DIMENSIONAL MEASURING TECHNOLOGY FOR PRODUCTION

MAHR CUSTOMER SOLUTIONS

The latest information about MARSOLUTION customer solutions can be found on our website:
www.mahr.com, WebCode 14520

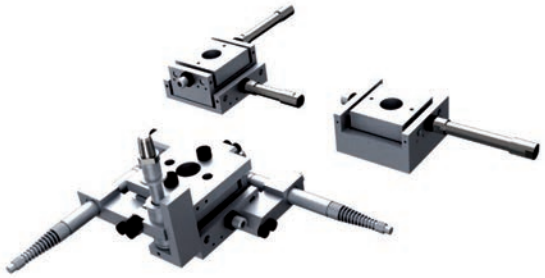
The design and manufacture of high-precision and reliable workpiece-specific gages requires immense measuring experience and expertise. State-of-the-art Millimar length measuring components produce reliable measuring equipment for a wide range of workpiece geometries with varying levels of automation. Our range of products and services covers all the necessary project steps right up to ready-to-use handover of the measuring equipment: Development, design, production, installation, commissioning and training.

MarSolution. Customer-specific Measuring Technology

MarSolution. Measuring Devices Based on Millimar Standard Elements

Millimar standard elements can be used for the flexible design and cost-effective realization of multi-gage measuring devices for a wide range of workpieces, e.g. rotationally symmetrical and non-rotationally symmetrical parts. Rotationally symmetrical workpieces can be mounted between centering tips or on prismatic supports, whereas non-rotationally symmetrical workpieces require a special holder. The extensive range of standard elements includes, for example, vertical and horizontal measuring stands, holders, coordinate measuring tables, block elements, spring parallelograms, swivel elements and a range of measuring anvils.

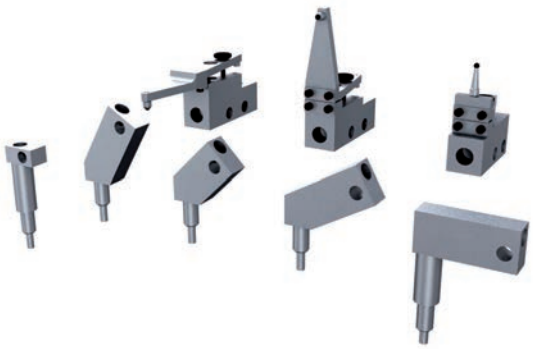
Gage modules
Travel distance: 5 –10 –20 mm



XY tables
Travel distance:
2,5 –5 –7 mm

Angular adjustment
0 –30 –45 –60 –90°

Measuring inserts



MarSolution. Measuring Devices Based on Millimar Standard Elements

Versatile

The versatility of the Millimar standard elements means that the right solution can be provided, whatever the measurement task at hand.

Whether outer, inner or length measurements, the Millimar standard elements can be adapted to the most diverse test requirements, even with awkward to reach workpiece geometries.

Thanks to the compact design of the anvils, a large number of measuring points can be inspected within a small area of the testpiece.

The pneumatic lifting mechanisms integrated in the measuring elements simplify the job of moving the testpiece into the measuring position and reduce wear to the measuring anvils.

Flexible

The modular concept using Millimar standard elements throughout the whole system and a generous amount of travel in the measuring anvils (up to 20 mm) allow a high degree of flexibility in terms of the variety of testpieces that can be accommodated.

Precise

The Millimar standard elements are specially designed for use in the workshop and are manufactured using a rigorous process. This guarantees that the measuring devices give stable and reliable measurements.

For example, using measuring anvils fitted with two ball-bearing guides for supporting the moving part, it is possible to achieve measurement repeatability in the µm range if this is required due to the tolerances of the feature being measured.

Reliable

All components are long-lasting and low-maintenance thanks to the use of rust-proof materials and the selection of appropriate heat treatments. The use of lifting mechanisms to minimize the effects of friction on the measuring anvils when the workpiece is inserted, further reduces component wear.

Economical

Our systems can either be constructed by the customer from standard catalog elements, or alternatively we can provide turn-key solutions. Whichever option you choose, you can be sure that you are purchasing a system that is tailored to your specific requirements on the most favorable of terms.

