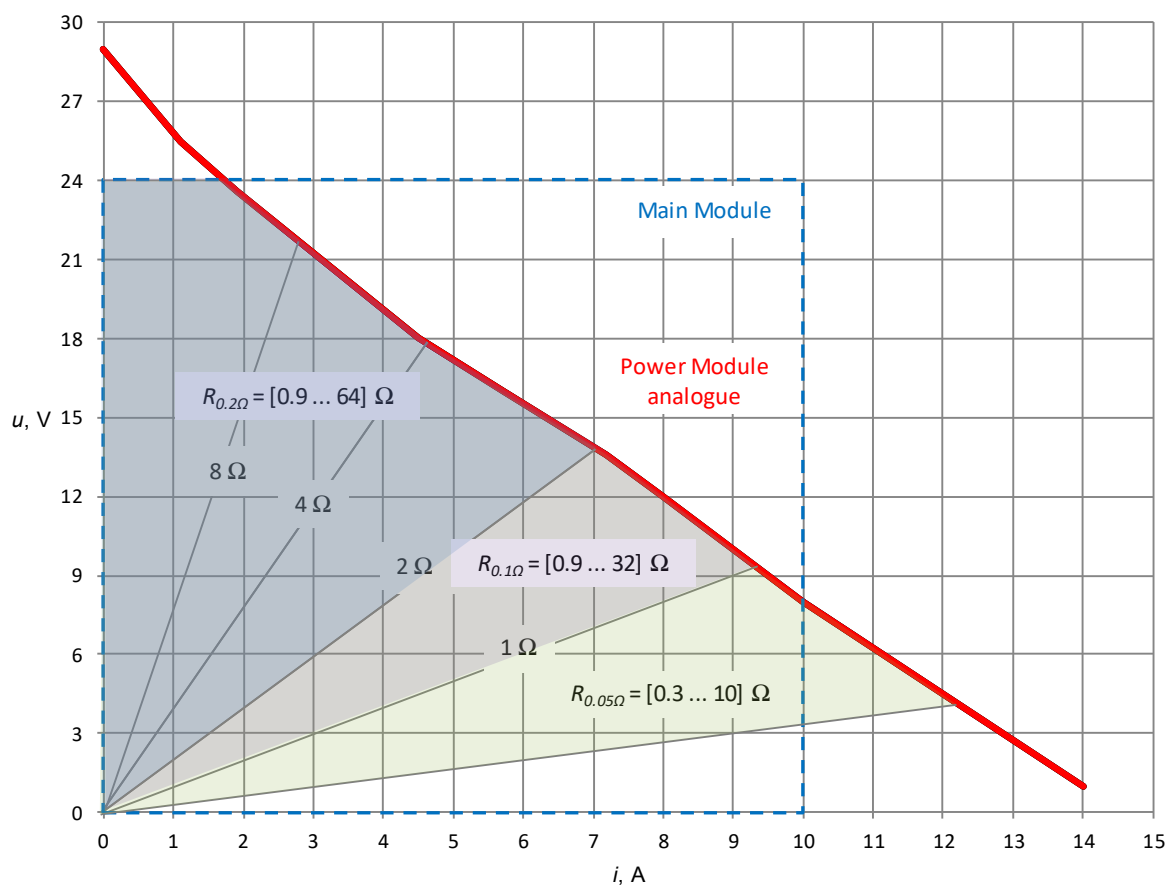
Devices for other measuring ranges are available on request.

High-voltage module

If a higher supply voltage is required, you can expand your measuring device with the high voltage module. This enables the measurement of electromagnets with up to 150 V.

