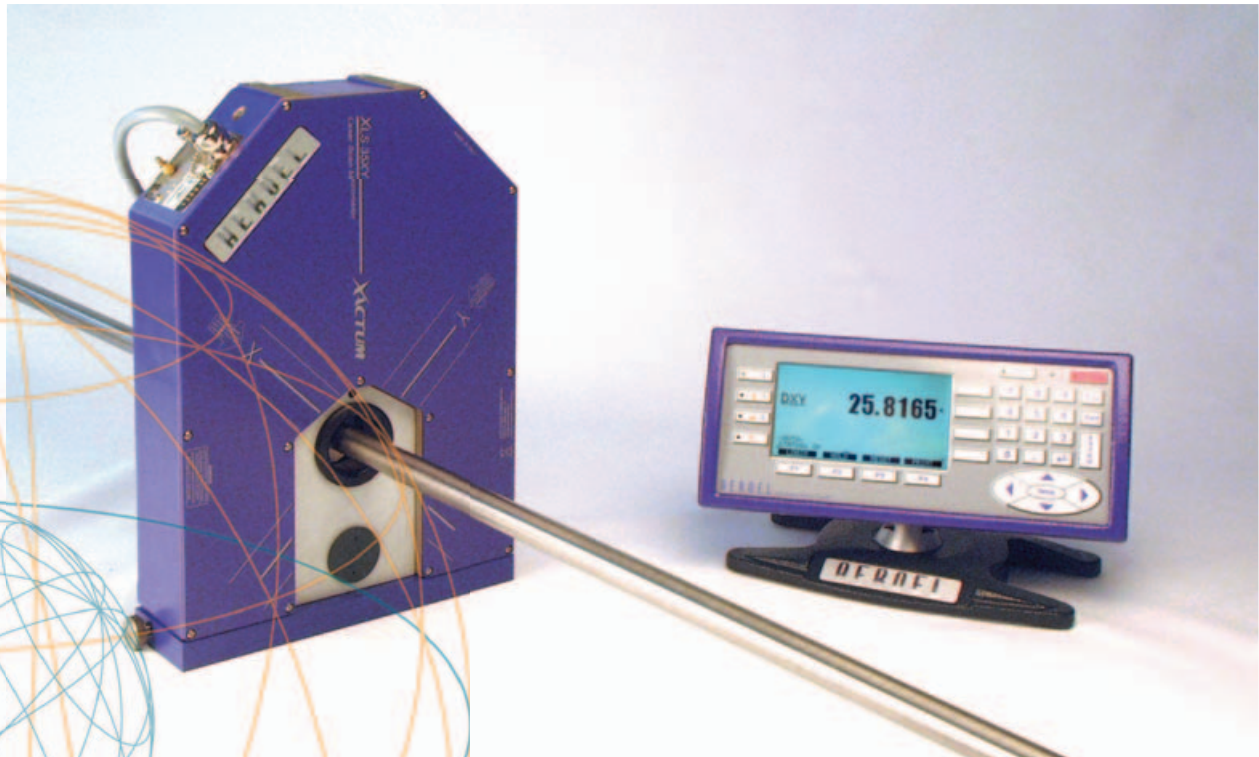


BARLINE.XY

**Laser System for on-line diameter control
of bars and tubes.**



The Barline.XY Laser System has been specially designed for on-line gauging of the outside diameter of products manufactured in cut lengths; such as steel ground bars, steel drawn tubes, copper tubing, etc

The main functions of the system are as follows:

- through-feed measurement and display of the external diameter
- tolerance checking and output alarms for part sorting
- real-time grinder regulation
- processing and printing of statistical reports
- interface with remote computer

How does it work?

The Barline.XY System is based on an Xactum Laser Gauge, installed at the output of the grinder or drawing bench, which measures very accurately the outside diameter of the product passing through the laser beam. The non-contact operating principle enables through-feed inspection, without having to stop or slow down the product, as its vibration and movement do not affect the gauging accuracy. The dual axis laser gauge (XY) allows additional ovality checking, provided that the product doesn't rotate around its axis (i.e. drawn tube); on spinning product (i.e. ground bar) it's impossible to get the ovality and the X and Y readings are processed in an undifferentiated way.

The measured average diameter is continuously compared with the nominal value pre-set by the operator: if the product size is going out of the pre-set limits, the Barline.XY software automatically adjusts the grinder, recovering the wheel wearing so as to keep the product always within the desired tolerance limits. After skipping the head and the tail, all the readings taken along the bar are stored in memory and compared to the pre-programmed tolerance limits: in case of any non conformity occurrence, suitable signals are activated at the end of the bar to drive sorting or/and rejecting devices.

