Single Axis Laser Micrometers

Mecline Series

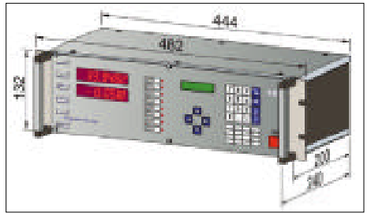
Specifications	Mecline 40	Mecline 80	Mecline 200
Measurement field	40mm (1.57”)	80mm (3.15”)	209mm (8.228”)
Measurement range	0.06 - 38mm (0.0025 - 1.496”)	0.8 - 78mm (0.03 - 3.07”)	0.75 - 207mm (0.029 - 8.15”)
Selectable resolution	0.1 / 1µm (0.000004 / 0.00004”)	0.001 / 0.01mm (0.00004 / 0.0004”)	1 / 10µm (0.00004 / 0.0004”)
Repeatability	± 0.35µm (0.000014”) @ 3 Sigma	± 1µm[1] (0.00004”) @ 3 Sigma	± 1µm[1] (0.00004”) @ 3 Sigma
Linearity (centered)	± 1.5µm (0.000059”)	± 2µm (0.00008”)	± 2 / 6µm[2] (0.00008 / 0.00024”)
Scan frequency	200Hz	200Hz	200Hz
Laser source	visible diode, class 2	visible diode, class 2	visible diode, class 2
Dimensions (W x D x H)	445 x 68.5 x 134mm (17.52 x 2.7 x 5.28”)	736 x 60 x 163mm (28.97 x 2.36 x 6.42”)	836 x 60 x 312mm (32.91 x 2.36 x 12.28”)
Throat distance (T)	101.9mm (4.01”)	148 / 248mm (5.83 / 9.76”)	259mm (10.2”)
Operating temperature	0 to 45° C	0 to 45° C	0 to 45° C
Weight	3.8Kg (8.37lbs.)	6.2Kg (13.66lbs.)	13Kg (28.64lbs.)

Notes:
1. Repeatability; ± 1µm up to 70mm, ± 3µm from 70 to 207mm.
2. Linearity; ± 2µm from 0.75 to 70mm (0.029-2.75”), ± 6µm from 70 to 207mm (2.75-8.14”)

CE 10 Control Unit

- **Display:** 2 line front panel, high visibility LEDs
- **Numerical keyboard:** backlit LCD for programming
- **Eight** function keys and **Eight** alarm LEDs
- **Three inputs** for length counting and to start / stop statistics
- **Six relay outputs** for DEC and INC signals (regulation of extruder) and alarm signals
- **Printer output:** Centronics parallel
- **RS 232 serial port** for connection to remote computer
- **Dimensions:** 482 x 240 x 132mm (19.0 x 9.45 x 5.2”)
- **Weight:** 7Kg (15.4 Lbs.)

Mecline 80 gauge head dimensions in mm.



CE 10 controller dimensions in mm.

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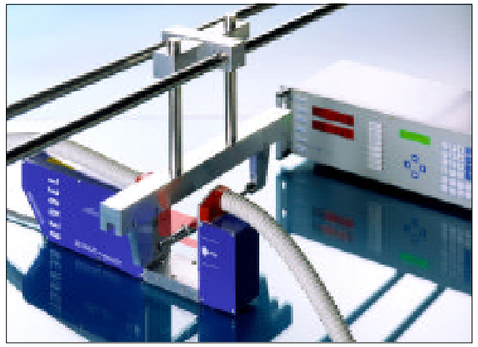
The closer you look, the better we measure!