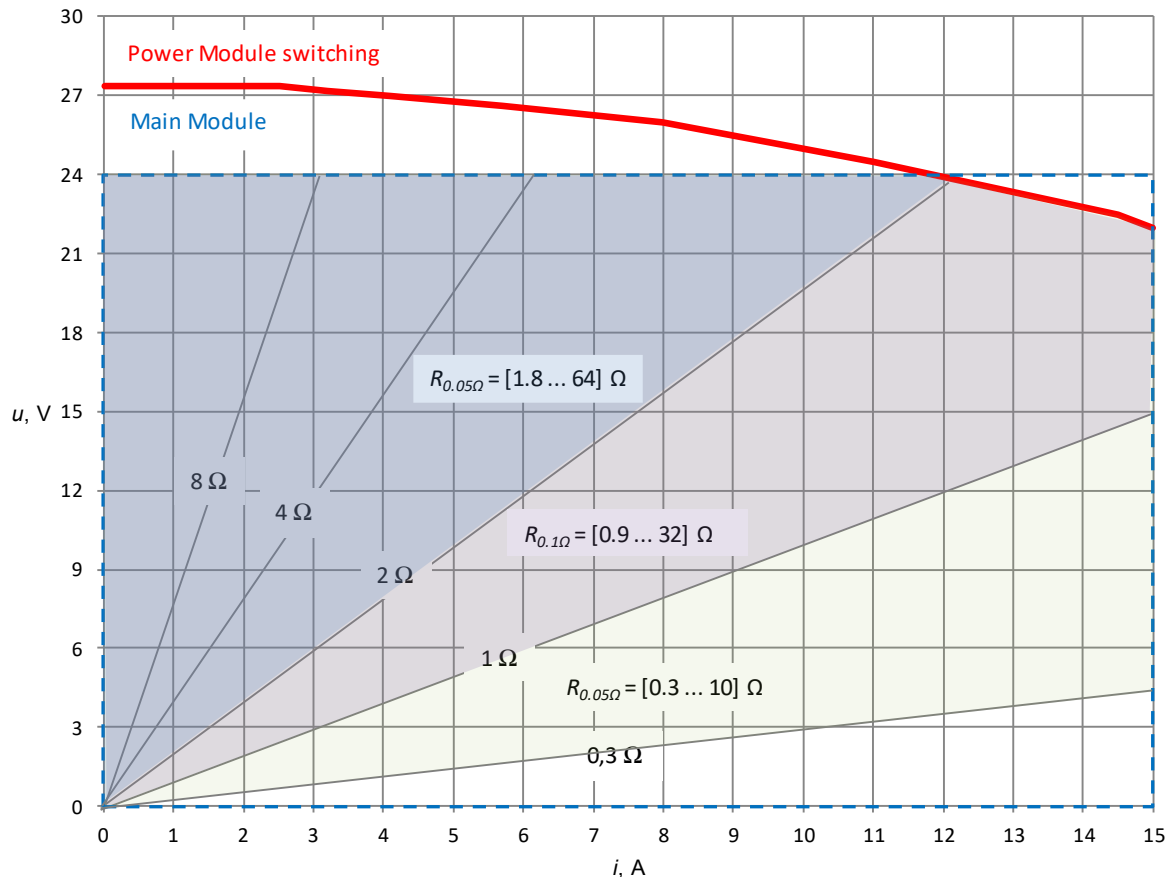
Analogue power supply unit

An analogue power supply with 24V output voltage up to 10A is included in the base unit. With a continuous output power of up to 150W, the module is optimised for low noise in the output signals. The input voltage must be 230V 50Hz, but other input voltage ranges are available on request.



Switching power supply

If higher output powers than available with an analogue power supply are required, a switching power supply with a wide input voltage range of 100V to 240V for 50/60 Hz mains frequency is available as an option. This can provide a current of 10A over the entire voltage range between $\pm 24V$, peaking briefly at 15A.



Communication module

The communication module is included in each base unit. It provides a USB port and an RS-232 port for connection to a PC.

Rod adapter



A rod adapter can be used to determine the magnetic properties of rod samples. The standard adapter accepts rods with a diameter between 8 mm and 10 mm that are at least 120 mm long.

The adapter is primarily suitable for comparing different materials. For ferromagnetic materials, the adapter is suitable for determining the B(H) characteristic. The measured characteristic curves can be used for simulations, for example.

Sheet adapter



Similar to the rod adapter, a sheet metal adapter can be used to measure strip-shaped sheet metal samples up to 3 mm thick. The width must not exceed 30 mm and should not be less than 10 mm. The length must be at least 180 mm.

The adapter is primarily suitable for comparing different materials. For ferromagnetic materials, the adapter is suitable for determining the B(H) characteristic. The measured characteristic curves can be used for simulations, for example.

Individualised material measuring adapters



Should you require an adapter for material samples with dimensions other than those mentioned above, please contact us for an individual offer.

2.2. Software products

For the MagHyst® modular, all software products are included in one programme. However, there are various functions that must be licensed individually in order to be used.

