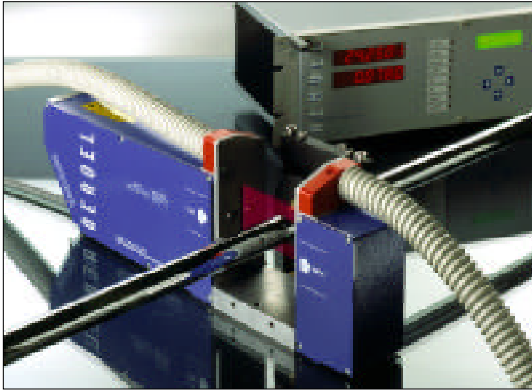


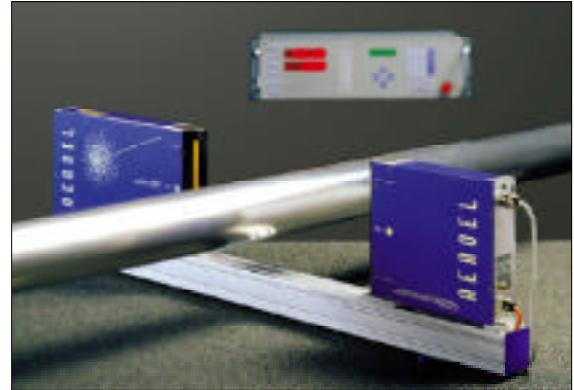
Single Axis Laser Micrometers

Barline Series

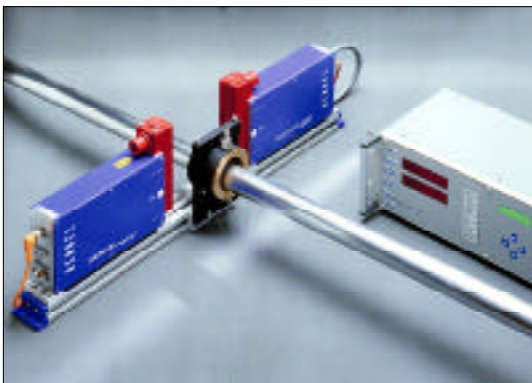
“On-line diameter gauging of manufactured product with cut lengths such as steel ground bars, drawn tubes and copper tubing, etc.”



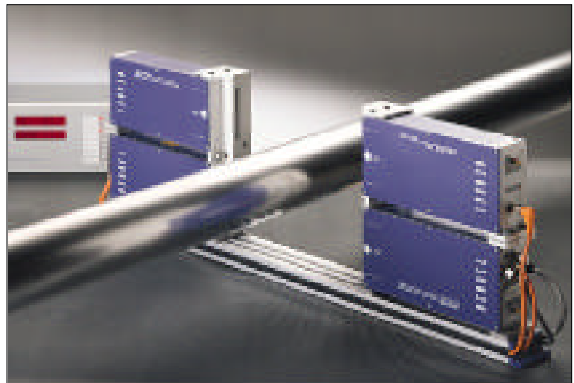
Barline 40



Barline 150



Barline 80



Barline 200

General Description

The Barline series of single axis laser micrometers is specially designed for on-line gauging of the outside diameter of products manufactured in cut lengths. Typical products include steel ground bars, steel drawn tubes, and copper tubing, etc..

The Barline single axis series includes four models, the Barline 40, 80, 150 and 200. Each Barline micrometer is made up of an ALS/ILS laser gauge head and a controller. Any gauge head (the 40, 80, 150 and 200) connects to the CE 10 controller via a single cable. These four models enable measurements of diameters from 0.15mm (0.005) to 200mm (8.15”).

The main functions of an Barline series micrometer are:

- through feed measurement and display of the diameter
- tolerance checking and output alarms for part sorting
- real-time grinder regulation
- process, print and report statistics
- interface with a remote computer

Features

- Measurement range: 0.15 to 207mm (0.0059 to 8.15”) dia.
- Repeatability: $\pm 0.25\mu\text{m}$ (0.00001”) @ 3 Sigma
- Grinder wheel wear control
- Alarms, reject and sorting control
- Software for regulation and statistical analysis
- Head and tail skip capability
- Patented self-calibration guarantees accuracy
- Compressed air windows on gauge head(s)

Benefits

- Fast non contact measurement
- On-line measurements for 100% control
- Improvement in quality and product consistency
- Assists in quality certification

Single Axis Laser Micrometers

System Operation

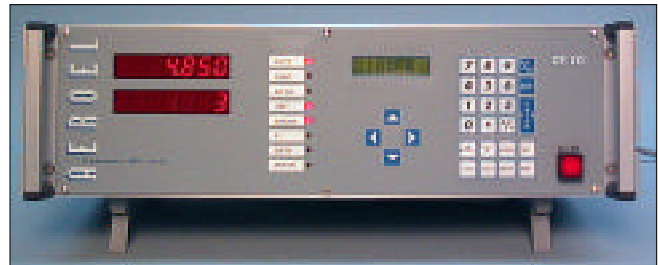
A Barline series laser micrometer, when installed at the output of a grinder or drawing bench can measure the product's diameter with extreme precision. The use of laser/optic technology makes this possible.

