



**Automatic high precision pycnometer**

**BELPYCNO** ■

Cell volume :  $10\text{cm}^3$ ,  $3.5\text{cm}^3$ ,  $1.0\text{cm}^3$

# One-touch, high-accuracy, automatic measurement

## FEATURES

- ▶ Accurate result with variable volume in cells
- ▶ Sample cell cap is grease-less and one-touch
- ▶ Touch panel display



## OUTLINE

BELPYCNO is an instrument to measure true density by the gas displacement method.

BELPYCNO is utilizing new technologies; high resolution pressure measurement, variable cell volume, grease-less and one-touch sample cell cap.

Those features realize high accuracy measurement result and easy handling.

## PRINCIPLE

### I Type of density

The density can be classified into two types, bulk density, and true density. The bulk density is calculated from the mass of a material (including void) in a unit volume. The true density is calculated from mass of a material that excludes void in contrast to bulk density. When the material includes closed pores, the gas molecules cannot diffuse into pores. Density of material including closed pores is regarded as apparent density.

### I Measurement principle

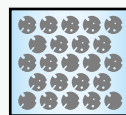
BELPYCNO measures true density by gas displacement method.

As shown in figure to the right, gas is introduced to the small cell with sample. Then, gas is diffused into expansion cell when opening the valve between sample cell and expansion cell.

Sample volume is calculated from 'blank sample cell volume', 'blank expansion cell volume' and 'pressure decrease'.

The sample density is calculated with sample weight dividing by sample volume.

### Type of density



Bulk density

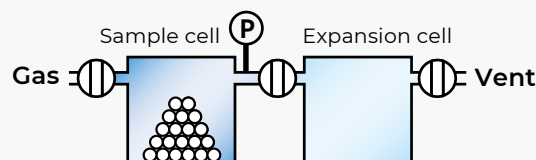


True density

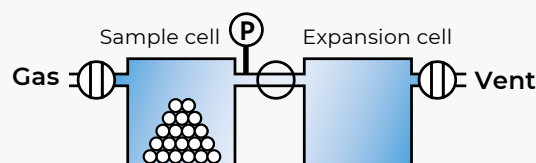


Apparent density

### Measurement principle



Pressure is measured after He is introduced to sample cell.



Gas is diffused into expansion cell when opening the valve and pressure is decreased. The sample volume is measured from the change in pressure.

## FUNCTION

### High accuracy measurement with variable expansion cell volume\*

Variable cell volume

Expansion cell volume: 10cm<sup>3</sup>, 5cm<sup>3</sup>

Appropriate expansion cell volume can be selected for sample cell volume to measure with highest accuracy.

\*Patent applied for.

### Grease-less and one-touch built-in sample cell cap\*

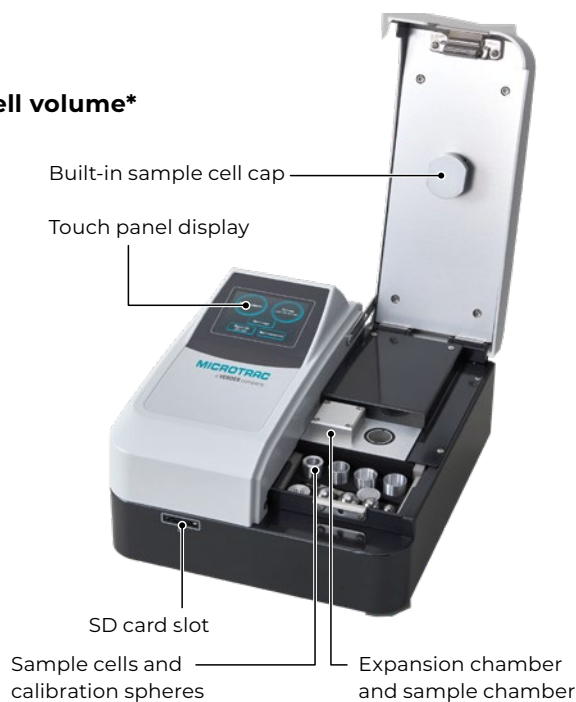
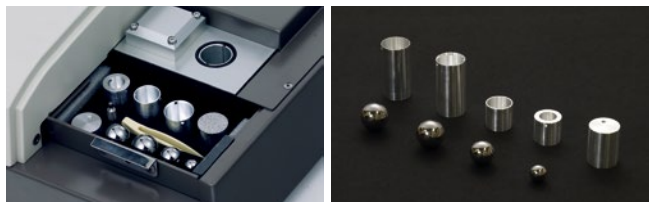
Sample cell cap is grease-less and one-touch.

Built-in sample cell cap can minimize the risk of pollution by grease and outside contamination leaking. Moreover, this unique structure makes for fast and easy operation.

\*Patent applied for.

Storage of sample cell and calibration sphere

Sample cell and calibration sphere are stored in the main unit to prevent loss of it.