Below are just a few examples of the many factors that contribute to the cost effectiveness of the Millimar standard elements:

- Standard elements can be reused: Once manufacture of a particular type of workpiece has ceased, all standard elements used in the test equipment can be reused to create new test equipment for a different type of workpiece.
- A choice of different mechanisms for guiding the moving part of the measuring anvils according to the accuracy requirements of the measuring task (optimal value for money).
- Reduction in development and implementation time.
- Availability of devices: Our standard elements are manufactured under standard production conditions and are always available off the shelf and ready to use.

For more information, please visit our website: www.mahr.com

MarSolution. Standardized Measuring Devices

Mahr's "MarSolution" product group offers special customized solutions in dimensional measuring technology – semi and fully automatic measuring systems that work directly in production. Mahr uses its tried and tested standard components (Millimar measuring interface, probes and standard elements) to provide reliable and accurate measuring technology. Always the right solution for your task. Mahr offers solutions for various sectors and industries.

Vertical measuring device with pivoting workpiece holder between centers

These measuring devices allow inspection of diameter, length, and radial and axial run-out for rotationally symmetrical parts.
With manual or automatic swivel workpiece holder between centers.

Motorized rotation also allows the option of dynamic workpiece measurement.

Measuring device with rotary table

Measuring devices with rotary table allow combined external and internal measurements and automatic radial and axial run-out testing.

This measuring device can also be motorized to enable dynamic measurements.

Horizontal measuring device

Workpiece holder on vees or between centers, including workpiece loading table.

The horizontal measuring devices allow workpieces to be held on vee supports or between centers. This system is particularly suitable for heavy workpieces.

The workpiece can be inserted in the workpiece holder outside of the actual measuring station.

For more information, please visit our website: www.mahr.com

MarSolution. Customer-specific Measuring Devices

RPM series - commutator shaft measuring device

The RPM measuring device is a simple and accurate solution for measuring diameters, roundness, radial runout and bar-to-bar height, for example, of the commutator shaft or precision shaft in the electric motor.

The RPM offers the following benefits:
- Simple operation for efficient measuring
- Fast measurements
- Powerful functional analysis using the D1200X software

TC series - housing measuring device

These measuring devices can be used to measure various types of housing, for example turbochargers, pumps, electric motors, housing. The measuring device is available as a standalone solution for close-to-production use or as an integrated version for 100% production control.

CR 240A: Automated measuring devices for connecting rods

Simple measuring devices can be used to control various work sequences. Automatic solutions can perform all the measuring tasks for the final inspection.

For example, the CR 240A measuring station can measure the usual dimensional features on a connecting rod and also offers the following functions:
- Interchangeable measuring heads with pneumatic plug gages and Millimar P2004 inductive probe
- Laser engraving of connecting rods, the complete housing protects against laser beams
- Camera for check reading
- Precise weighing system
- D1200X measuring software with clear and simple user guide
- Measurement results can be evaluated online to allow tool adjustments, statistical analysis, etc.

For more information, please visit our website: www.mahr.com

MarSolution. Customer-specific Measuring Devices

Dynamic measurements of the inner diameter of cylinder bores and wall thicknesses

The cylinder liner measuring machine is a standalone version for automatically measuring the inner diameter of bores and the wall thickness of a diesel cylinder liner.
A handling device allows fully automatic loading and unloading. The measuring machine is directly integrated in the production line. The cycle time for a complete measurement is less than 2 seconds.

The measuring instrument consists of three stations:

- The first station is the charging station where the temperature of the socket is measured.
- At the second station the inner diameter of the bore is measured using a pneumatic plug gage. The second station also contains the diameter setting master for the pneumatic plug gage; the plug gage is automatically calibrated at regular intervals. This process guarantees maximum measuring accuracy and stability of the measuring results, even in the harshest of manufacturing environments.
- At the third station a tactile measurement determines the wall thickness of the socket. The probes are automatically positioned at the relevant measuring points after loading. The wall thickness measurement takes just seconds. The probes are parked before the socket is removed from the measuring device to minimize wear to the contacting measuring elements.

Dynamic measuring of deformations in half-bearings
Type 2152447 is an automatic standalone measuring instrument for measuring dimensional changes caused by pressure to half-bearings (e.g. for connecting rods).

The half-bearing is automatically conveyed into the measuring machine and inserted into the relevant test chamber (semicircular holder), secured at one side, and a defined pressure is applied to the other free side (e.g. according to the operating mode of the subsequent motor assembly). A tactile probe system simultaneously measures the dimensional change circumferential to the half-bearing. After the measurement, the half-bearing is removed by the handling device.

