Extruline.X is a laser system designed to control the external diameter of extruded products such as electrical wires, plastic tubes and similar products.

In addition to the diameter measurement and tolerance checking, Extruline.X can provide the automatic extrusion process regulation, detect and locate diameter flaws all along the product's length.

With non contact technology it is possible to measure moving products, hot or soft, where conventional instruments cannot be used and may even damage the product.
How does it work?

The Extruline.X system is based on an Xactum laser gauge, installed at the exit of the extruder, which measures the external diameter of the product.

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 Extruline.X software automatically corrects the extruder so that the product is always within the desired tolerance limits.

The measured data are displayed on the screen of a CE-200 Operator Interface Panel, which is also used to program the system; in addition all measurements are recorded and processed to get a complete statistical report which can be immediately printed to prove the product Quality.

System configuration

The Extruline.X system uses single-axis Xactum Laser Gauges.

The Basic system is composed of:

- XLS40, XLS80 or XLS150, Xactum Laser Gauge;
- CE-200, Operator’s Interface Panel, 19” Rack mount;
- Extruline.X 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 the extruder regulation
- Additional software for statistical analysis
- Additional software for Flaw Detection and Location
- Electronic potentiometer for the extruder interfacing
- Proximity switch for length counting
- Blow rings to dry the product
- Telescopic stand for the laser gauge
- Extension cables
- Gauge Calibration Report

Advantages

Two instruments in one: diameter controller and flaw detector. Extruding at the lower limits of tolerance means significant savings in materials.

The automatic control capability saves labour costs.

Non-contact measurement for the on-line application and 100% control.

Improvement in product quality and reduction of waste.

Flaw-free products with assessed quality.
The Extruline.X Software

The Extruline.X software is pre-loaded inside the Xactum gauge and, thanks to its modular structure (basic package + optional Regulation, Statistics and Flaw Location) 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-200 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 and of the shift from the nominal diameter.
• 3 measured values can be simultaneously displayed on the screen.
• Programmable alarms and pre-alarms for out-of-tolerance conditions.
• Measurement of opaque or transparent products (Glass Logic).
• Library for 1000 different products, retrievable directly 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 regulation of the diameter by adjusting the drawing speed or the flow rate of the extruder.
• PI (Proportional Integral) mode using INC (+) or DEC (-) signals.
• The process regulation is started only when a real trend to deviate from the nominal pre-set value is detected.
• Automatic compensation of dead time, according to variations of the line speed.
• All control parameters can be programmed and stored in the product library.
• Programmable hot/cold offset to compensate for the thermal expansion of the extruded product when the measurement is performed immediately after the extrusion head.

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

• Histograms showing the measured diameters
• Programmable diameter limits to filter out and ignore abnormal measurements arising from anomalous working conditions.
• The data acquisition interval can be selected manually by the operator or automatically determined via a Start/Stop input.
• Recording of maximum, minimum and average values.
• Calculation of standard deviation of Cp and Cpk values.
• Total length and average speed reporting.
• All listings show the date and time.
• Identification of the operator, the machine and the type of product.
• Progressive numbering of the reel.

The additional Flaw Detecting and Location module (*) (Option 3) offers the following functions:

• Single scan diameter checking capability.
• Separate tolerance limits for the flaw detection function, added to the pre-set nominal value or to the average diameter previously measured (self adapting mode).
• Independent outputs for + and - flaws.
• Recording of the max or min value of the flaw and its position along the spool.
• Print out of a Flaw Location Report.
• The report can include flaws detected by other external devices (i.e. Spark Testers, Capacitance Testers, etc.)

(*) Only flaws which turn into a diameter change all along the product circumference, like “olives” or “neck-down”, can be surely detected. The minimum detectable flaw length is given by the max line speed divided by the gauge scan frequency.
### Specifications

#### XLS40
- **Color LCD Display**: 640x480, backlit
- **"Touch-Sensitive" capacitive keyboard**: with 35 keys and 7 warning LED
- **RS485 interface** to connect the XLS gauges
- **8 protected PNP outputs**, **5 PNP Inputs**, **2 inputs** to the gauge
- **2 configurable analog outputs**

#### XLS80
- **Dimensions**: 500 x 134 x 68.5 mm (panel alone)
- **Weight**: 4.2 kg (panel), 3.1 kg (table-top version)
- **Power supply**: 24 VDC, 100 mA Typical (1 A max)

#### XLS150
- **Dimensions**: 790 x 170 x 60 mm
- **Weight**: 7 kg (panel), 5.2 kg (table-top version)
- **Power supply**: 24 VDC, 100 mA Typical (1 A max)

### Notes

1. For Ø < 25 mm, the linearity is ± 0.15 μm. The value is inclusive of the Aeroel's masters uncertainty (± 0.3 μm).
2. For Ø < 40 mm, the linearity is ± 0.15 μm. The value is inclusive of the Aeroel's masters uncertainty (± 0.3 μm).
3. For Ø > 100 mm, the linearity is ± 0.75 μm. The value is inclusive of the Aeroel's masters uncertainty (± 0.3 μm).
4. The measured error, when a master is moved in the measuring plane, checked with Ø = 8 mm (XLS40), Ø = 20 mm (XLS80) or 10 Ø = 100 mm (XLS150). The measuring plane is located halfway between transmitter and receiver.

### CE-200 Operator’s Interface Panel

- **Color LCD Display**: 640x480, backlit
- **"Touch-Sensitive" capacitive keyboard**: with 35 keys and 7 warning LED
- **RS485 interface** to connect the XLS gauges
- **8 protected PNP outputs**, **5 PNP Inputs**, **2 inputs** to the gauge
- **2 configurable analog outputs**

<table>
<thead>
<tr>
<th>Type of gauge</th>
<th>EXTRULINE.X40/A</th>
<th>EXTRULINE.X80/A</th>
<th>EXTRULINE.X150/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Field (mm)</td>
<td>40</td>
<td>80</td>
<td>150</td>
</tr>
<tr>
<td>Measurable Diameters (mm)</td>
<td>0.1 - 38</td>
<td>0.75 - 78</td>
<td>0.8 - 149</td>
</tr>
<tr>
<td>Resolution (Selecteble) (μm)</td>
<td>± 0.5</td>
<td>10 / 1 / 0.1 / 0.01</td>
<td>± 3</td>
</tr>
<tr>
<td>Linearity (Centred Product) (μm)</td>
<td>± 0.5</td>
<td>± 1</td>
<td>± 3</td>
</tr>
<tr>
<td>Repeatability (μm)</td>
<td>± 0.07</td>
<td>± 0.2</td>
<td>± 0.4</td>
</tr>
</tbody>
</table>

### Electronic potentiometer

- **Analog output from 0 to 10 Volt**, adjusted by INC (+) or DEC (-) pulses.
- **Additional PWM output** to drive solenoid valve
- **Output level display in % of range**, 3 digits LED display H=14.2 mm
- **LOCAL or REMOTE adjustment mode.**
- **Memory of last setting before power down.**

### Contact Information

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