By connecting a printer to the CE-100 panel, it is possible to get a print-out listing the max, min and average values measured on each part; in addition this data can be recorded and processed to print a final statistical report related to each selected bundle of bars. Through an Ethernet or RS232 serial line, a remote computer can be used to download the measured data or to programme the system.

Benefits

- **No customer reject or later complaints**, as the continuous on-line inspection allows detection and sorting any out-of-tolerance parts.
- **Reduction of scrap and material savings**: the real-time process control keeps the product within the tolerance range.
- **Labour savings**: the operator's task is made lighter by the unsupervised grinder regulation.
- **Quality certification made easier**: the 100% inspection makes random sample checks redundant and allows the printing of detailed reports to prove Product Quality and Process Capability

System configuration

The Barline.X system uses dual-axis Xactum Laser Gauges and can also be supplied in the HF (High Scan Frequency) version.

The Basic system is composed of:

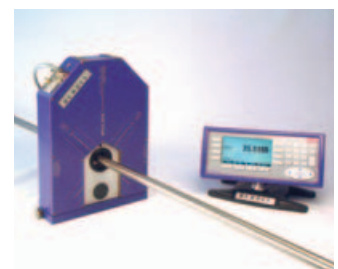
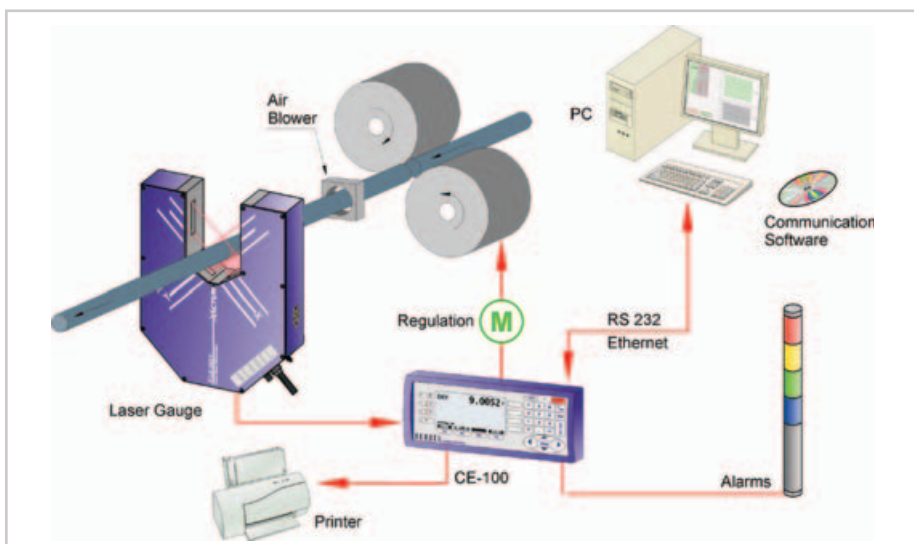
- **XLS13XY** or **XLS35XY** Xactum Laser Gauge;
- **CE-100**, Operator's Interface Panel, 19" Rack mount version;
- **Barline.XY software** (basic module) pre-installed in the Gauge;
- 5 m long connecting cable

Some options and accessories available to complete the system are:

- Additional software for for grinder feed-back
- Additional software for statistical reporting
- Protective bracket
- Air blowing rings for bar cleaning
- Telescopic stand for the laser gauge
- Extension cables
- Gauge Calibration Report

Advantages

- **Insensitive to bar vibration and movement**: the non-contact laser operating principle enables through-feed inspection, without having to stop or slow-down the product.
- **The oil doesn't affect the gauging accuracy**: thanks to the compact size of the gauges and to some specially developed accessories, in most cases it is possible to install the sensor just after the grinding wheels and before the oiling device, in such a position where the bar can be easily cleaned by blowing away the emulsion.
- **High precision**: a patented self-calibration device guarantees permanent gauge accuracy with no re-mastering required.
- **Straightforward operation**: guided menus ensure maximum ease of usage, even for untrained staff.
- **Competitive price**: the favourable cost/benefits ratio ensures a short pay back time.
- **Reliability and long life**: the high standards of components and the solid state laser source warrant long operational life.



The Barline.XY Software

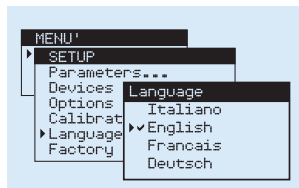
The Barline.XY software is pre-loaded inside the Xactum gauge and, thanks to its modular structure (basic package + optional Regulation and Statistics) it can meet all operational requirements. Special care has been taken to ensure that the system is easy to use and simple to program even by non-experts. Through the CE-100 Interface Panel, the operator



uses function keys and pop-up menus to select the various functions or to enter the numerical values requested by the program.

