

## STANDARD ACCESSORIES

### DR-A1

|   |        |
|---|--------|
| Test piece                                  | 1 pc   |
| Contact liquid [monobromonaphthalene] (4mL) | 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   |

### DR-A1-Plus

|   |        |
|---|--------|
| Test piece                                  | 1 pc   |
| Contact liquid [monobromonaphthalene] (4mL) | 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   |

### NAR-1T LIQUID

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

### NAR-1T SOLID

|   |        |
|---|--------|
| 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-2T

|   |        |
|---|--------|
| 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   |
| Tube band                                   | 10 pcs |
| Instruction manual                          | 1 pc   |

### NAR-3T

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

### NAR-4T

|  |        |
|--|--------|
| 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   |
| Contact liquid [methylene iodide containing sulfur solution] (4mL) | 1 pc   |
| Special screwdriver calibration                                    | 1 pc   |
| Milky white reflector  | 1 pc   |
| Tube band  | 10 pcs |
| Instruction manual   | 1 pc   |

### DR-M2 DR-M4

|  |        |
|--|--------|
| Test piece   | 1 pc   |
| Allen wrench   | 1 pc   |
| Contact liquid [monobromonaphthalene] (4mL)                          | 1 pc   |
| Contact liquid [methylene iodide containing sulfur solution] (4mL) * | 1 pc   |
| Interference filter, 589nm   | 1 pc   |
| Lighting glass for film measurement                                  | 1 pc   |
| Spare bulb   | 1 pc   |
| Tube band  | 10 pcs |
| Instruction manual   | 1 pc   |

### DR-M2/1550 DR-M4/1550

|  |        |
|--|--------|
| Near infrared ray viewer   | 1 pc   |
| Mounting adapter   | 1 pc   |
| Monochromatic light source device                                    | 1 set  |
| Test piece   | 1 pc   |
| Allen wrench   | 1 pc   |
| Contact liquid [monobromonaphthalene] (4mL)                          | 1 pc   |
| Contact liquid [methylene iodide containing sulfur solution] (4mL) * | 1 pc   |
| Interference filter, 589nm   | 1 pc   |
| Interference filter frame for 589nm                                  | 1 pc   |
| Tube band  | 10 pcs |
| Lighting glass for film measurement                                  | 1 pc   |
| Instruction manual   | 1 pc   |

## OPTIONAL PARTS

### For measuring solid samples (excluding the NAR-1T LIQUID)

|  |                    |
|--|--------------------|
| ○ Eyepiece For Polarizing  | Parts No. RE-1146  |
| ○ Test Piece   |                    |
| • Test Piece D For Measurement of Film (nD 1.74)   | Parts No. RE-1498  |
| • Test Piece E For Measurement of Film (nD 1.92)   | Parts No. RE-1499  |
| • Adapter For Film Sample (for DR-A1)  | Parts No. RE-1581  |
| ○ Contact Liquid   |                    |
| • Contact Liquid - monobromonaphthalene nD 1.65 (4mL)                                    | Parts No. RE-1196  |
| • Contact Liquid nD 1.78 (4mL)   | Parts No. RE-1199  |
| • Contact Liquid LJ nD 1.80 (7mL)  | Parts No. RE-99080 |
| ○ Test Piece with monobromonaphthalene as contact liquid                                 |                    |
| • Test Piece A (nD=1.516) with M-Naphthalene with monobromonaphthalene as contact liquid | Parts No. RE-1195  |
| • Test Piece C (nD=1.620) with M-Naphthalene with monobromonaphthalene as contact liquid | Parts No. RE-1197  |

### For connecting to a computer (for DR-A1/DR-A1-Plus only)

|   |                    |
|---|--------------------|
| ○ RS-232C Cable For Personal Computer (D-Sub 9 Pin) | Parts No. RE-15305 |
|---|--------------------|

