


# ABBE REFRACTOMETERS



## Abbe Refractometers

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## Multi-Wavelength Abbe Refractometers

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 **DR-M4 / 1550(B)**



## ■ ATAGO products conform to ASTM Standards.

※ Please contact ATAGO for further details.

D542	STM for Index of Refraction of Transparent Organic Plastics
D1045	STM for Sampling and Testing Plasticizers Used in Plastics
D1218	STM for Refractive Index and Refractive Dispersion of Hydrocarbon Liquids
D1416	STM for Rubber from Synthetic Sources--Chemical Analysis
D1747	STM for Refractive Index of Viscous Materials
D1807	STM for Refractive Index and Specific Optical Dispersion of Electrical Insulating Liquids
D4095	STM for Use of the Refractometer for Determining Nonvolatile Matter (Total Solids) in Floor Polishes
D5006	STM for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
D5775	STM for Rubber from Synthetic Sources-Bound Styrene in SBR

## ■ Sucrose Solution (for Brix confirmation)

Sucrose solutions for Brix confirmation are NOW available by ATAGO. Please choose for your use.



Part No.	Part Name	Brix Concentration	Contents
RE-110010	10% Sucrose	10.00 ±0.03%	Approx.5mℓ
RE-110020	20% Sucrose	20.00 ±0.03%	
RE-110030	30% Sucrose	30.00 ±0.03%	
RE-110040	40% Sucrose	40.00 ±0.04%	
RE-110050	50% Sucrose	50.00 ±0.05%	
RE-110060	60% Sucrose	60.00 ±0.05%	

\* Shelf life for these solutions is 6 weeks.

## EXPLANATION OF ICONS

Icons for functions, specifications and scals have been added to catalog.



- \*Can be connected to a circulating constant temperature bath
- \*Thermostatable par circulation
- \*Cirkulierendes konstant temperiertes Wasserbad angeschlossen
- \*Collegabile a bagno termostatico a circolazione
- \*Conexión para baño termostático de circulación
- \*可連結恒温循環水槽



- \* High temperature samples
- \* Résistant à la chaleur
- \* Hitzebeständig
- \* Resistente al calore
- \* Muestras De Alta Temperatura
- \* 高温様品用



- \*Can be connected to a printer
- \*Sortie imprimante
- \*Verbindung mit Personalcomputer
- \*Collegabile a stampante esterna
- \*Conexión para impresora
- \*可與印表機連結



- \*RS-232C Interface
- \*Interface RS232C pour PC
- \*Interface RS232C
- \*Interfaccia RS232C
- \*Interface RS232C
- \*RS-232C輸出



- \*AC outlet (AC100 to 240V)
- \*Alimentation secteur(CA 100 à 240 V)
- \*AC Ausgang (AC 100 bis 240V)
- \*Uscita AC (AC 100 240V)
- \*Conexión a 240V CA
- \*AC插座 (AC 100至240V)



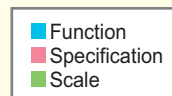
- \*Digital display
- \*Affichage numérique
- \*Digital Anzeige
- \*Display digitale
- \*Pantalla digital
- \*數字顯示



- \*Calibration with water
- \*Calibration 1 point\* sur eau distillée
- \*Kalibrierung mit Wasser
- \*Calibrazione con acqua
- \*Calibración con agua
- \*用水歸零



- \*Refractive index scale
- \*Indice de réfraction
- \*Skala fuer Refraktive Index
- \*Indice di rifrazione
- \*Escala de índice de refracción
- \*折射率刻度



# DIGITAL ABBE REFRACTOMETER

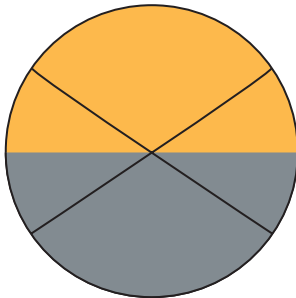
Cat.No.1310

# DR-A1



By simply setting the boundary line of refraction at the cross hairs, this refractometer directly indicates a measurement value (in refractive index or Brix (%), selective) together with the temperature on a digital display. This refractometer enables anyone to easily carry out measurements without reading analog graduation.