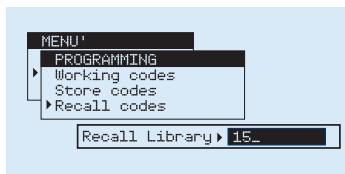
The basic package includes the following functions:

- Display of the measured diameter, of its shift from the set point and of the ovality (*)
- 3 measured values can be simultaneously displayed on the screen.
- Programmable skipping of head and tail scans.
- Recording of measurements taken along the bar and printing of the values of max, min, avg diameter and ovality (*).
- Programming of nominal value and tolerances.
- Real-time and delayed (end of bar) out-of tolerance alarms (Go/NoGo).
- Part sorting signals (Rework/Reject).
- Automatic compensation for product thermal expansion, by programming the temperature and the expansion coefficient.
- Library of parameters for 1000 different products, directly retrievable by the operator.
- Possibility of entering a password to restrict the programming functions to authorized personnel.
- Ethernet / Rs232 interface for remote programming or data retrieval.
- Multi-lingual menus (Italian, English, French and German).
- Selectable measuring unit (mm or inches) and resolution.
- Pre-programmed factory set-up to facilitate installation and start-up of the system.

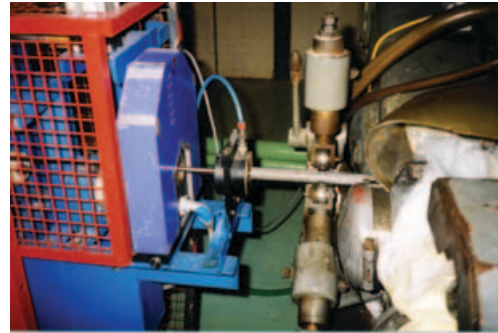
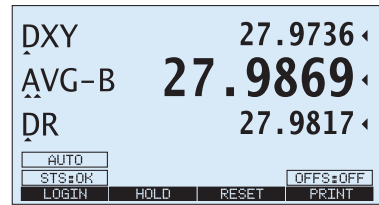


The additional Process Regulation module (Option 1) features the following functions:

- 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 the required correction.
- Regulation is started after having positively checked a real trend to drift from the nominal set-point.



- Control parameters can be programmed and stored in the product library.
- Automatic backlash recovery, by adding extra pulses each time the correction is reversed.
- Separate averaging time for feed-back: it may be set longer than the averaging time for tolerance checking, usually programmed to be as low as possible to detect even shortest diameter flaws.



The additional Statistics module (Option 2) offers the following functions:

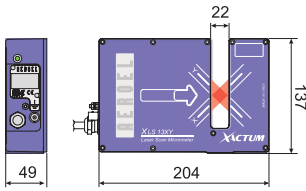
- Processing and printing of a report for each batch of bars (bundle).
- The max, min, avg, Cp and Cpk values for each parameter recorder on the bar (max, min, avg diameter and ovality) are computed and printed.
- The bundle can be selected manually by the operator or determined automatically via a Start/Stop input signal.
- Identification of the order and of the operator, with automatic progressive numbering of the bundle.
- Statistics can include all the bars of the bundle, or it can be restricted to the good or rejected bars only.
- All reports show the date and time

BUNDLE STATISTICS		STATISTICS VARIABLES		
		Minimum	Maximum	Average
#Bundle	5658			
#Bars	15			
Minimum [mm]	5.416	5.485		5.480
Maximum [mm]	5.479	5.507		5.490
Average [mm]	5.468	5.498		5.484
Dev.Std [UR]	167.50	81.94		42.02
Cp	0.20	0.41		0.79
Cpk	-0.13	-0.14		0.75

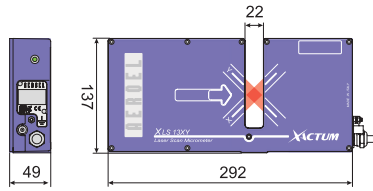
(*) The ovality processing and displaying is possible only when measuring non spinning products.

Specifications

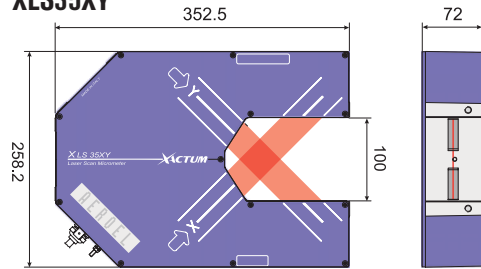
XLS13XY/480



XLS13XY/1200



XLS35XY



All dimensions are in mm.