The non contact principle enables through-feed inspection without having to stop or slow down the product. Vibration and movement of the product do not affect the gauging accuracy.

The CE 10 controller compares the measured diameter to a reference or nominal diameter. This parameter is stored in the CE 10 controller by the operator. If the measured deviation of the product exceeds the stored limits, the Barline software automatically adjusts the grinder (recovers for wheel wear of the grinder) thereby maintaining product size within the specified limits.

After skipping the head and tail sections, all the measurements taken along the bar are stored in memory and compared to the pre-programmed tolerance limits. If there is a non conformity, the appropriate signals are activated at the end of the bar to drive sorting and/or rejecting devices.

The measured diameter can also be stored in the CE 10's memory and proceed to produce fully detailed statistical reports which are required for quality certification. Through a RS 232 serial line, a remote computer can be used to download the measured data or to program the system.



The CE 10 controller is pictured above. 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.

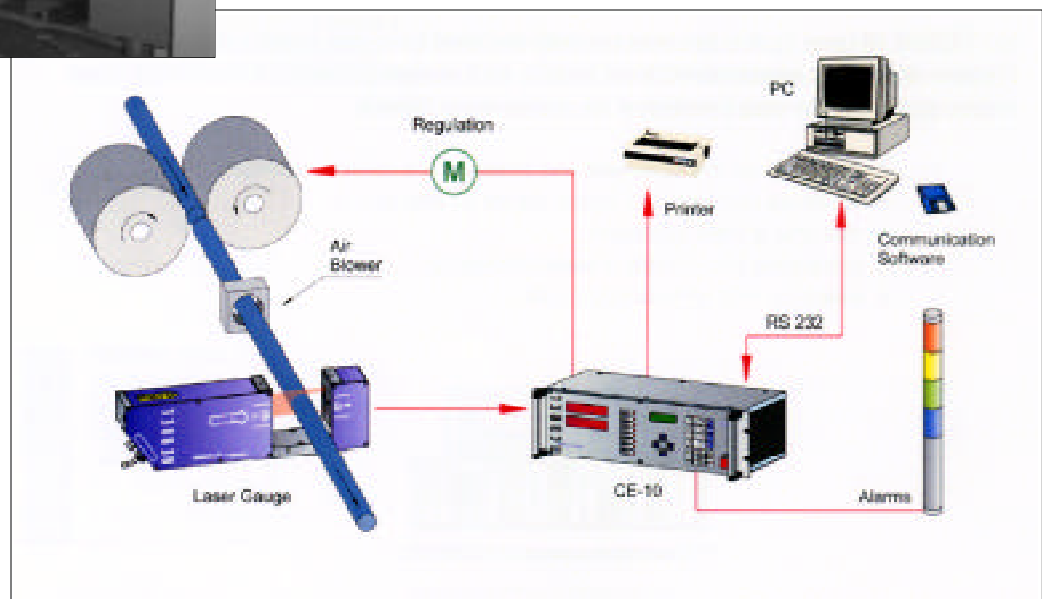
In the center of the front panel are a group of indicators. They are; High, Low, No Go, Go, Continuous, Limit, Dirty, and Error. A two line LCD display just above the direction arrows is used to advise the operator what dimensions are displayed on the LED displays. With this display, the operator can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



By installing the laser gauge head right after the grinding wheels and before the oiling device the bar can easily be cleaned by blowing away the emulsion with our blow ring accessories.

Pictured above is a typical grinder process. The Barline 200 laser micrometer is visible in the foreground to the left. The CE 10 controller is on the right. The CE 10 controller is in charge of the control process. The CE 10 controls for the grinder wear and alarms. To the right is a block diagram of the system setup.

The photograph illustrates the harsh environment in which a Barline laser micrometer is typically installed.



Barline Software

The Barline 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 Barline X 202 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).

Barline X 202

The Barline X 202 software is designed to gauge the outside diameter of cut to length products. The basic package includes the following functions:

- Display of the measured diameter and its shift from the nominal set point.
- Programmable skipping of head and tail scans.
- Recording of measurements taken along the bar and printing of the values of max, min, avg. diameter.
- Programming of nominal value and tolerances.
- Real-time and delayed (end of bar) out-of tolerance alarms (Go/No Go).
- Part sorting signals (Rework/Reject).
- Automatic compensation for product thermal expansion by programming the temperature and the expansion coefficients.
- Library of parameters for 20 different products, directly retrievable by the operator.
- Optional password to restrict the programming functions to authorized personnel only.
- Bidirectional RS232 interface for remote programming or data down loading.
- Multilingual menus: English, French, German and Italian.
- Pre-programmed factory set up to facilitate system installation and start-up.

