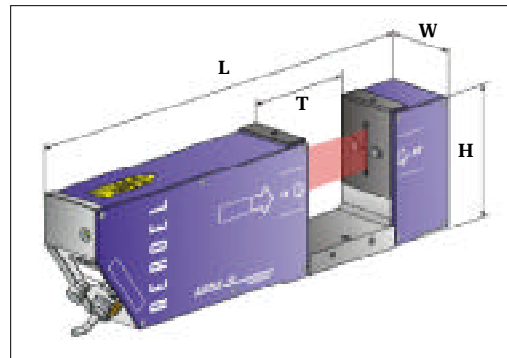


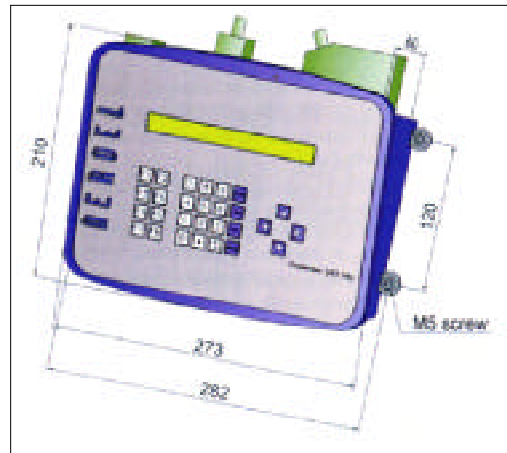
Multi-Wire Laser Micrometers

System Performance

Min. measurable diameter:	0.05mm (0.002")
Max. measurable diameter:	depends on wire size
Resolution (user selectable):	0.001/0.0001 mm 40/4" x 10 ⁻⁶
Repeatability (@ 3 sigma):	± 0.0003/0.001mm ± 0.000012/0.00004"
Measuring time:	0.25/1.00 sec.
Minimum wire pitch:	4.5mm (0.177") for 8 wires
Max. no. of wires:	8
Wire positions:	equally spaced in meas. range
Measurement range:	40mm (1.57")
Laser source:	visible diode, class 2



ALS 40 laser gauge head dimensions: (l x w x h) 414 x 104 x 129mm (16.3 x 4.09 x 5.08")



IBU control unit dimensions: (l x w x h) 282 x 210 x 60mm (11.1 x 8.27 x 2.36")

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Wirescan 40 System

Electric Potentiometer, MOD-02-00

- Analog output - 0 to 10V, adjusted by INC(+) or DEC(-) pulses
- Additional PWM output to drive solenoid valve
- Output level display in % of range, 3 digit LED display, 14.2mm (0.56") high characters
- LOCAL or REMOTE adjustment mode
- Memory maintains last setting on power down
- Plastic case: DIN 43700
- Dimensions: 96w x 106d x 48h mm (3.78 x 4.17 x 1.89")
- Power requirements: 24VDC/VAC, 100ma



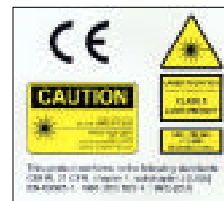
Remote Display, MOD-00-00

- RS 485 interfaces - two
- Display* - dia. x, dia. y, avg., ovality, 4 tolerance indicators
- Plastic case: DIN 43700
- Dimensions: 96w x 106d x 48h mm (3.78 x 4.17 x 1.89")
- Power requirements: 24VDC/VAC, 100ma



Note* the display can be used with both single axis and dual axis laser micrometers. When used with the single axis Wirescan system, the average dimension displays the wire diameter.