### Interference Filters for MULTI-WAVELENGTH ABBE REFRACTOMETERS (Standard accessory only 589nm)

|  |                    |          |                    |
|--|--------------------|----------|--------------------|
| ○ for DR-M2/DR-M4  |                    |          |                    |
| 589(D)nm   | Parts No. RE-3520  | 546(e)nm | Parts No. RE-3523  |
| 486(F)nm   | Parts No. RE-3521  | 480(F)nm | Parts No. RE-3524  |
| 656(C)nm   | Parts No. RE-3522  | 644(C)nm | Parts No. RE-3525  |
| Any wavelength (450 to 539nm, 540 to 680nm, 681 to 799nm, 800 to 1100nm) | Parts No. RE-3526  |          |                    |
| ○ for DR-M2/1550, DR-M4/1550   |                    |          |                    |
| 589(D)nm   | Parts No. RE-16501 | 546(e)nm | Parts No. RE-16504 |
| 486(F)nm   | Parts No. RE-16502 | 480(F)nm | Parts No. RE-16505 |
| 656(C)nm   | Parts No. RE-16503 | 644(C)nm | Parts No. RE-16506 |
| Any wavelength (450 to 539nm, 540 to 680nm, 681 to 799nm, 800 to 1550nm) | Parts No. RE-16507 |          |                    |

### Near-infrared Ray Viewer for MULTI-WAVELENGTH ABBE REFRACTOMETERS

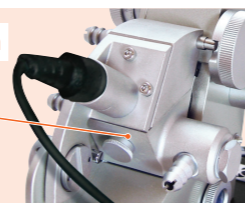
|   |                   |
|---|-------------------|
| ○ Near-infrared Ray Viewer (With Adapter) | Parts No. RE-9119 |
|---|-------------------|

### Measurement of Birefringent Samples

Measurement of birefringent (double refraction) materials requires an optional Polarizing Eyepiece (Part No. RE-1146). Double refraction measurements are available at wavelengths between 450 and 680nm. Contact us for more details.

### Special Order Option

The sample stage height can be customized.



All ATAGO refractometers are designed and manufactured in Japan.

**ATAGO CO., LTD.**

Headquarters: The Front Tower Shiba Koen, 23rd Floor  
2-6-3 Shiba-koen, Minato-ku, Tokyo 105-0011, Japan  
TEL : 81-3-3431-1943 FAX : 81-3-3431-1945



**HACCP GMP GLP**

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

|                                    |                                |                                    |
|------------------------------------|--------------------------------|------------------------------------|
| ATAGO U.S.A., Inc.                 | TEL : 1-425-637-2107           | customerservice@atago-usa.com      |
| ATAGO INDIA Instruments Pvt. Ltd.  | TEL : 91-22-28544915, 40713232 | customerservice@atago-india.com    |
| ATAGO THAILAND Co., Ltd.           | TEL : 66-21948727-9            | customerservice@atago-thailand.com |
| ATAGO BRASIL Ltda.                 | TEL : 55 16 3913-8400          | customerservice@atago-brasil.com   |
| ATAGO ITALIA s.r.l.                | TEL : 39 02 36557267           | customerservice@atago-italia.com   |
| ATAGO CHINA Guangzhou Co., Ltd.    | TEL : 86-20-38108256           | info@atago-china.com               |
| ATAGO RUSSIA Ltd.                  | TEL : 7-812-777-96-96          | info@atago-russia.com              |
| ATAGO NIGERIA Scientific Co., Ltd. | TEL : 234-707-558-1552         | atagonigeria@atago.net             |

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

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# ABBE REFRACTOMETERS



## Abbe Refractometers

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## Multi-Wavelength Abbe Refractometers

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- DR-M4
- ▶ Page 6 ■ DR-M2 / 1550
- DR-M4 / 1550



**ATAGO®**



## ■ Uses and Applications of the Abbe Refractometers

ATAGO's Abbe Refractometers are widely used in a variety of fields; from basic research to product management.