\*Dispersion value cannot be measured with the DR-A1.



Refraction view



Display



## SPECIFICATIONS

Measurement range	: Refractive Index (nD) 1.3000 to 1.7100 Brix 0.0 to 95.0% (Automatic Temperature Compensation is executed from 5 to 50°C )
Minimum scale	: Refractive Index (nD) 0.0001, Brix 0.1%
Measurement accuracy	: Refractive Index (nD) $\pm 0.0002$ , Brix $\pm 0.1\%$
Measurement temperature	: 5 to 50°C
Ambient temperature	: 5 to 40°C
Light source	: LED Lamp (Approximating to wavelength of D-line)
Power supply	: AC adapter (100 to 240V (50/60Hz) AC input )
Power consumption	: 16VA
Dimensions and weight	: Refractometer 13×29×31cm, 6.0kg (main unit only) AC adapter 10.5×17.5×4cm, 0.7kg

## ACCESSORIES

Test piece	.....	1 pc
Contact liquid [monobromonaphthalene](4m $\ell$ )	.....	1 pc
Allen wrench for detaching/attaching prism	.....	1 pc
Lighting adapter for solid sample	.....	1 pc
Tube band	.....	10 pcs
AC adapter (AD-13)	.....	1 pc
AC cable	.....	1 pc
Instruction manual	.....	1 pc

## CIRCULATING CONSTANT TEMPERATURE BATH

-optional-

**60-C3**  
Cat.No.1921



## SPECIFICATIONS

Tank capacity	: 0.5 $\ell$
Temperature setting range	: 10 to 60°C (water)
Temperature control	: PID control method using a thermo-module
Flow Rate	: 4 $\ell$ / min
Temperature display	: LED (red)
Under setting display	: LED (green)
Nozzle	: External diameter of 9mm, 2pieces
Temperature sensor	: Platinum thermometer bulb
Under safety device	: Low-water cut off device, and mechanism to prevent overheating
Power Supply	: AC100 to 240V, 50/60Hz
Power Consumption	: 430VA
Dimensions & Weight	: 38×24×27cm, 11.0kg (main unit only)



# ABBE REFRACTOMETER

Cat.No.1211

## NAR-1T LIQUID



The NAR-1T LIQUID is for liquid sample measurement only. This model has the Refractive Index scale and Brix scale, and operates with D line (589nm) light source. Calibration is performed using distilled water.

# ABBE REFRACTOMETER

Cat.No.1212

## NAR-1T SOLID



The NEW NAR-1T SOLID Abbe Refractometer was designed for solid sample measurement (this model can also measure liquid samples). This model has the Refractive Index scale and Brix scale, and operates with D line (589nm) light source.

### SPECIFICATIONS

Measurement range : Refractive Index (nD) 1.3000 to 1.7000  
 Brix 0.0 to 95.0%  
 Minimum scale : Refractive Index (nD) 0.001, Brix 0.5%  
 Measurement accuracy : Refractive Index (nD)  $\pm 0.0002$ , Brix  $\pm 0.1\%$   
 Measurement temperature: 5 to 50°C  
 Ambient temperature : 5 to 40°C  
 Light source : LED Lamp (Approximating to wavelength of D-line)  
 Power supply : AC100V to 240V , 50/60Hz  
 Power consumption : 5VA  
 Dimensions and weight: Refractometer 13×18×23cm, 2.5kg (main unit only)  
 Thermometer 10×11×7cm, 0.5kg

