

# LR

# 01



DIGITAL

REFRACTOMETER

FOR

LABORATORY

ANALYSIS



**maselli misura**  
PROCESS ANALYZERS

## LR-01 Laboratory Refractometer: simply sophisticated



**W**ith 40 years of refractometer design and manufacturing experience, Maselli has recently developed an advanced instrument for laboratory analysis: the model LR-01 Refractometer. Many important innovations in refractometer technology have been introduced with this instrument.

A sophisticated optical assembly provides high resolution of the product's shadowline and assures exceptional repeatability. The special software program allows:

- personalized operating parameters (custom scale range and calibration parameters)
- optimized shadowline detection by the CCD optical array

- "user-friendly" operation
- total interface flexibility with external hardware and software

The elegant but durable industrial design of the LR-01 permits it to be used both in the laboratory and in the process area.

### Design without compromise

Many years of experience in the design of analytical instrumentation has made Maselli aware of the fact that high performance cannot be achieved by compromising quality. This experience has ingrained the philosophy to always place quality first, before other considerations. This philosophy of "quality first" continues with the design of the new laboratory refractometer LR-01... quality in the design, in the choice of components, the manufacture and testing and in after-sale service as well. Maselli's attention to quality creates the ability to achieve high performance through simple and reliable solutions.

### MAIN FEATURES

- High accuracy (+0.05 Brix)
- Wide scale range (0-95 Brix)
- Automatic temperature compensation
- Totally programmable from keyboard
- 8 operating scales
- 3 custom user ranges for other than Bx or nD
- Sapphire prism
- LED light source
- Digital optical image transducer
- Water-proof stainless steel housing
- Voice synthesizer
- Centronix parallel output for printer
- RS232 serial output for PC
- Special Maselli software for diagnostics and remote configuration

```
LAB LR01 Maselli
Lavoro
Span = 01.000
Interaz. = 00001
Produzione = 049.00
Prod. nD = 1.33986
Zero Pixel = -019.14
X3 USER 1 = 1.36384
X5 USER 1 = 1.45343
Y2 USER 1 = 010.00
Y5 USER 1 = 050.00
T1 USER 1 = 005.01
C1 USER 1 = 000.00
E1 USER 1 = -000.54
E4 USER 1 = 000.34
E7 USER 1 = 002.23
OFFSET 1 = 000.00
X3 USER 2 = 1.36384
```



## Maximum programmability and flexibility

The LR-01 Digital Refractometer is a versatile and functional instrument. Its innovative software allows the user to personalize all the parameters in a simple and complete way. The analyzed results can be displayed in 8 different scale units (one standard Brix scale, one nD scale, 3 custom user's scales and 3 personalized Brix scales). It is also possible to program 3 personalized temperature compensation tables for each user scale. All the parameters are easily entered at the keypad on the front of the instrument, using the simple and logical functions menu. Access to upper level menus requires entering a personalized access code number. This allows even untrained personnel to operate the LR-01 without compromising the integrity of the instrument or its protected parameters. Measurements can be made individually or repeated automatically. The measured values and other messages are shown on a 2x16 character LCD display for easy viewing. Diagnostic alarms reduce the risk of a user entering erroneous parameters. The voice synthesizer, when enabled, provides functional messages in a choice of 4 languages: English, Italian, French and Spanish.



## Applications and optional accessories

The LR-01 unit can be used either in the laboratory or directly in the process area. Although attractively designed, the instrument is really quite sturdy and is constructed for water resistant operation. If the refractometer will be used by untrained personnel, it is possible to program the instrument to restrict the allowable operating procedures to a minimum set of essential commands. The unit can also be used for continuous measurement in a pilot plant environment using an optional flow cell that can be installed directly on the basin to circulate product past the prism. The refractometer can be connected to a parallel printer for printing out the measurement data during operation, and for printing all the essential stored parameters when in the service mode.