### Uses and Applications

|   |  |
|---|--|
| For measuring the refractive index (nD) of liquid samples between 5 to 50°C:  | DR-A1, DR-A1-Plus, and NAR-1T LIQUID. We recommend the NAR-3T for high-accuracy measurements.                      |
| For measuring the refractive index (nD) of liquid samples up to 120°C:  | NAR-2T   |
| For measuring the refractive index (nD) of solid samples (glass, plastics, films, etc.):  | NAR-1T SOLID, DR-A1, and DR-A1-Plus. The NAR-3T is also capable of measuring clear, translucent glass or plastics. |
| For measuring liquid or solid samples with a high refractive index (1.47 to 1.87):  | NAR-4T   |
| For measuring and determining the refractive index or Abbe number of liquid or solid samples at different wavelengths:  | DR-M Series: DR-M2, DR-M2/1550, DR-M4, and DR-M4/1550 (For high refractive index measurements.)                    |
| For determining average dispersion values or abbe numbers:  | NAR-1T SOLID, NAR-2T, and NAR-3T   |
| For measuring Brix (%):   | DR-A1, DR-A1-Plus, and NAR-1T LIQUID. We recommend the NAR-3T for high-accuracy measurements.                      |
| For connecting to a printer:  | DR-A1, DR-A1-Plus, and DR-M Series   |
| For measuring birefringent (double refraction) samples (plastics, films) that have different refractive indices depending on their orientation, or for measuring the ordinary ray (n subscript null) or extraordinary ray (n subscript exponential) of liquid crystals (LCs): | DR-A1, DR-A1-Plus, NAR-1T SOLID, NAR-2T, NAR-4T, and DR-M Series   |

## ■ 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
- D3321 STM for Use of the Refractometer for Field Test Determination of the Freezing Point of Aqueous Engine Coolants
- 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 the most suitable sucrose solution for your application.



| 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%       | Approx. 5mL |
| RE-110030 | 30% Sucrose | 30.00 ±0.03%       | Approx. 5mL |
| RE-110040 | 40% Sucrose | 40.00 ±0.04%       | Approx. 5mL |
| RE-110050 | 50% Sucrose | 50.00 ±0.05%       | Approx. 5mL |
| RE-110060 | 60% Sucrose | 60.00 ±0.05%       | Approx. 5mL |

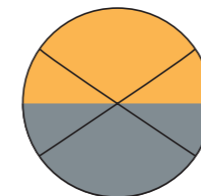
\* Warranty period for these solutions is 6 weeks.

Custom concentration sucrose solutions are now available. Accuracy and price will depend on the concentration; please contact ATAGO for more details.

## DIGITAL ABBE REFRACTOMETERS

# DR-A1

Cat.No.1310



Refraction view



Display

By simply aligning the boundary line of refraction at the cross hairs, this refractometer directly indicates a measurement value (in refractive index or Brix (%), selectable) 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.

### Choosing the Right Model for Your Sample Type

#### DR-A1

Stews  
Ketchup  
Curry  
Salsa  
Vinaigrettes  
Opaque samples with undissolved solids

#### DR-A1-Plus

Milk  
Yogurt  
Puree  
Grape juice  
Soy sauce  
Opaque samples with no undissolved solids

Clear samples

# DR-A1-Plus

for Opaque Samples

Cat.No.1311

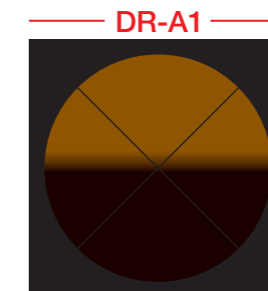


With the new prism, the field of view is brighter than the predecessor model (DR-A1), making it easier to measure inhomogeneous/opaque samples.

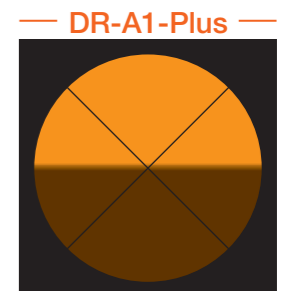
### Common Specifications (DR-A1/DR-A1-Plus)

|                         |  |
|-------------------------|--|
| Measurement Range       | Refractive Index (nD) 1.3000 to 1.7100, Brix 0.0 to 100.0% (ATC is executed at 5 to 50°C)                |
| Resolution              | Refractive Index (nD) 0.0001, Brix 0.1%  |
| Measurement accuracy    | Refractive Index (nD) ±0.0002, Brix ±0.1%  |
| Measurement temperature | 5 to 50°C (Circulating constant temperature bath range, as well as Brix temperature compensation range.) |
| Thermometer accuracy    | ±0.2°C   |
| Ambient temperature     | 5 to 40°C  |
| Indications             | Refractive Index (nD), Brix (%), Temp (°C)   |
| Display                 | LCD  |
| Light source            | LED Lamp (Approximating to wavelength of D-line)   |
| Power supply            | AC adapter (100 to 240V (50/60Hz) AC input)  |
| Power consumption       | 16VA   |
| Output                  | Printer DP-63(C) (Optional)<br>PC (via RS-232C)  |
| Dimensions and weight   | 13x29x31cm, 6.0kg (Main unit)<br>10.5x17.5x4cm, 0.7kg (AC adapter)                                       |

### For Measuring Emulsions or Dark Samples



The DR-A1 has a slightly dimmer field of view, which makes it difficult to measure emulsions or dark samples.