### SPECIFICATIONS

Measurement range : Refractive Index (nD) 1.3000 to 1.7000  
 Brix 0.0 to 95.0%  
 Minimum scale : Refractive Index (nD) 0.001, Brix 0.5%  
 Measurement accuracy : Refractive Index (nD)  $\pm 0.0002$ , Brix  $\pm 0.1\%$   
 Average dispersion value : nF-nC (to be calculated according to conversion table)  
 Measurement temperature: 5 to 50°C  
 Ambient temperature : 5 to 40°C  
 Light source : LED Lamp (Approximating to wavelength of D-line)  
 Power supply : AC100V to 240V , 50/60Hz  
 Power consumption : 5VA  
 Dimensions and weight: Refractometer 13×18×23cm, 2.5kg (main unit only)  
 Thermometer 10×11×7cm, 0.5kg

### ACCESSORIES

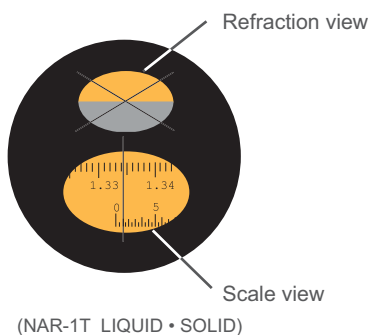
Digital thermometer .....1pc  
 AC power cable .....1pc  
 Lamp cable .....1pc  
 LED lamp .....3pcs  
 Special screwdriver for calibration .....1pc  
 Tube band .....10pcs  
 Instruction manual .....1pc

### ACCESSORIES

Digital thermometer ..... 1 pc  
 AC power cable ..... 1 pc  
 Lamp cable ..... 1 pc  
 LED lamp .....3 pcs  
 Test piece ..... 1 pc  
 Contact liquid [monobromonaphthalene] (4mℓ) ..... 1 pc  
 Special screwdriver calibration ..... 1 pc  
 Milky white reflector ..... 1 pc  
 Tube band .....10 pcs  
 Instruction manual ..... 1 pc



NAR-1T LIQUID



NAR-1T SOLID

### Abbe Refractometer for low refractive index measurement

In addition to our standard Abbe Refractometer NAR-1T SOLID, we can supply the following Abbe model.

#### ● Abbe Refractometer NAR-1T • LO Cat.No.1217 (for low refractive index measurement)

Measurement range : Refractive Index (nD) 1.1500 to 1.4800 / Measurement temperature : 5 to 50°C

Note: The refractometers listed above have the same scale as the NAR-1T SOLID.

To obtain the true refractive index value, simply refer to the conversion table that is provided with each unit.

\*Dispersion values cannot be measured by the Abbe refractometers listed above. For further details, please inquire to the Overseas Department at ATAGO.





# ABBE REFRACTOMETER

Cat.No.1220

# NAR-2T



## HIGH TEMPERATURE MODEL

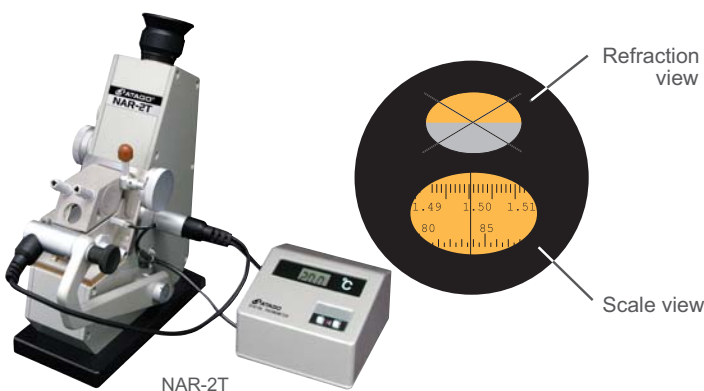
Designed for use with compounds that require measurement at high temperatures (up to 120°C).