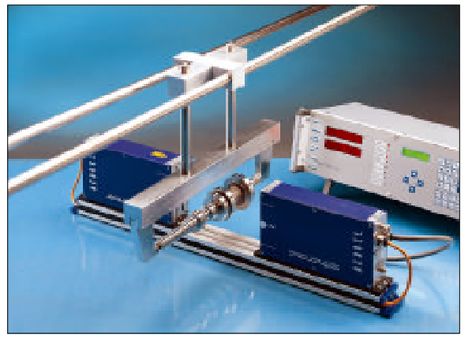
Freedom Technologies

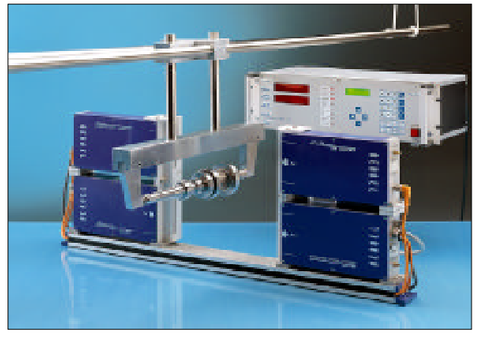
Single Axis Laser Micrometers

Mecline Series

“Multi diameter gauging on NC lathes.”







Pictured above, from top left to right and down are the Mecline 40, Mecline 80, and Mecline 200 laser micrometers. Each system is depicted with a multi diameter part placed in the laser beam.

General Description

The Mecline series of single axis laser micrometers is especially designed for multi diameter laser gauging of parts machined by NC lathes and automatic inspection equipment. Machines where robot handling devices move the work piece to the selected (multi diameter) gauging position. The measured data is trhen transmitted to external electronic units for further processing.

The Mecline series accomodates a wide variety of part sizes. Parts diameters as small as 0.06mm (0.0025) and as large as 207mm (8.15”) can be measured to a high degree of accuracy. A Mecline system includes a laser gauge head, a CE 10 controller with the application specific software stored in EPROMs.

Features

- Meas. range: 0.06 to 207mm (0.0025 to 8.15”) dia.
- Repeatability: ± 0.35µm (0.000014”) @ 3 Sigma
- Patented auto-calibration guarantees accuracy
- Temperature compensation for varying shop temperatures
- Three year warranty

Benefits

- Fast non contact measurement
- Broad measurement range enables gauging a number of parts with different shapes and dimensions without changing setups
- On-line control provides for 100% inspection
- Improvement in quality and product consistency
- Assists in quality certification

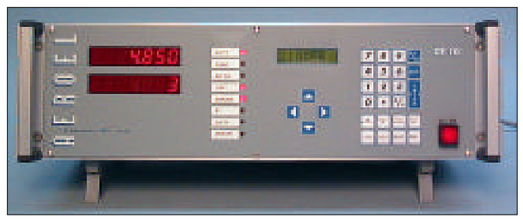
System Operation

The Mecline system is installed at the output of the lathe It measures the finished diameter of the part after the machining process and during the down loading phase. The turned workpiece, after cleaning by blowing away the water and oil emulsion, is presented to the laser beam. It is stopped at each selected gauging position. After it is positioned, a start signal triggers the measurement. The measurement information is processed in the CE 10 control unit. The measured value is presented to the lathe where the value is checked against the preset tolerances.

If there are out of tolerance conditions, alarm signals are immediately activated after the measurement. In addition an overall reject/rework signal is released once the measurement cycle is completed.

The measurement data is transmitted to the NC via an optional parallel interface board or by using the standard RS 232 serial port. By connecting a standard serial printer to the CE 10 control unit, a list of all measured data is available.

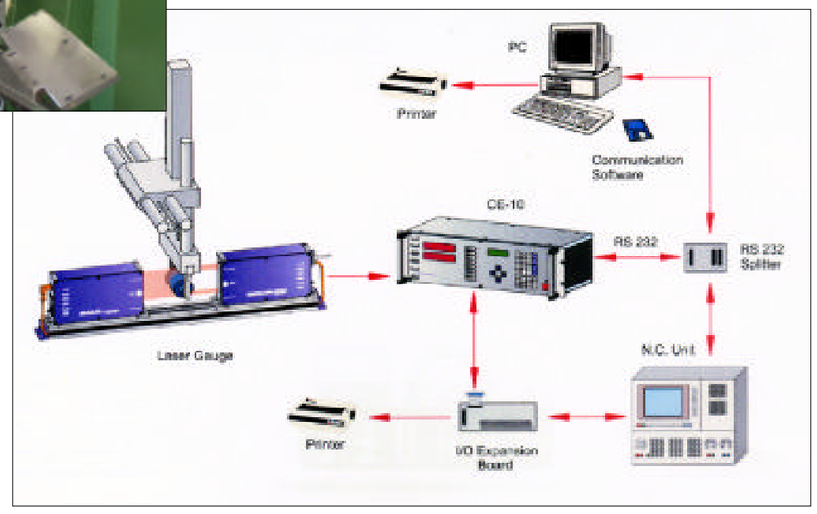
The CE 10 controller is pictured below. All the necessary control functions are easily entered via the front panel. A bright two line LED display makes for easy reading of the data.