The DR-A1-Plus features a brighter field of view, making it easier to measure dark, opaque samples.

\*Samples containing undissolved solids may not produce measurement results.

# NAR-1T LIQUID

For Measuring Liquid Samples Only Cat.No.1211

# NAR-1T SOLID

For Measuring Solid Samples Cat.No.1212



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.

The 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) ±0.0002, Brix ±0.1%  |
| Average dispersion value | nF-nC (to be calculated according to conversion table)*SOLID only                          |
| Measurement temperature  | 5 to 50°C<br>(Temperature range regulated by circulating constant temperature water bath.) |
| Thermometer accuracy     | ±0.2°C   |
| Ambient temperature      | 5 to 40°C  |
| Light source             | LED Lamp<br>(Approximating to wavelength of D-line)  |
| Power supply             | AC100 to 240V, 50/60Hz   |
| Power consumption        | 5VA  |
| Dimensions and weight    | 13×18×23cm, 2.5kg (Main unit)<br>10×11×7cm, 0.5kg (Thermometer)                            |

# NAR-2T

High Temperature Model Cat.No.1220



Designed for use with compounds that require measurement at high temperatures (up to 120°C). Capable of measuring samples from 5 to 120°C, such as substances with a melting point higher than room temperature, or compounds containing substances with a transition temperature below 120°C. Aside from liquid samples, glass, films, plastics and other solid samples can also be measured.

\*Optional accessories: Circulating constant temperature bath (up to 60°C). (Pg. 5) For a circulating constant temperature bath above 61°C, please purchase separately (not available through ATAGO).

### 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<br>(Temperature range regulated by circulating constant temperature water bath.) |
| Thermometer accuracy     | 0 to 100°C...±0.2°C,<br>100 to 120°C...±0.5°C   |
| Ambient temperature      | 5 to 40°C   |
| Light source             | LED Lamp<br>(Approximating to wavelength of D-line)   |
| Power supply             | AC100 to 240V, 50/60Hz  |
| Power consumption        | 5VA   |
| Dimensions and weight    | 12×20×25cm, 5.8kg (Main unit)<br>10×11×7cm, 0.5kg (Thermometer)                             |

# NAR-3T

Precision Model Cat.No.1230



The NAR-3T is the unit with the highest degree of precision and accuracy among the Abbe Refractometers. It was developed to give improved measurement accuracy and ease of use. This was achieved by making fundamental improvements to the optical system and utilizing a larger scale, which allows for a refractive index scale measurements of up to 0.00005. Incorporating a high intensity lamp and using a double control knob gives quick and more accurate control.

### 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) ±0.0001, Brix ±0.05%   |
| Average dispersion value | nF-nC (to be calculated according to conversion table)                                     |
| Measurement temperature  | 5 to 50°C<br>(Temperature range regulated by circulating constant temperature water bath.) |
| Thermometer accuracy     | ±0.2°C   |
| Ambient temperature      | 5 to 40°C  |
| Light source             | LED Lamp<br>(Approximating to wavelength of D-line)  |
| Power supply             | AC100 to 240V, 50/60Hz   |
| Power consumption        | 5VA  |
| Dimensions and weight    | 12×31×34cm, 9.0kg (Main unit)<br>10×11×7cm, 0.5kg (Thermometer)                            |

# NAR-4T

High Refractive Index Model Cat.No.1240



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.

\*Dispersion values cannot be measured with this unit.