### SPECIFICATIONS

- Measurement range : Refractive Index (nD) 1.3000 to 1.7000  
Brix 0.0 to 95.0%
- Minimum scale : Refractive Index (nD) 0.001, Brix 0.5%
- Measurement accuracy : Refractive Index (nD) ±0.0002, Brix ±0.1%
- Average dispersion value : nF-nC (to be calculated according to conversion table)
- Measurement temperature: 5 to 120°C
- Ambient temperature: 5 to 40°C
- Light source : LED Lamp (Approximating to wavelength of D-line)
- Power supply : AC100V to 240V, 50/60 Hz
- Power consumption : 5VA
- Dimensions and weight: Refractometer 12×20×25cm, 5.8kg (main unit only)  
Thermometer 10×11×7cm, 0.5kg

### ACCESSORIES

- Digital thermometer.....1 pc
- AC power cable .....1pc
- Lamp cable.....1pc
- LED lamp ..... 3pcs
- Test piece .....1 pc
- Contact liquid [monobromonaphthalene](4mℓ) .....1 pc
- Special screwdriver for calibration .....1 pc
- Tube band .....10pcs
- Instruction manual .....1 pc



# ABBE REFRACTOMETER

Cat.No.1240

# NAR-4T



## HIGH REFRACTIVE INDEX MODEL

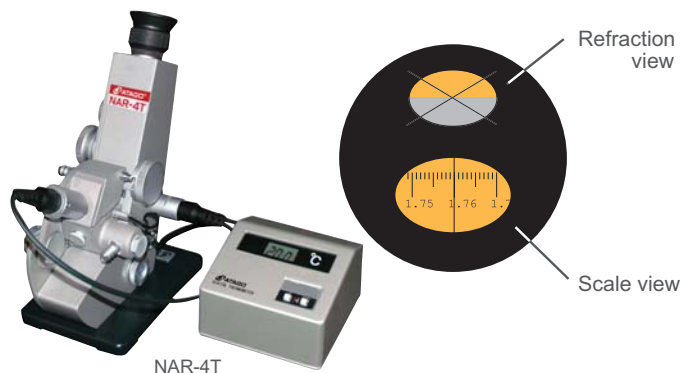
Research and Development on new materials for modern technologies is being actively conducted in every industry. Many of these materials (especially polymer film and related materials) are of high refractive index - often too high for the existing Abbe refractometers. These can now be measured with the nD 1.4700 to 1.8700 range of the NAR-4T.

### SPECIFICATIONS

- Measurement range : Refractive Index (nD) 1.4700 to 1.8700
- Minimum scale : Refractive Index (nD) 0.001
- Measurement accuracy : Refractive Index (nD) ±0.0002
- Measurement temperature: 5 to 50°C
- Ambient temperature : 5 to 40°C
- Light source : LED Lamp (Approximating to wavelength of D-line)
- Power supply : AC100V to 240V, 50/60Hz
- Power consumption : 5VA
- Dimensions and weight: Refractometer 13×18×23cm, 2.5kg (main unit only)  
Thermometer 10×11×7cm, 0.5kg

### ACCESSORIES

- Digital thermometer.....1 pc
- AC power cable .....1pc
- Lamp cable.....1pc
- LED lamp ..... 3pcs
- Test piece .....1 pc
- Contact liquid [monobromonaphthalene](4mℓ) .....1 pc
- Contact liquid [methylene iodidecontaining sulfur solution](4mℓ).....1pc
- Special screwdriver for calibration.....1pc
- Milky white reflector.....1pc
- Tube band .....10pcs
- Instruction manual .....1 pc



● **Abbe Refractometer NAR-2T • LO Cat.No.1227** (for high temperature and low refractive index measurements)

Measurement range : Refractive Index (nD) 1.1500 to 1.4800 / Measurement temperature : 5 to 120°C

● **Abbe Refractometer NAR-2T • HI Cat.No.1228** (for high temperature and high refractive index measurements)

Measurement range : Refractive Index (nD) 1.4700 to 1.8700 / Measurement temperature : 5 to 120°C

**Another option**

\*ATAGO can supply Abbe refractometer with measurement range of "nD1.7000 to 2.0800" and with measurement temperature range of "5 to 50°C" or "5 to 120°C".