MagHyst® modular basic software

The basic software enables the parameterisation and execution of step response measurements and quasi-static measurements. The comparative display of the measured characteristic curves and the configurable export of the measurement data and data sheets are part of the functional scope. Measurements can be organised in projects and stored in Microsoft SQL Server databases. In addition to the measurement of electromagnets, ring, rod and sheet samples can be measured with corresponding adapters and the magnetic material properties can be determined.

Network licence

The network licence allows the MagHyst® software to be run on a workstation PC while the licence dongle is connected to a network-accessible server. All additionally licensed modules are also made usable by the server via network licence after purchase of the network licence.

Multi-SRM module

The licence for this software function enables the measurement of magnetic actuators with up to 25 voltage or current jumps in one sequence. The corresponding measurement method allows the definition of several independent segments that can be combined in any way, current or voltage controlled.

This measurement method is advantageously applicable, for example, in the form of bipolar step response measurement as a possible, time-defined alternative to bipolar quasi-static measurement or for cases in which the control of an electromagnet takes place as peak & hold. Short,

not very high clocked PWM controls can be mapped as well as controls which are used for the analysis of partial loops.

Module $\Psi(i) \leftrightarrow \Psi(u)$

In some applications, the electrical voltage is defined as the reference and evaluation variable and not the electrical current. With this function, the conversion of the axes for the characteristic curves of the concatenated magnetic flux can be carried out for the entire database with one mouse click. As a result, the $\Psi(u)$ characteristic curves are then available to the user for observation and analysis instead of the $\Psi(i)$ characteristic curves.

Resistance compensation module

This function can only be used in conjunction with the Multi-SRM. In cases where the electrical resistance of the measuring coil changes during the measurement, this function can be used to reduce the resulting measurement error.

For this, it is necessary that short phases with constant current are included during the measurement. These can be used to determine the current electrical resistance and, based on the change in this value, the course of the resistance value over the measurement period can be approximately calculated. With this curve, it is subsequently possible to determine the corrected induced voltage and the corrected, concatenated magnetic flux.

This function is to be understood as a post-processing method and can only be used after a measurement has been completed.

Secondary Flow Calculation Module

When measuring magnet systems, the $\Psi(i)$ characteristic is always calculated using the self-induction in the primary coil. From an optionally available measuring winding, the voltage induced in it can be recorded as an additional measuring channel. This software module is required to calculate the corresponding $\Psi(i)$ characteristic from this induced voltage. This is advantageously applicable, for example, if the measuring winding is arranged at a different location than the primary winding, for example the working air gap or in a measuring adapter.

3. MagHyst® -Accessories

The accessories listed below can be used for all applications and MagHyst® variants.

Licence dongle

A licence dongle is always required together with MagHyst® software. Depending on the application, it is advisable to divide your own licences between several dongles, so that, for example, one licence dongle is permanently installed in the PC of a MagHyst® test station and another is made available in the company network to make the other software licences available.

There are different types of dongles. The most common are designed with USB headers to be installed internally on a mainboard and thus permanently available in a PC. Another variant is equipped with a USB-A connector and can be easily exchanged between PCs if necessary.

Toroidal sample (factory calibrated)

With a toroidal sample, a MagHyst® meter can be checked against a reference characteristic defined for the toroidal sample. In the case of an automation gauge, this is provided in maintenance mode, but can also be triggered externally by a PLC.

In the laboratory environment, the reference and the currently measured characteristic curve can be compared directly to draw conclusions about possible inaccuracies in the measurement.

In both cases, the toroidal sample is delivered together with a file containing the reference characteristic after factory calibration, which can be imported into the respective automation or modular database.

Toroidal sample (externally calibrated)

As an alternative to factory calibration by IMG, we also offer you a measuring standard calibrated by Magnet-Physik Dr. Steingroever GmbH as a reference toroidal sample. You will receive a calibration certificate in addition to the MagHyst® importable measurement data.

Reference measurement objects (master)

Especially in connection with MagHyst® automation, automated monitoring of the test technology is important. For this purpose, we will be happy to work with you to produce reference measurement objects that are based on the measurement objects to be tested. With these, a fully automatic, regular inspection of the MagHyst® measurement can be carried out easily.

The delivery of the reference measurement objects includes the provision of reference characteristics determined in the factory, which are used comparatively for the evaluation of the measurement accuracy.

Uninterruptible power supply

To enable you to work without data loss in the event of a power supply failure, we offer an uninterruptible power supply as an accessory for your MagHyst® system uninterruptible power supply. We will be happy to dimension these to suit your application.