### 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<br>(Temperature range regulated by circulating constant temperature water bath.) |
| Thermometer accuracy    | ±0.2°C   |
| Ambient temperature     | 5 to 40°C  |
| Light source            | LED Lamp<br>(Approximating to wavelength of D-line)  |
| Power supply            | AC100 to 240V, 50/60Hz   |
| Power consumption       | 5VA  |
| Dimensions and weight   | 13×18×23cm, 2.5kg (Main unit)<br>10×11×7cm, 0.5kg (Thermometer)                            |

### Custom Refractive Index Ranges Available by Special Order

- NAR-1T • LO Cat.No.1217 Measurement Range: Refractive Index (nD) 1.1500 to 1.4800, Measurement temperature: 5 to 50°C
- NAR-2T • LO Cat.No.1227 Measurement Range: Refractive Index (nD) 1.1500 to 1.4800, Measurement temperature: 5 to 120°C

Note: To obtain the refractive index value, simply refer to the conversion table that is provided with this unit. Dispersion values cannot be measured with this unit.

- NAR-2T • HI Cat.No.1228 Measurement Range: Refractive Index (nD) 1.4700 to 1.8700, Measurement temperature: 5 to 120°C
- NAR-2T • UH Cat.No.1229 Measurement Range: Refractive Index (nD) 1.7000 to 2.0800, Measurement temperature: 5 to 120°C



# DR-M2

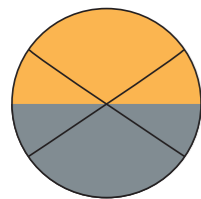
Cat.No.1410

# DR-M4

High Refractive Index Model

Cat.No.1414

Customizable wavelength: 1100nm range supported



Refraction view



Display



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. The DR-M4 is a high refractive index version of the DR-M2, with a refractive index measurement range of 1.4700 to 1.8700 (at a wavelength of 589nm). The DR-M4 shares common appearance and features with the DR-M2.

### Specifications

|  |                               |   |
|--|-------------------------------|---|
| Measurement Range                                      | Resolution                    | Refractive Index (nD) 0.0001, Abbe number 0.1   |
| DR-M2  | Measurement accuracy          | Refractive Index (nD) ±0.0002 (With the attached test piece at 500 to 650nm)            |
| Wavelength 450nm : Refractive Index 1.3278 to 1.7379   | Wavelength range              | From 450 to 1,100nm   |
| Wavelength 589nm : Refractive Index 1.3000 to 1.7100   | Measurement temperature range | 5 to 50°C (Temperature range regulated by circulating constant temperature water bath.) |
| Wavelength 680nm : Refractive Index 1.2912 to 1.7011   | Thermometer accuracy          | ±0.2°C  |
| Wavelength 1,100nm : Refractive Index 1.2743 to 1.6840 | Ambient temperature           | 5 to 40°C   |
| DR-M4  | Power consumption             | 160VA   |
| Wavelength 450nm : Refractive Index 1.5219 to 1.9220   | Output                        | For digital printer, DP-63(B) (optional), Conforming to Centronics standard             |
| Wavelength 589nm : Refractive Index 1.4700 to 1.8700   | Power supply                  | AC100 to 240V, 50/60Hz  |
| Wavelength 680nm : Refractive Index 1.4545 to 1.8544   | Dimensions and weight         | 13×29×31cm, 6.0kg (Main unit)   |
| Wavelength 1,100nm : Refractive Index 1.4260 to 1.8259 |                               | 15×33×11cm, 3.2kg (Power supply unit)   |

### Optional Accessories

#### Circulating Constant Temperature Bath

## 60-C5

Cat.No.1923

A circulating water bath for precise temperature control of refractometers without Peltier. The temperature range can be set from 10 to 60°C and its compact, easy to use design makes it optimal for connecting to a refractometer.



#### Specifications

|                                |  |
|--------------------------------|--|
| Tank capacity                  | 1.0 L                                    |
| Temperature setting range      | 10 to 60°C (water)                       |
| Minimum temperature indication | 0.1°C                                    |
| Constant-temperature accuracy  | ±0.2°C                                   |
| Power consumption              | 250VA                                    |
| Power supply                   | AC 100 to 240V, 50/60Hz                  |
| Dimensions and weight          | 20.4×33.6×28.9cm, 9.0kg (main unit only) |