Note: The refractometers listed above have the same scale as the NAR-2T. To obtain the true refractive index value, simply refer to the conversion table that is provided with each unit.

\*Dispersion values cannot be measured by the Abbe refractometers listed above. For further details, please inquire to the Overseas Department at ATAGO.



# ABBE REFRACTOMETER

# Cat.No.1230 NAR-3T



## PRECISION MODEL

The NAR-3T was developed to give improved measurement accuracy and ease of use. This was achieved by making fundamental improvements to the optical system, utilizing a larger scale, incorporating a high intensity lamp and using a double control knob to give quick and more accurate control.

## FEATURES

1. High accuracy obtained using a large scale.
  - (a) The scale is four times larger than those used in conventionality.
  - (b) The minimum scale division of 0.0002 enables measurements of refractive index of 0.0001 to be made.
2. Double control knob for easier operation.
  - (a) Fine control knob for fine adjustment gives greater accuracy and enables the operator to bring the boundary line into the center cross more quickly.
  - (b) This facility gives quicker operation and better reproducibility of measurements.
3. Able to measure solid and liquid samples.
  - (a) The high intensity lighting is suitable for the measurement of both solid and liquid samples.
4. Safe electrical system.
  - (a) The high intensity lighting is suitable for the measurement of both solid and liquid samples.
  - (b) The power supply cable is fixed to the main body of the instrument.
5. Built-in air dryer and moisture removal device.
  - (a) A large cartridge drying chamber containing silicagel is incorporated to prevent moisture condensing on the inside of the instrument.
  - (b) Means are provided for using compressed air to remove internal moisture droplets.



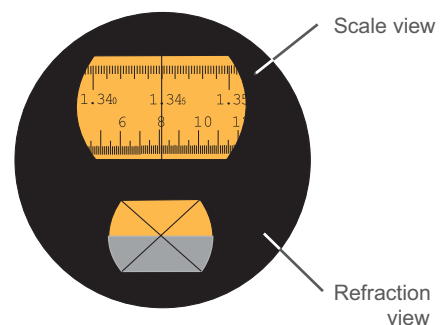
NAR-3T

## SPECIFICATIONS

Measurement range :	Refractive Index (nD) 1.30000 to 1.71000 Brix 0.00 to 95.00%
Minimum scale :	Refractive Index (nD) 0.0002, Brix 0.1%
Measurement accuracy :	Refractive Index (nD) $\pm 0.0001$ , Brix $\pm 0.05\%$
Average dispersion value :	nF-nC (to be calculated according to conversion table)
Measurement temperature :	5 to 50°C
Ambient temperature :	5 to 40°C
Light source :	LED Lamp (Approximating to wavelength of D-line)
Power supply :	AC100V to 240V, 50/60Hz
Power consumption :	5VA
Dimensions and weight :	Refractometer 12×31×34cm, 9.0kg (main unit only) Thermometer 10×11×7cm, 0.5kg

## ACCESSORIES

Digital thermometer .....	1pc
AC Power cable .....	1pc
Lamp cable .....	1pc
LED Lamp .....	3pc
Allen wrench for calibration .....	1pc
Test piece .....	1pc
Contact liquid [monobromonaphthalene](4mL) .....	1pc
Air purger for dehumidification .....	1pc
Tube band .....	10pcs
Instruction manual .....	1pc



## Measurement of double refraction samples

Note: Measurement of double refraction samples requires the "Polarizing eyepiece" that is supplied optionally. Polymer film and other compounds of this sort have different refractive indices depending on the orientation of the film (X-Y-Z axis). MULTI-WAVE-LENGTH ABBE REFRACTOMETERS are best suited for measuring film orientation, etc.