MagHyst® workstation rack



The MagHyst® workstation rack is an optional extension for MagHyst®. The mobile rack enclosure offers space for monitor and input devices, a large work surface with all important connections and a shock-absorbing internal frame for 19" enclosures. This provides sufficient space for a PC, two MagHyst® units and an optional uninterruptible power supply.

With the help of the workstation, a mobile and self-sufficient workstation for magnetic measurements can be realised, which, thanks to the UPS, can also be operated for several hours without direct connection to the mains.

All components required for your application can be integrated into the MagHyst® workstation. We can adapt the exact specifications and dimensions to your needs at the customer's request.

4. Services

We offer various services in connection with our MagHyst® measuring devices.

4.1. Material measurements

Are you interested in the B(H) data of ferromagnetic materials? We would be happy to measure material samples for you. Suitable sample shapes are toroidal core samples, round bar samples and sheet metal samples (rectangular profile).

Ring core samples

For the measurement of toroidal samples, we wind a primary and secondary winding around these samples and then measure them. In principle, the most accurate results can be achieved with the toroidal specimen measurement. Due to the ring-shaped samples, however, no anisotropy in the magnetic properties can be measured, as the averaged B(H) characteristic is measured over the entire sample circumference in the radial direction.

Optimum sample dimensions are:

outer diameter Da	inner diameter Di	height h
50 mm	40 mm	10 mm
60 mm	50 mm	12 mm

Deviating specimen sizes must be discussed with us in advance. Make sure that the ratio of outer diameter to inner diameter is less than 1.25.

Rod probes

With the aid of the rod adapter, it is also possible to measure round rods.

The B(H) measurement is made inside the bar in the axial direction. The measured range is only a few mm, so only a small section of the material is analysed.

Suitable sample dimensions are:

outer diameter Da	length L
10 mm -0.2mm	≥ 120 mm
5 mm -0.2mm	≥ 120 mm

Sheet probes

With the help of the sheet metal adapter, it is possible to measure material probes with a rectangular cross-section. In addition to the measurement of individual probes, the measurement of several stacked probes of the same geometry is also possible.

The B(H) measurement is carried out along the longest edge of the probe. The measured area is only a few mm, so only one section along the longest edge of the probe is analysed.

	probe width b	total height h	probe length l
minimum	10 mm	-	150 mm
recommended	≥ 20 mm	≥ 0.1 mm	≥ 160 mm
maximum	30 mm	3 mm	-

4.2. Calibration and maintenance contracts

Calibration of your device

To ensure the quality of measurement results, calibration of the measuring instruments is indispensable. Therefore, we calibrate all our measuring instruments before delivery to you according to our factory calibration instructions. We also recommend that you repeat the calibration of the MagHyst® modular and MagHyst® automation devices annually.

Calibration takes place at IMG's premises. Calibration usually takes place within 5 to 15 working days.

Maintenance contract MagHyst® modular

When ordering the maintenance contract, you will receive for the duration of the maintenance contract:

- Annual calibration within 3 to 5 working days (by appointment, excl. shipping time)
- An additional basic licence
- Two licences each for all available additional modules
- All MagHyst® modular licences as network licence
- 10% discount on additional MagHyst® modular software licenses, accessories and training courses
- Free device analysis in case of hardware defect

When changing to the MagHyst® modular software from version 1.8, you will receive the licence dongle including the unlimited usable basic licence free of charge if you order your maintenance contract at the same time.

Maintenance contract MagHyst® automation

When ordering the maintenance contract, you will receive for the duration of the maintenance contract:

- Annual calibration (by appointment)
- Provision of a replacement unit during calibration
- Provision of a replacement unit in the event of a defect within 3 working days (excl. shipping)
- 10% discount on MagHyst® automation accessories & software
- Free device analysis in case of hardware defect

4.3. Miscellaneous

One-day training course on "Magnetic Measurement Technology"

Would you like to train your employees in the operation of our measuring systems or refresh your knowledge of magnetic measuring technology? We would be happy to offer you training tailored to your needs at.

Commissioning of your MagHyst® automation system on site

We are also happy to support you with the commissioning of your MagHyst® automation station and its integration into your production line.

Development of measurement & evaluation algorithms

We are happy to support you in the development and adaptation of evaluation methods as well as the "measuring object types" (MOT) to your electromagnet systems. We take your individual wishes and requirements into account so that you can optimally test your electromagnet systems.