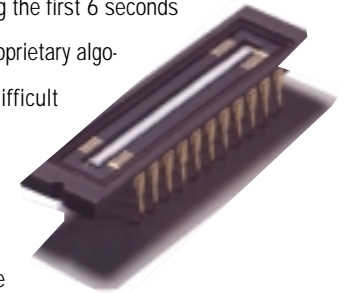
## Easy interface with external peripherals

To satisfy various requirements of interface compatibility, the LR-01 Laboratory Refractometer comes with different digital interfaces able to communicate with a variety of peripheral devices. All of the interface connections are located on the rear panel of the instrument. It is possible to simultaneously communicate with a parallel printer and, via the RS232 serial output, with a personal computer for data acquisition. A special Maselli utility program for PC computers is provided with the LR-01 that permits the user to control the unit in a remote mode. If the refractometer is programmed for the automatic measurement cycle, the auxiliary connector will be needed. This connection provides an input contact to remotely start the measuring cycle, and an output contact that signals the end of measuring cycle. The same connector can also be used to attach an external Pt1000 temperature sensor mounted directly on the continuous flow cell.

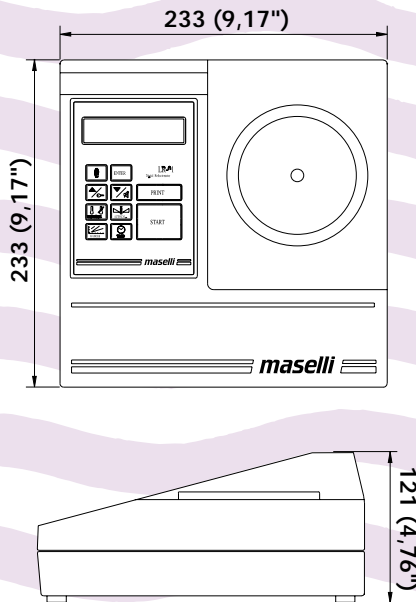


## Very high precision and repeatability

The optical system's innovative solutions for image detection and mathematical interpolation of the measured data guarantee high precision and repeatability. The image reflected by the sapphire prism is detected by a high resolution CCD (Charge Coupled Device) sensor array. The high speed of the CCD optical sensor allows reading the image many times during the first 6 seconds of the measuring cycle before processing the final data. A proprietary algorithm precisely locates the shadow/light interface even for difficult analyses like those for viscous products or with suspended solids. The optical detection hardware and the temperature compensation circuit are designed to achieve maximum speed and accuracy, with automatic compensation from 10 to 40 °C (per ICUMSA 1974 tables). For custom products to be measured on the 3 user-programmable ranges, the software allows individual temperature compensation tables to be defined.



## Technical data



Technical characteristics:	
Measuring limits	1.3330...1.5318 nD 0 to 95° Brix (ICUMSA 1974)
Accuracy	±0.0004nD (±0.03Brix)
Temperature compensation (Brix ranges)	Automatically compensated between 5 to 45°C (41 to 113°F) ICUMSA 1974
Temperature compensation (User ranges)	3 different compensations defined by the user, selectable by entering the error curves within the 5 - 45°C range
10 Measurement Scale Ranges	Brix, nD, 3 user ranges configurable by entering nD vs. % data; 3 Brix user ranges with Zero and Span adjustments HFCS42 and HFCS55 with adjustable Zero value
Temperature sensor	Internal Pt 1000 RTD; with capability of optional external sensor
Light source	LED (Light Emitting Diode)
Prism	Sapphire
Measuring element	CCD optical sensor
Keyboard	Waterproof polyester membrane keyboard
Display	2x16 character LCD display of measured values, units, temperature and other function control symbols
Analysis basin	Stainless steel with circulation ports for optional water bath
Sample volume	0.3 cc minimum
Data output	RS232 serial port for data acquisition, diagnostic and uploading/downloading all setup parameters via computers. Centronix parallel port for data and graphic outputs to printer
Auxiliary Inputs/Outputs	Input and output contacts for START and END of measurement; Input for external Pt 1000 RTD
Power	DC 5V 5W external power supplier AC115/230 V ±10% 50...60 Hz 7VA
Power consumption	7 VA
Weight	-4,8 Kg (10.6 lb)