#### Digital Printer

## DP-63(C)

for DR-A1 · DR-A1-Plus

Cat.No.3136

## DP-63(B)

for DR-M2 · DR-M4 · DR-M2/1550 · DR-M4/1550

Cat.No.3135



#### Specifications

|                       |   |
|-----------------------|---|
| Printing method       | Thermal dot                               |
| Power consumption     | 13VA                                      |
| Power supply          | AC adapter (Input voltage: AC100 to 240V) |
| Dimensions and weight | 17×16×7cm 580g (main unit only)           |

# DR-M2/1550

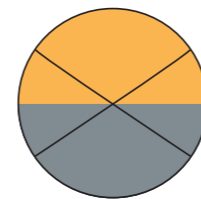
Cat.No.1412

# DR-M4/1550

High Refractive Index Model

Cat.No.1415

Customizable wavelength: 1550nm range supported



Refraction view



Display



Refractive Index or Abbe number (vd or ve) can be measured at different wavelengths ranging from 450 to 1,550nm. Measurement at wavelengths of 1550nm has become more in demand with the recent development of materials for the IT communications field. The DR-M2/1550 and the DR-M4/1550 are suitable for measuring samples that require a refractive index in the near infrared range, such as fiber optics materials, optical glass, and plastics. These models are equipped with a power supply unit and a monochromatic light

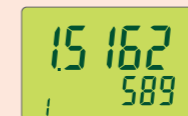
source. They can be used with a near infrared ray viewer or interference filters. These refractometers digitally display the measurement result on the LCD. Measurement can be achieved by matching the boundary line at the intersection point of the cross hairs. These units can be connected to the digital printer. The DR-M4/1550 is a high refractive index version of the DR-M2/1550, with a refractive index measurement range of 1.4700 to 1.8700 (at a wavelength of 589nm). The DR-M4/1550 shares common appearance and features with the DR-M2/1550.

### Specifications

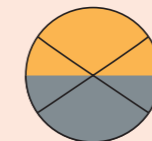
|  |                               |   |
|--|-------------------------------|---|
| Measurement Range                                      | Resolution                    | Refractive Index (nD) 0.0001, Abbe number 0.1   |
| DR-M2/1550   | Measurement accuracy          | Refractive Index (nD) ±0.0002 (with the attached test piece at 500 to 650nm)            |
| Wavelength 450nm : Refractive Index 1.3278 to 1.7379   | Wavelength range              | From 450 to 1,550nm   |
| Wavelength 589nm : Refractive Index 1.3000 to 1.7100   | Measurement temperature range | 5 to 50°C (Temperature range regulated by circulating constant temperature water bath.) |
| Wavelength 680nm : Refractive Index 1.2912 to 1.7011   | Thermometer accuracy          | ±0.2°C  |
| Wavelength 1,100nm : Refractive Index 1.2743 to 1.6840 | Ambient temperature           | 5 to 40°C   |
| Wavelength 1,550nm : Refractive Index 1.2662 to 1.6759 | Power consumption             | 160VA (Refractometer), 240VA (Monochromatic Light source)                               |
| DR-M4/1550   | Output                        | For digital printer, DP-63(B) (optional), Conforming to Centronics standard             |
| Wavelength 450nm : Refractive Index 1.5167 to 1.9166   | Power supply                  | AC100 to 240V, 50/60Hz  |
| Wavelength 589nm : Refractive Index 1.4700 to 1.8700   | Dimensions and weight         | 13×29×31cm, 6.0kg (Main unit)   |
| Wavelength 680nm : Refractive Index 1.4559 to 1.8557   |                               | 15×33×11cm, 3.2kg (Power supply unit)   |
| Wavelength 1,100nm : Refractive Index 1.4298 to 1.8296 |                               | 22×30×20 to 30cm, 5.2kg (Light source)  |
| Wavelength 1,550nm : Refractive Index 1.4211 to 1.8209 |                               |   |

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

- Set the sample on the prism surface.
- 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.

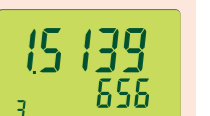


Display



Refraction view

- Replace the interference filter with the 486nm interference filter (an optional part). While looking through the eyepiece, match the boundary line with the intersection point of the cross hairs. Then, press the SET key.
- 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.
- Press the SET key. The indication on the display at that time represents the Abbe number "vd".



\* For optimum convenience, use an optional digital printer to print out the refractive index at each wavelength and Abbe number.