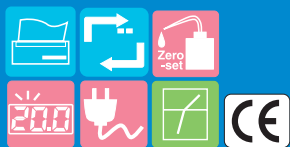
\*Please ask if you need more information for measurement of double refraction samples.



# MULTI-WAVELENGTH ABBE REFRACTOMETERS

Cat.No.1410

## DR-M2



Cat.No.1414

## DR-M4



Refractive Index or Abbe number (vd or ve) can be measured at different wavelengths ranging from 450 to 1,100nm. For measurement at wavelengths ranging from 681 to 1,100nm, the optional near infrared ray viewer (Part No.RE-9119) is required. The DR-M2/DR-M4 digitally displays the measurement results of refractive index or Abbe number on the LCD. Measurement can be achieved by matching the boundary line at the intersection point of the cross hairs. These refractometers can be connected to the digital printer.

### SPECIFICATIONS

Measurement range :

DR-M2

Wavelength 450nm : Refractive Index 1.3278 to 1.7379

Wavelength 589nm : Refractive Index 1.3000 to 1.7100

Wavelength 680nm : Refractive Index 1.2912 to 1.7011

Wavelength 1,100nm : Refractive Index 1.2743 to 1.6840

DR-M4

Wavelength 450nm : Refractive Index 1.5219 to 1.9220

Wavelength 589nm : Refractive Index 1.4700 to 1.8700

Wavelength 680nm : Refractive Index 1.4545 to 1.8544

Wavelength 1,100nm : Refractive Index 1.4260 to 1.8259

Minimum indication : Refractive Index (nD) 0.0001, Abbe number 0.1

Measurement accuracy: Refractive Index (nD)  $\pm 0.0002$   
(with the attached test piece at 589nm)

Wavelength range : From 450 to 1,100nm (with interference filters)  
(For measurement at wavelengths ranging from 681 to 1,100nm, the near infrared ray viewer (optional) is required.)

Measurement temperature range : 5 to 50°C

Output terminal : For digital printer, DP-22(B)(optional),  
Conforming to Centronics standard

Power supply : AC100V to 240V, 50/60Hz

Power consumption : 160VA

Dimensions and weight: Refractometer 13×29×31cm, 6.0kg  
Light source unit 15×33×11cm, 3.0kg

### ACCESSORIES

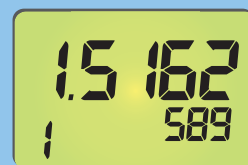
Test piece .....	1 pc
Allen wrench .....	1 pc
Contact liquid [monobromonaphthalene](4mℓ) .....	1 pc
Contact liquid [methylene iodidecontaining sulfur solution](4mℓ)(for DR-M4 only).....	1 pc
Interference filter, 589nm and 546nm.....	1 each
Lighting glass for film measurement .....	1 pc
Spare bulb .....	1 pc
Tube band .....	10 pcs
Instruction manual .....	1 pc

### Abbe number can be measured simply! (In the case of measurement of Abbe number "vd")

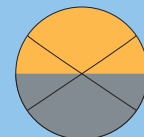
(1)Set the sample on the prism surface.

(2)Insert the 589nm interference filter (attached to the DR-M2 as a standard accessory). While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs.

Then, press the SET key.

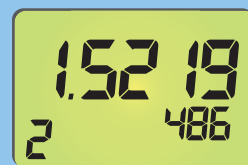


Display

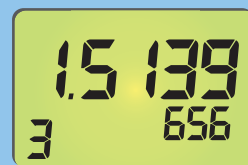


Refraction View

(3)Replace the interference filter with the 486nm interference filter (of an optional part). While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs.



(4)Replace the interference filter with the 656nm interference filter (of an optional part). While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs.



(5)Press the SET key.  
The indication on the display at that time represents the Abbe number "vd".  
\*It is very convenient if you use an optional digital printer, because refractive index at each wavelength and Abbe number are printed.