In the center of the front panel are a group of indicators. They are; High, Low, No Go, Go, Continuous, Limit, Dirty, and Error. A two line LCD display just above the direction arrows is used to advise the operator what dimensions are displayed on the LED displays. With this display, the operator can scroll and enter the available menus, store data setups and select the operating mode.

Pictured above is a typical NC process utilizing a Mecline 40 as the measuring device. A part is placed in the measuring field of the Mecline 40.

A typical system configuration is illustrated in the block diagram on the right.



Mecline Software

The Mecline software resides in the CE 10 controller and is modular in design. At any time additional modules can be added by the user. The standard software which is included in the basic price is the Mecline 213 software. By adding different modules, such as process regulation and statistics, the system can be adapted to suit different operating requirements. Special care has been taken to ensure the user that the system is easy to use and simple to program by non computer types. Function keys and branch menus are used to select the various functions or to enter the numerical values prompted by the program(s).

Mecline 213

The Mecline 213 software is designed to gauge multiple diameters of parts made on NC lathes. The basic package includes the following functions:

- Measures up to 10 different diameters on the same part.
- Displays the measured values and their shifts from the nominal set points.
- Two selectable section gauging modes: "Stopped" or 'Through Feed"
- When in "Stopped" mode, after getting the Start / Stop command, the section diameter is measured. Once the preset measuring time has elapsed the diameter value is displayed and transmitted to the NC.
- When in 'Through Feed" mode, several samplings are performed during the measurement period included between two consecutive Start / Stop signals. Each sampling has the preset measurement time needed to achieve the required repeatability. The max, min, avg and max-min (TIR) values are recorded and displayed.
- Each parameter, depending upon the movement of the part during the sampling period (translation or rotation) can be related to a different dimension (average diameter, peak or valley diameter, peak to peak range, ovality).
- For each section it is possible to program a nominal set point and tolerances, following the gauging mode and the measured parameter which has been selected.
- After each section measurement, the recorded value is transmitted and Go, No-Go, Hi and Low signals are activated.
- Overall Good, Reject and Rework signals are released once the checking sequence has been completed.
- Suitable Input lines (Start/Stop, Next and Reset) and Output signals (Measurement in progress) allow simple interfacing with the gantry loader electronics and correct handling of the work piece.
- RS 232, two-way serial interface using the Aeroel or Siemens communication protocol, to remotely program the system or to transmit measured data.
- By adding an optional 1/0 expansion board, parallel data transmission is also possible, sending bytes in sequence.
- Automatic print-out of the section measured value through a standard parallel printer.
- Glass logic for measuring transparent components.
- Up to ten (10) libraries for product parameters are available, directly retrievable by the operator.
- Optional password to restrict the programming functions by authorised personnel only.
- Bi-directional RS232 interface for remote programming or data down loading.
- Multi-lingual menus: English, French, German, and Italian.
- Pre-programmed factory set up to facilitate system installation and start up.

System Components

- ALS 40, ALS 80 or ALS 200 laser gauge head
- CE 10 control unit with Mecline 213 software
- Compressed air window for the gauge head
- 5 meter (16.4') cable between CE 10 and gauge head

Optional Accessories

- 16 outputs plus 10 input expansion board for parallel interface
- High performance filters for compressed air
- High pressure centrifugal blower to pressurize the air windows
- Extension cables