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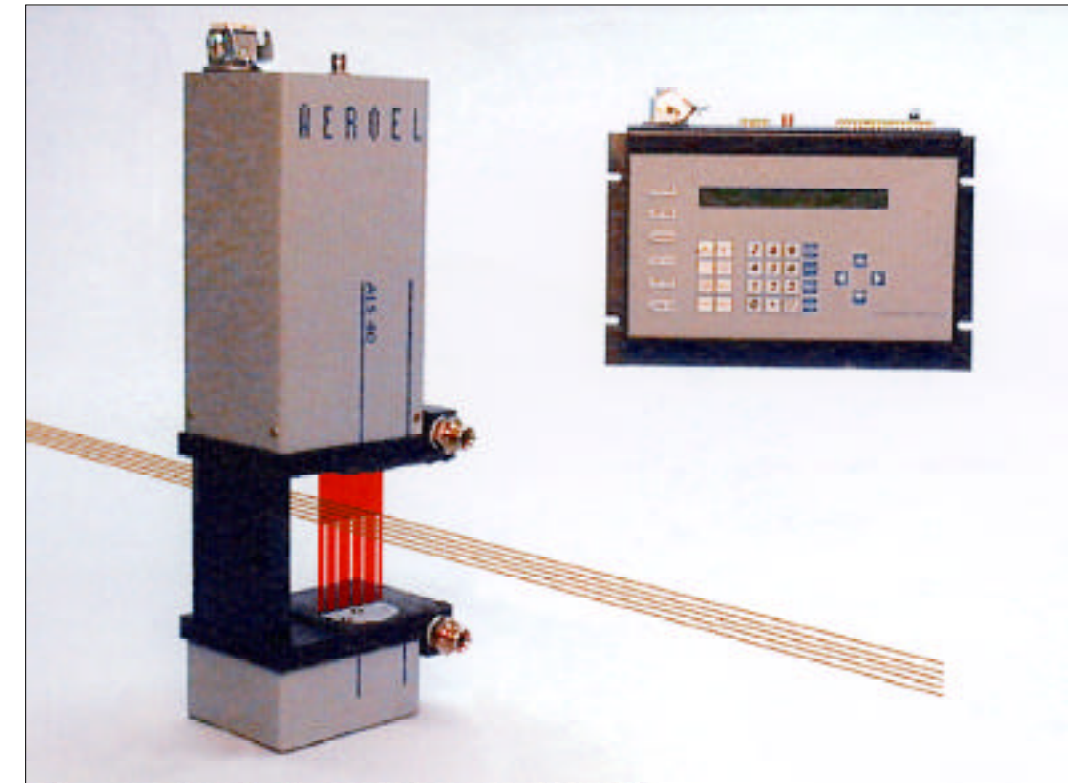


The closer you look, the better we measure!

Multi-Wire Laser Micrometers

Wirescan 40 System

"On-line diameter control of multiple wires simultaneously"



Pictured above is the ALS 40 laser gauge head with the IBU controller. Five wires are being measured.

General Description

The Wirescan 40 system is designed to be used on-line on multiple wire manufacturing machines. Typical applications include copper drawing machines, magnet wire enamelling and the textile industry to monitor monofilament fibers.

The Wirescan 40 system is composed of the ALS 40 laser gauge head and the IBU control unit. Up to eight (8) wires can be measured simultaneously, provided they are arranged within the 40mm (xx) beam of the laser gauge head.

For the application of magnet wire, an optional software module is available which enables real-time adjustment of the enamel thickness by feeding back the flow of paint that wets the felts.

Typical applications of a Wirescan 40 system are:

- multi-wire measuring on copper drawing machines
- monitor monofilament fibers in the textile industry
- real-time adjustment of enamel thickness for magnet wire

Features

- Measurement range: 40mm (1.57")
- Minimum measurable diameter: 0.05mm (0.002")
- Repeatability: ± 1µm (0.000039") @ 3 Sigma
- Measures up to 8 wires simultaneously
- Measures opaque or transparent objects
- Automatic process regulation
- Software for statistical analysis
- Patented self-calibration guarantees accuracy
- Three year warranty

Benefits

- Fast non contact measurement
- On-line measurements for 100% control
- Improvement in quality and product consistency
- Assists in quality certification
- High performance at a low cost per line

System Operation

When installed on-line, a Wirescan laser micrometer can measure the diameter of any wire(s) placed within the measurement beam. Up to eight (8) wires can be arranged within the measuring field of 40mm (1.57") to be measured. The minimum measurable diameter is 50µm (0.002"). The wires to be measured must be equally spaced within the measuring field of the laser gauge. In other words, each wire must stay within the assigned "window".