BARLINE		NEW XY 13/A	XY 13/A/HF	NEW XY 35/A	XY 35/A/HF
Gauge Model		XLS13XY/480/A	XLS13XY/1200/A	XLS35XY/480/A	XLS35XY/1200/A
Measuring Field (mm)		13 x 13 ⁽¹⁾		35 x 35 ⁽²⁾	
Measurable Diameters (mm)		0.1 - 10		0.2 - 32	
Resolution (Selectable) (µm)		10 / 1 / 0.1 / 0.01			
Linearity (Centred Product) ⁽³⁾ (µm)		± 0.5 ⁽⁴⁾		± 1 ⁽⁵⁾	
Linearity (Full Range) ⁽⁶⁾ (µm)		± 1.5		± 2.5	
Linearity (Reduced Field) ⁽⁷⁾ (mm)		± 1		± 1.5	
Repeatability (T=1s, ±2σ) (µm)		± 0.15 ⁽⁸⁾	± 0.04 ⁽⁹⁾	± 0.3	± 0.15
Single Shot Repeatability (±2σ) (µm)		± 1	± 0.75	± 3.5	± 2.5
Beam Spot Size (s,l) ⁽¹⁰⁾ (mm)		0.1 x 4		0.2 x 4	
Scanning Frequency (Hz)		480 (X) x 480 (Y)	1200 (X) x 1200 (Y)	480 (X) x 480 (Y)	1200 (X) x 1200 (Y)
Scanning Speed (m/s)		156	98	288	180
Gauge Thermal Coefficient ⁽¹¹⁾ (µm/m°C)		- 18		- 18.4	- 9
Laser Source		VLD (Visible Laser Diode); λ = 650 nm			
Dimensions (mm)		204 x 137 x 49	292 x 137 x 49	352.5 x 258.2 x 72	
Weight (kg)		2	2.5	5.8	

Notes

- (¹) For $\varnothing \geq 0.3$ mm; for smaller diameters the field is proportionally reduced up to 4 x 4 mm for $\varnothing = 0.1$ mm.
(²) For $\varnothing \geq 0.3$ mm; for smaller diameters the field is proportionally reduced up to 20 x 20 mm for $\varnothing = 0.2$ mm.
(³) Related to the average diameter $(X+Y)/2$. The value is inclusive of the Aeroel's masters uncertainty (± 0.3 µm).
(⁴) For $\varnothing \leq 1$ mm. For $\varnothing > 1$ mm the linearity is ± 1 µm. The value is inclusive of the Aeroel's masters uncertainty (± 0.3 µm).
(⁵) For $\varnothing \leq 15$ mm. For $\varnothing > 15$ mm the linearity is ± 1.5 µm. The value is inclusive of the Aeroel's masters uncertainty (± 0.3 µm).

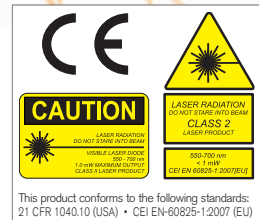
- (⁶) Max. measurable shift of the average diameter $(X+Y)/2$, when a master is moved along the two X and Y axes crossing the centre of the field, checked with $\varnothing=3$ mm (XLS13XY) or $\varnothing=8$ mm (XLS35XY).
(⁷) The field is 5 x 5 (XLS13XY) or 16 x 16 (XLS35XY).
(⁸) For $\varnothing \leq 0.5$ mm the repeatability is ± 0.03 µm.
(⁹) For $\varnothing \leq 0.5$ mm the repeatability is ± 0.02 µm.
(¹⁰) Elliptical spot: "s" is the thickness and "l" is the width.
(¹¹) Typical value. It states the measurement drift due to the room temperature change, when measuring a master with null coefficient of expansion (INVAR).

Specifications subject to change without notice. For additional details and complete specifications please see the gauge data sheet.



CE-100 Operator's Interface Panel

Monochromatic **LCD Display**, 240 x 128, backlit
"Touch-Sensitive" **capacitive keyboard**, with 34 keys and 7 warning LED
RS485 interface to connect the XLS gauges
8 protected and optocoupled **outputs**, **4 optocoupled inputs**,
2 inputs to the gauge
Ethernet & RS232 ports and **Centronics output for parallel printer**
Available with adjustable **table-top base** or for **19" Rack mounting**
Dimensions: 132 x 300 x 72 mm (panel alone)
Weight: 1,9 kg (panel), 3,4 kg (table-top version), 2,8 kg (Rack mounting version)
Power supply: 24 VDC, 100 mA Typical (1 A max)



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