To ensure measuring accuracy throughout the process, the measuring device is automatically calibrated at regular intervals using a setting master.

The entire process is computer-controlled with user-definable force parameters. Measuring records and databases can be created.

Measuring device for checking diameters on large rings

Large rings (e.g. bearing rings) are subject to the most stringent tolerances. Checking these requires flexible measuring equipment that can cover a range of inner and outer diameters.

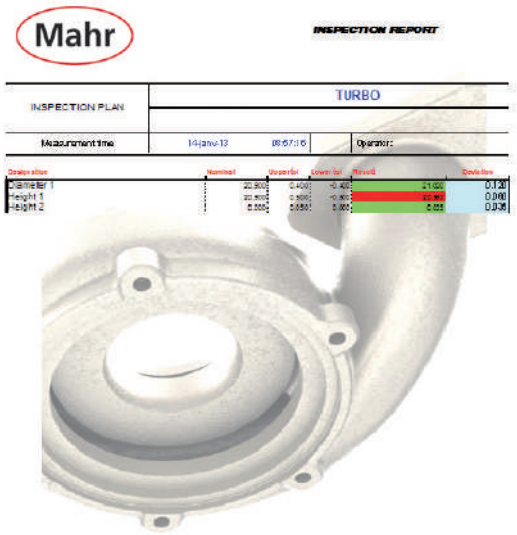
The measuring device for large rings means that inner and outer diameters can be measured with just one device.

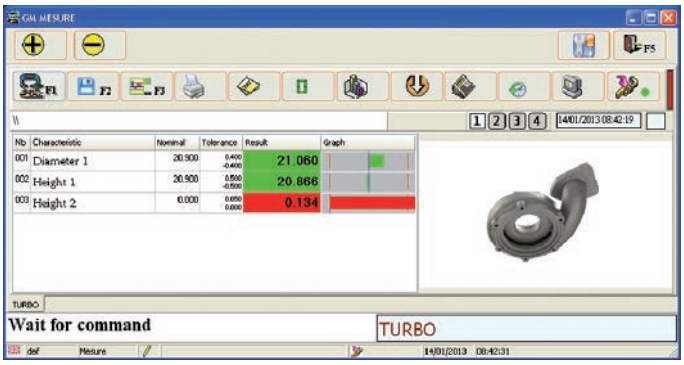
It can measure inner diameters from 63.5 mm up to maximum 825 mm and outer diameters from 76.2 mm up to maximum 831 mm.

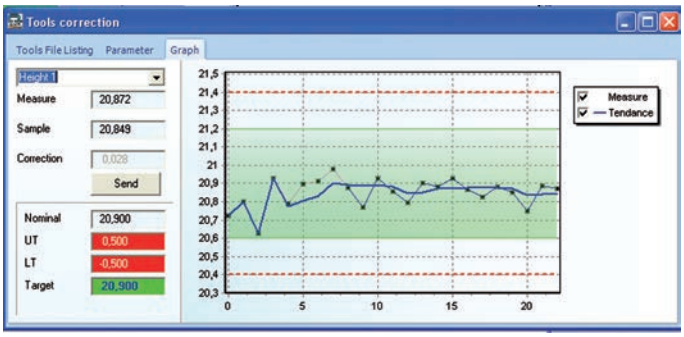
For more information, please visit our website: www.mahr.com

MarSolution. D1200X Software

- Windows®-based software
- Microsoft ACCESS® database
- Password protected menus and access privileges
- Non-restrictive formula editor
- Easy-to-program test plans - simply fill in the on-screen forms
- User-programmable calculation formula
- Quick-select options for displaying measurements performed
- Simple sensor adjustment using an on-screen assistant
- Storage of calibration history
- Measurement value display (numeric and bar graph views)
- Storage of measurements (manual or automatic)
- Sensor workspace monitoring with alarm output
- Statistical analysis of measurement results, with visualization using histograms and SPC control charts
- Automatic calibration requests defined by hours and number of measurements
- Comments can be added to faulty measurement values to indicate the cause
- Statistical analyses
- Tests to determine normal distribution
- Integrated measuring system analysis (R&R) and gage capability
- Data export module supporting numerous formats
- QDAS, SUMEQ, SESAME, QUASAR and other interfaces supported
- Option to use I/O port for automatic control
- Can be used in automatic production lines with dialog control







For more information, please visit our website: www.mahr.com