Cell volume [cm <sup>3</sup> ]	Inside diameter [mm]	Depth [mm]
10	19.2	39.2
3.5	16.4	16.4
1.0	11.4	11.4

### Easy operation with touch panel display

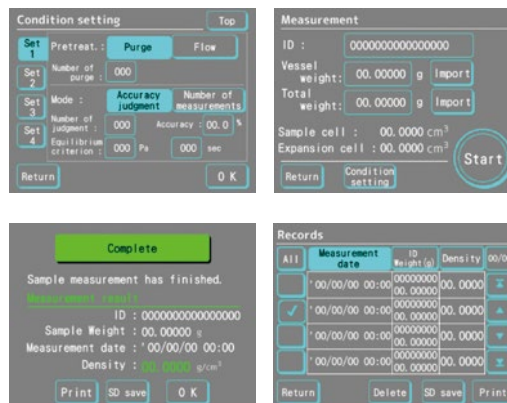
Multi-language function, English and Japanese.

Automatic measurement with simple measurement condition setting.

Accuracy estimation mode: measurement is repeated until the result error is within a predetermined criteria.

Multiple test mode: measurement is repeated until the set number of times are reached.

Measurement is started with input of sample ID and sample weight after determination of measurement condition. Sample weight can be optionally loaded from balance to prevent the error. Measurement result is displayed on the touch panel display.



## OPTIONS

Vacuum pretreatment for sample

Sample weight acquisition from electronic balance

Thermostatic water bath to maintain the sample temperature

## APPLICATIONS

BELPYCNO can evaluate following materials; catalyst, battery cell, pharmaceutical, cosmetic, cement, toner, colorant, electronic component, mineral.



Catalyst



Battery cell



Pharmaceutical



Cosmetic



Cement



Toner



Pigment



Electronic component



Mineral

### Vacuum pretreatment option



## SPECIFICATIONS

Measurement principle	Gas displacement method
Sample cell volume	10 cm <sup>3</sup> , 3.5 cm <sup>3</sup> , 1 cm <sup>3</sup>
Measurement accuracy	0.03% F.S + 0.03% R
Repeatability	0.02% F.S
Pretreatment	Gas purge, Flow, Vacuum (option)
Pretreatment pressure	0~145 kPa (Gauge)
Measurement pressure	145 kPa (Gauge)
Measurement repetition number of time	Max. 100 times
Mean number of times	Max. 100 times
Measurement temperature	Room temperature (Circulator (Option) : 15 to 50 °C)
Calibration method	Automatic calibration with calibration sphere
Interface Input	RS232C (communication with a electric balance)
Utility gas	He, inert gases: pres. 1.5bar (Gauge), 1/8" Swagelok joint
Allowed gases	He, N <sub>2</sub> , inert gases
Power supply	AC 90~250 V / 200 W
Dimensions, Weight	270 (W) × 170 (H) × 300 (D) mm, 8 kg
Recommended Monitor	Full HD monitors

## DATA SHEET

Measurement result output is in text-file format and can be printed in report form.  
Measurement data can also be edited by Microsoft Excel.

### ▼Detail of measurement result

```

Measurement Result
-----
Measuring instrument : BELPyro VER 0.80
Serial No. : 001

ID : SAMPLE6
Sample Weight : 1.45690 g
Number of purge : 3

Mode : Accuracy Judgment
Number of judgment : 5
Accuracy : 0.5 %
Equilibrium criterion : 50 Pa
30 sec

Reference volume setting : [10.0]
Sample cell volume : 12.7656 cm3
Expansion cell volume : 13.1793 cm3

Measurement time : 2015/02/10 17:29 ~ 17:51

No. Volume[cm3] Density[g/cm3] Temp.[°C] Elapsed time
+1 0.6448 2.2594 25.0 00:03:17
+2 0.6456 2.2566 25.0 00:07:02
+3 0.6456 2.2566 25.0 00:10:47
+4 0.6456 2.2566 25.0 00:14:33
+5 0.6460 2.2552 25.0 00:18:18

Average volume value : 0.6455 cm3 Std. dev. : 0.0002 cm3
Average density value : 2.2568 g/cm3 Std. dev. : 0.0019 g/cm3
    
```

### ▼List of measurement results

```

List of measurement results - Notepad
-----
Measurement Result
-----
Measuring instrument : BELPyro VER 0.80
Serial No. : 001

No. Date Time ID Weight[g] Sample-cell[cm3] Expansion-cell[cm3] Density[g/cm3]
1 2015-02-08 12:43 201501270000000 16.86489 7.9421 7.9421 2.9421
2 2015-02-08 11:18 201501270000000 16.86456 7.9421 7.9421 2.9421
3 2015-02-01 09:55 201501270000000 16.86459 7.9421 7.9421 2.9421
4 2015-01-30 16:34 201501270000000 16.86455 7.9421 7.9421 2.9421
5 2015-01-28 14:12 201501270000000 16.86456 7.9421 7.9421 2.9421
    
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※Specifications and appearance of the products listed are subject to change without notice.

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