Process Regulation Module

- Software for automatic diameter regulation by adjusting the distance between the grinding wheels.
- PI (Proportional-Integral) mode, using INC (+) or DEC (-) pulse trains, whose number is proportional to the amount of correction required.
- Regulation is started after a positive check on a real trend of drift from the nominal set-point.
- Control parameters can be programmed and stored in the product library.
- Automatic backlash recovery is accomplished by adding extra pulses each time the correction is reversed.
- A Separate averaging time for feedback. It can be set longer than the averaging time for tolerance checking. It is usually programmed to be as low as possible to detect the shortest flaw diameter.

Statistics Module

The Statistics Module (Option P2) offers the following additional functions:

- Processing and printing of a report for each batch of bars (bundle).
- The max, min, avg, Cp and Cpk values for each parameter recorded on the bar (max, min, avg. diameter) are computed and printed.
- The bundle can be selected manually by the operator or determined automatically via a Start/Stop input signal.
- Identification of the order and the operator with automatic progressive numbering of the bundle.
- Statistics can include all the bar's in a bundle, or it can be restricted to good or rejected bars only.
- All reports show the date and time which can be preceded by a programmable alphanumeric header.
- The reports can be printed by a standard PC printer or they can be transferred to a remote computer via the RS232 serial interface.

BUNDLE STATISTICS				
- STATISTICS VARIABLES -				
		Min.	Max.	Avg.
# Bundle	1			
# Bars	4			
Min. (mm)		5.416	5.485	5.480
Max. (mm)		5.479	5.507	5.490
Avg. (mm)		5.468	5.498	5.484
Std. Dev. (UR)		167.50	81.84	42.02
Cp		0.20	0.41	0.79
Cpk		-0.13	-0.14	0.75

By connecting a printer to the CE 10 controller printer port, statistical reports are easily accomplished. A typical printout is illustrated above. The language selected in the CE 10 was English.

Optional Accessories

- Air blow rings for bar cleaning
- High performance filters for compressed air
- Vertically adjustable floor stand for the gauge head
- Extension cables

Single Axis Laser Micrometers

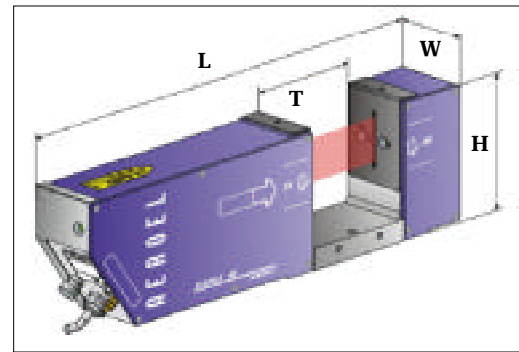
Barline Series

Specifications	Barline 40	Barline 80	Barline 150	Barline 200
Measurement field	40mm (1.57")	80mm (3.15")	150mm (5.9")	209mm (8.228")
Measurement range	0.06 - 38mm (0.002 - 1.50")	0.8 - 78mm (0.03 - 3.07")	0.8 - 149mm (0.03 - 5.87")	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")	1/10µm (0.00004/0.0004")
Repeatability @ 3 Sigma	± 0.6µm (0.000024")	± 1µm ² (0.00004")	± 1.5µm (0.000055")	± 1µm ¹ (0.00004")
Linearity	± 1.5µm (0.00006")	± 3µm (0.0001")	See note ¹	See note ¹
Dimensions (L x W x H)	445 x 68.5 x 134mm (17.5 x 2.7 x 5.27")	736 x 60 x 163mm (28.97 x 2.36 x 6.42")	1090 x 60 x 279mm (32.91 x 2.36 x 12.28")	836 x 60 x 312mm (32.91 x 2.36 x 12.28")
Throat distance	102mm (4.01")	148/248mm (5.83/9.76")	400/600mm ² (15.74")	259mm (10.2")
Operating temperature	0 to 50° C	0 to 50° C	0 to 50° C	0 to 50° C
Weight	3.8Kg (8.37lbs.)	6.2Kg (13.66lbs.)	15Kg (33.05lbs.)	13Kg (28.64lbs.)

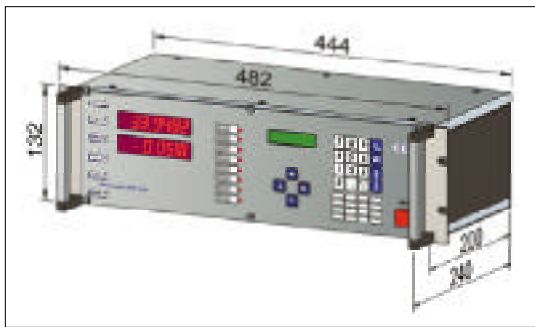
1. Linearity ± 3µm for diameters < 75mm, ± 5µm for diameters > 75mm.
2. Repeatability; ± 1µm up to 70mm, ± 3µm from 70 to 207mm.
3. Length dimensions for the ILS 150, add 200mm for the 600mm separation.
4. Laser source; visible diode, class 2.
5. Scan frequency, 200Hz.

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.)



Barline 40 gauge head dimensions.



CE 10 controller dimension in mm.

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