There are two modes of operation, Automatic and Manual.

Automatic Mode

In the automatic mode, all the wires are scanned one by one (sequentially). The front panel display of the IBU control unit will show sequentially the measured diameters along with their associated position numbers. Any out of tolerance condition is reported by a front panel warning message. In addition there are alarm output signals to drive external devices.

By selecting the stop mode, the sequential scanning can stop at any out of tolerance condition and wait for a manually activated restart signal from the operator. Alternatively, the operator can set the gauge to continue the measurement cycle while maintaining the alarm condition of an out of tolerance condition.

During the scanning cycle, any desired wire can be skipped to avoid useless gauging of out of order wire lines. Likewise different scanning programs can be stored in memory. In the automatic mode, the operator can select any one of the preset programs.

Manual Mode

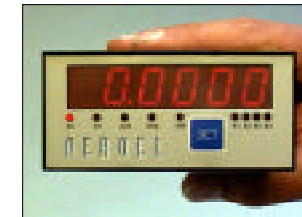
In the manual mode, all setup parameters can be programmed by the operator, i.e: wire number; average time; sampling time; nominal diameter; and the tolerance range. A library is included in the IBU control unit in which the operator can store several types of wire, associated with its tolerances and nominal diameter. Any wire can be manually addressed by entering the wire number. The measured diameter is displayed on the IBU control unit.

Optional Software and Accessories

- Optional software (P1) to feedback the enameling process through remote electronic potentiometers
- Optional software (P2) to process and print statistical reports for each wire
- Modules for remote displays with alarm outputs and drive potentiometers (one for each wire)
- remote electronic potentiometers for process feedback driven through display modules (one for each wire)
- Communication software to connect the system to a remote PC via the RS 485 serial port
- Compressed air windows to prevent contamination build up on the optical windows

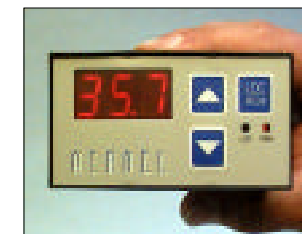
Remote Displays

Up to eight (8) remote display modules can be added to the basic system configuration on the RS 485 common line. The IBU will update these modules to display each wire's diameter or it's deviation from the nominal setpoint. Each display module accommodates two **additional** alarm outputs (nogo and prealarm) activated by the IBU unit. In this manner the tolerance limit capacity of the IBU is expanded and two different alarm outputs for each wire are provided.



Electronic Potentiometer Modules

When the Wirescan system is used to monitor enameled wire, as an optional feature, it is possible to equip the IBU unit with the optional P1 software to feedback the enameling process. To accomplish this feature, the electronic potentiometer module is required. One module per line is required. These modules perform just like standard motor driven potentiometers. They provide the interface between the Wirescan system and the enameling device; pump or rotating drum or solenoid valve which modulates the enamel mass flow rate wetting the applicator felt. For each wire, the IBU will compute and transmit (through the display modules) to the electronic potentiometers the Decrease or Increase pulses required to adjust the enamel flow to its optimum value in order to obtain a constant finished diameter for each wire, as close as possible to its preset value. Different types of enameling devices can be directly driven by the electronic potentiometer module:



- Pumps or rotating drums (DC motors) by using the 0-10 analog output.
- Solenoid valves by using the pulse width modulated output, included in the module as a standard feature.

