Equipment Set TP 47220: Basic Dimensional Metrology (Brand)
8130867 (47220-00)

LabVolt Series

Datasheet

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General Description

Essential skills for several trades

Proper selection and adequate handling of common measuring instruments such as tape measures, rules, protractors, calipers, micrometers and various gages can be challenging for beginners in dimensional metrology. This is even more the case when various types of reading scales and systems of units must be understood.

The basic dimensional metrology equipment set offers a structured, systematic introduction to concepts, instruments, and techniques related to dimensional metrology. Developing skills in interpreting technical drawings and making measurements is particularly important for machinists, CNC machine operators, millwrights, and workers involved in quality assurance activities.

Realistic experimentation

Through hands-on activities, the basic dimensional metrology training package enables instructors to efficiently convey the fundamental knowledge and know-how related to linear and angular measurements. Comprehensive courseware offers a large range of exercises and projects arranged in a sequence of increasing complexity. This approach allows students to reinforce and expand their skills in a fluid way and improves transferability to the workplace. Guided exercises build basic know-how and confidence; realistic projects develop decision-making skills.

Build expertise with the right equipment

This package includes semi-precision and precision measuring instruments commonly used in the industry for metrology purposes. The value of the training package is based on the parts used for measurement activities. These parts – from simple to intricate ones – represent real-life consumer and industrial components and are carefully designed to challenge students' metrology skills in a variety of realistic scenarios. They allow the tools to be used to their fullest extent while providing multiple measurement opportunities. Parts are manufactured to ensure repeatability from one equipment set to another.

Also included are a set of master rings and a gauge block that allow students to self-assess their expertise and build confidence. They also develop their ability to perform routine field checks to detect conditions that may impair the accuracy and performance of instruments, a key aspect of metrology.

This helps them develop competencies in performing routine tests to identify conditions that could affect the accuracy and quality of the measuring equipment. This is an essential aspect of measuring technology.

Note

Whether you choose the Standard version which includes brand-name measuring instruments such as Mitutoyo and Starrett or the Value version with generic versions, the learning outcomes and student manuals and instructor guides remain the same.

Enhanced learning experience through Augmented Reality

Students use the free Festo Didactic AR app to visualize the features of parts in 3D from their home with smartphones or tablets. The app is compatible with Apple and Android devices.

Included parts

- TV bracket
- Joist hanger
- Hydraulic fitting
- Sensor brackets
- Pump shaft

- Bearing cover
- Lock pins
- Hydraulic disc brake calipers Included measuring instruments
- Tape measure, steel rules, protractor
- Digital, Vernier and outside calipers
- Depth and thickness gauges
- Screw pitch gauges
- Digital and Vernier micrometers with stand
- Set of thread measuring wires
- Small holes gauges
- Telescoping gauges Learning outcomes
- Explain the concepts of metrology and measurement
- Differentiate and convert between SI and US customary units
- Define the concepts of precision, accuracy and error
- Explain the difference between calibration and field check
- Describe and read various types of instruments and scales
- Describe proper use of instruments
- Perform field check of instruments
- Perform measurements
- Identify the standard sizes for drawing sheets
- Recognize the main types of lines used in technical drawings
- Identify the various views on a technical drawing
- Explain the difference between orthographic and pictorial projections
- Explain the difference between first angle and third angle projections
- Identify and interpret tolerances on technical drawings
- Explain the importance of standard tolerances and fits in assemblies
- Explain what a precision transfer measuring instrument is
- Interpret tolerance codes for metric tolerances based on the standard ISO 286
- Find limit deviations for metric tolerances using the tables provided in the standard ISO 286-2
- Find limit deviations for tolerances in inches using the tables provided in the standard ANSI B4.1

Equipment Set TP 47220/47221: Basic Dimensional Metrology, Fundamentals of dimensional measurements

The equipment to teach the fundamentals of dimensional measurements shall include semi-precision and precision measuring instruments along with manufactured parts and their corresponding technical drawings. A set of precisely manufactured reference parts is also required. Guided exercises and unguided projects shall be available for students to get an in depth understanding and hands-on practice on the selection, proper use and care of a variety of common measuring instruments. All instruments and parts shall be stored in a protective foam on stackable trays equipped with handles.

It shall include the following features:

- Outstanding repeatability from one set of parts to another
- Students can work simultaneously with one set of parts and instruments
- Content available as e-Learning, PDF and printed format
- Exercises are followed by projects to develop decision-making skills
- Students learn the various standards and systems of units found on technical drawings
- Portable and stackable storage trays with handles
- Outline of each instrument and part is cut from foam block
- A QR code for each instrument reveals its main technical specifications

- Learning enhanced with Augmented Reality (AR)The following components shall be included:
- 1x tape measure
- 3x steel rules
- 1x steel protractor
- 1x digital caliper
- 1x caliper with Vernier scale
- 1x outside caliper
- 1x depth gauge
- 1x thickness gauge
- 2x screw pitch gauges
- 1x outside digital micrometer
- 1x micrometer stand
- 1x outside micrometer with Vernier scale
- 1x set of thread measuring wires
- 4x small holes gauges
- 4x telescoping gauges
- 2x master rings
- 1x gauge block
- 1x TV bracket
- 1x joist hanger
- 1x hydraulic fitting
- 3x sensor brackets
- 1x pump shaft
- 1x cover
- 2x lock pins
- 2x hydraulic disc brake calipers
- 1x box of cleaning tissues
- 5x stackable storage trays with handles

The following learning aims for students should be covered with specific didactical documentation:

- Explain the concepts of metrology and measurement
- Differentiate and convert between SI and US customary units
- Define the concepts of precision, accuracy and error
- Explain the difference between calibration and field check
- Describe and read various types of instruments and scales
- Describe proper use of instruments
- Perform field check of instruments
- Perform measurements
- Identify the standard sizes for drawing sheets
- Recognize the main types of lines used in technical drawings
- Identify the various views on a technical drawing
- Explain the difference between orthographic and pictorial projections
- Explain the difference between first angle and third angle projections
- Identify and interpret tolerances on technical drawings
- Explain the importance of standard tolerances and fits in assemblies
- Explain what a precision transfer measuring instrument is
- Interpret tolerance codes for metric tolerances based on the standard ISO 286
- Find limit deviations for metric tolerances using the tables provided in the standard ISO 286-2

- Find limit deviations for tolerances in inches using the tables provided in the standard ANSI B4.1
- Explain what is a fit
- Describe the three basic types of fits

List of Manuals

Description	Manual number
Dimensional Metrology (Workbook (Instructor))	8122035 (81220-35)
Dimensional Metrology (Workbook (Instructor))	8130685 (81306-85)

Table of Contents of the Manual(s)

Dimensional Metrology (Workbook (Instructor)) (8130685 (81306-85))

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