Display



# MULTI-WAVELENGTH ABBE REFRACTOMETERS

Cat.No.1412

**DR-M2/1550(A)** <sup>(A)only</sup>



Cat.No.1413

**DR-M2/1550(B)**



Cat.No.1415

**DR-M4/1550(A)** <sup>(A)only</sup>



Cat.No.1416

**DR-M4/1550(B)**



Refractive Index or Abbe number (vd or ve) can be measured at different wavelengths ranging from 450 to 1,550nm. These refractometers digitally display the measurement result on the LCD. Measurement can be achieved by matching the boundary line at the intersection point of the cross hairs. These units can be connected to the digital printer.

## SPECIFICATIONS

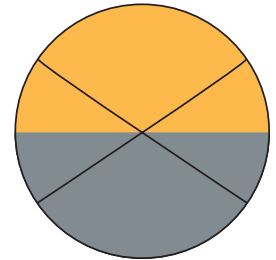
- Measurement range :
  - DR-M2/1550(A) • DR-M2/1550(B)
    - Wavelength 450nm : Refractive Index 1.3278 to 1.7379
    - Wavelength 589nm : Refractive Index 1.3000 to 1.7100
    - Wavelength 680nm : Refractive Index 1.2912 to 1.7011
    - Wavelength 1,100nm : Refractive Index 1.2743 to 1.6840
    - Wavelength 1,550nm : Refractive Index 1.2662 to 1.6759
  - DR-M4/1550(A) • DR-M4/1550(B)
    - Wavelength 450nm : Refractive Index 1.5219 to 1.9220
    - Wavelength 589nm : Refractive Index 1.4700 to 1.8700
    - Wavelength 680nm : Refractive Index 1.4545 to 1.8544
    - Wavelength 1,100nm : Refractive Index 1.4260 to 1.8259
    - Wavelength 1,550nm : Refractive Index 1.4138 to 1.8136
- Minimum indication : Refractive Index (nD) 0.0001, Abbe number 0.1
- Measurement accuracy : Refractive Index (nD) ±0.0002 (with the attached test piece at 589nm)
- Wavelength range : From 450 to 1,550nm (with interference filters)
- Measurement temperature range : 5 to 50°C
- Output terminal : For digital printer, DP-22(B)(optional), Conforming to Centronics standard
- Light source : Monochromatic light source device  
Dimensions, Weight and Power supply (Cat.No.1412,1415)  
23×35×21 to 31cm, 5.9kg, AC200 to 240V, 50/60Hz, 285VA  
(Cat.No.1413,1416)  
23×32×21 to 31cm, 5.0kg, AC100 to 110V, 50/60Hz, 225VA
- Power supply : AC100V to 240V, 50/60Hz
- Power consumption : 100VA
- Dimensions and weight : Refractometer 13×29×31cm, 6.0kg  
Power supply unit 15×33×11cm, 3.2kg

## ACCESSORIES

- Near infrared ray viewer .....1pc
- Mounting adapter ..... 1pc
- Monochromatic light source device ..... 1set
- Test piece ..... 1pc
- Allen wrench ..... 1pc
- Contact liquid [monobromonaphthalene](4mℓ) ..... 1pc
- Contact liquid [methylene iodidecontaining sulfur solution] (4mℓ) (for DR-M4/1550 only) 1pc
- Interference filter, 589nm ..... 1pc
- Interference filter frame for 589nm ..... 1pc
- Interference filter frame for registration ..... 1pc
- Tube band ..... 10pcs
- Lighting glass for film measurement ..... 1pc
- Instruction manual ..... 1pc



Display



Refraction View



DR-M2/1550(A)

## DIGITAL PRINTER -optional-

**DP-22(B)**  
Cat.No.3125



All ATAGO refractometers are designed and manufactured in Japan.

**HACCP GMP GLP**

ATAGO products comply with HACCP, GMP, and GLP system standards.

**ATAGO CO.,LTD.**

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**ATAGO CHINA Guangzhou Co., Ltd.**

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\* Specifications and appearance are subject to change without notice.