Serial Ports

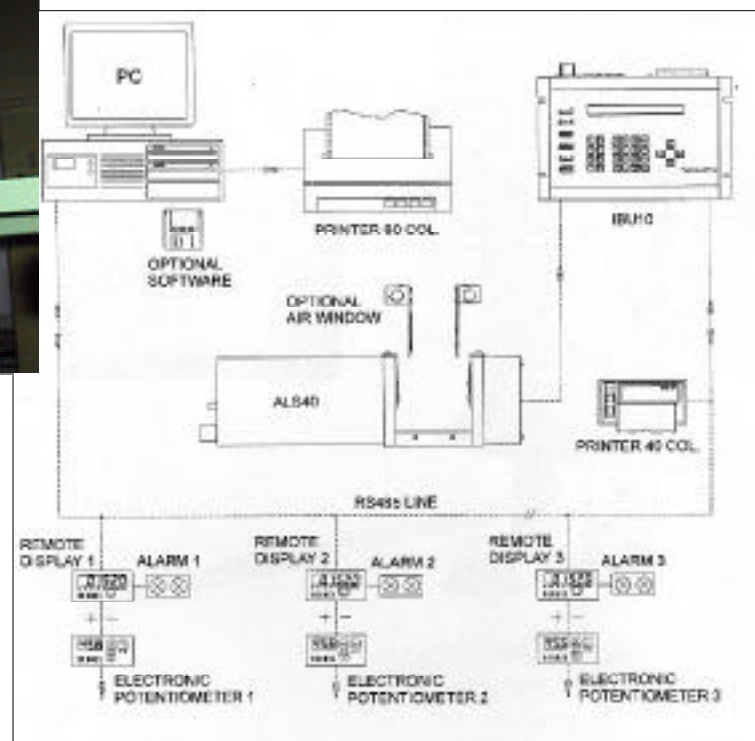
Through a RS 232 or RS 485 serial port, a remote computer can be connected to program the system or to log the measured data. Freedom Technologies will supply, on request, a suitable PC program to manage the data exchange. The same external computer can be used to perform data collection and real-time statistical process control.



Pictured above is a complete system with the remote display and the electronic potentiometer. It is a very compact system.



Pictured above is an installation of a Wirescan system. Two Wirescan 40 systems are depicted. One in the foreground and one in the background. To the right is a block diagram of a typical Wirescan system. It illustrates three remote displays, three electronic potentiometers, and a PC connected to the RS 485 port. Two printers can be supported since one printer is connected directly to the IBU control unit. Compressed air windows can be bolted to the ALS 40 laser gauge head for operation in dirty environments.



STATISTICS REPORT		START: 09:16:59		
08/04/95		STOP: 09:17:41		
Wnn	Var	Min s(n)	Avg Cp	Max Cpk
W01	DXY	3.5011	3.5012	3.5013
		0.038	43.86	33.33
	OVA	0.0037	0.0039	0.0040
		0.080	4.17	-7.92
W02	DXY	3.5012	3.5012	3.5013
		0.044	37.88	28.79
	OVA	0.037	0.039	0.041
		0.092	3.62	-6.88
W05	DXY	3.5011	3.5012	3.5013
		0.044	37.88	28.79
	OVA	0.037	0.039	0.041
		0.078	4.27	-7.69

By connecting a printer to the RS 485 port of the IBU unit, statistical reports are easily accomplished as illustrated above. Illustrated below is the alarm triggered mode. Printing starts each time a wire goes from an in-tolerance to out-of-tolerance condition and vice versa.

		>>> GG/MM/AA		00:MM	
Wnn	STATUS	DN OV	T+ T-	DDXY OVA	DDX DDY
		>>> 08/04/95		11:21	
W01	NOGO	3.5000	0.0050	-0.0309	-0.0306
		0.0040	0.0050	0.0006	-0.0312
		>>> 08/09/95		11:35	
W01	GO	3.5000	0.0050	0.0024	0.0030
		0.0040	0.0050	0.0012	0.0018