

Automatic high precision pycnometer

# BELPycno

Cell volume : 10cm<sup>3</sup>, 3.5cm<sup>3</sup>, 1.0cm<sup>3</sup>



# One-touch, high-accuracy, automatic measurement

## BELPycno

### Features

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



### Outline

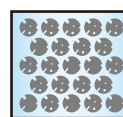
BELPycno is an instrument to measure true density by the gas displacement method. BELPycno is utilizing new technologies; high resolution pressure measurement, variable cell volume, grease-less and one-touch sample cell cap. Those features realize high accuracy measurement result and easy handling.

### Principle

#### 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.

#### Type of density



Bulk density



True density

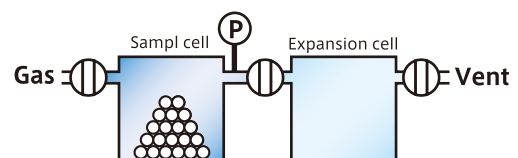


Apparent density

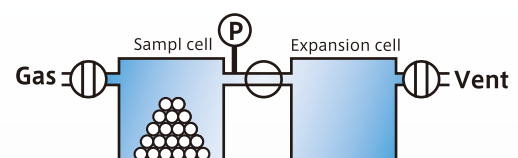
#### Measurement principle

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.

#### 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\*

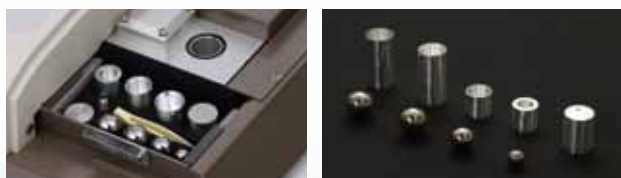
#### Sample cell cap is grease-less and one-touch.

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.



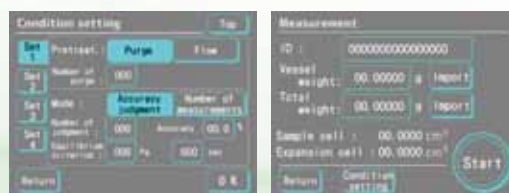
### Easy operation with touch panel display

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.



## Option

Label printer for result output  
 Sample weight acquisition from electronic balance  
 Thermostatic water bath to maintain the sample temperature



## Application

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



Catalyst



Battery cell



Pharmaceutical



Cosmetic



Cement



Toner



Colorant



Electronic component



Mineral

## Specification

Measurement principle	Gas displacement method
Sample cell volume	10cm <sup>3</sup> , 3.5cm <sup>3</sup> , 1cm <sup>3</sup>
Measurement accuracy	(+/-0.5% of F.S. )+ (+/-0.03% of reading)
Repeatability	+/-0.2% of F.S.
Pretreatment	Gas purge, Flow, Vacuum (option)
Pretreatment pressure	0~145kPa (Gauge)
Measurement pressure	0~145kPa (Gauge)
Measurement repetition number of time	Max. 100 times
Mean number of times	Max. 100 times
Temperature range	15~35°C, Water bath: 15~50°C (option)
Calibration method	Automatic calibration with calibration sphere
Interface	input output
	RS232C (communication with Personal computer) RS232C (communication with printer)
Utility gas	He, inert gases: pres. 1.5bar (Gauge), 1/8" Swagelok joint
Allowed gases	He, N <sub>2</sub> , inert gases
Power supply	AC90~250V/ 200W
Dimensions	W270×H170×D300mm, 8kg

## 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. 0.00  
Serial No.: 001

ID: SAMPLES  
Sample Weight: 1.45000 g  
Number of purge: 3  
Mode: Accuracy Judgment  
Number of judgment: 5  
Accuracy: 0.5 %  
Equilibrium criterion: 40 Pa  
30 sec

Reference value setting: (10.0)  
Sample cell volume: 12.2658 cm<sup>3</sup>  
Expansion cell volume: 11.1783 cm<sup>3</sup>

Measurement time: 2015.02.10 17:29 ~ 17:31

No.	Volume[cm <sup>3</sup> ]	Density[g/cm <sup>3</sup> ]	Temp.[°C]	Elapsed time
*1	0.6485	2.2594	25.0	00:03:17
*2	0.6486	2.2566	25.0	00:07:40
*3	0.6486	2.2566	25.0	00:10:43
*4	0.6486	2.2566	25.0	00:14:23
*5	0.6480	2.2552	25.0	00:18:18

Average volume value: 0.6485 cm<sup>3</sup> Std. dev.: 0.0002 cm<sup>3</sup>  
Average density value: 2.2568 g/cm<sup>3</sup> Std. dev.: 0.0019 g/cm<sup>3</sup>

### ▼List of measurement results

Measurement Result

Measuring instrument: BELPyro VER. 0.00  
Serial No.: 001

No.	Date	Time	ID	Weight[g]	Sample-cell [cm <sup>3</sup> ]	Expansion-cell [cm <sup>3</sup> ]	Density[g/cm <sup>3</sup> ]
1	2015.02.10	17:40	201501700000000	16.64456	1.9427	1.9427	1.9427
2	2015.02.10	17:19	201501700000000	16.64456	1.9427	1.9427	1.9427
3	2015.02.10	09:56	201501700000000	16.64456	1.9427	1.9427	1.9427
4	2015.01.20	16:14	201501700000000	16.64456	1.9427	1.9427	1.9427
5	2015.01.28	14:17	201501700000000	16.64456	1.9427	1.9427	1.9427

※The design and the specifications in the catalog are subject to change without notice due to continual improvements.  
※Certain MicrotracBEL products (commodities, technologies, and software) are subject to export control laws of Japan, and import/export regulations of other countries.

## MicrotracBEL Corp.

1-9-1 Haradanaka, Toyonaka-shi, Osaka 561-0807, Japan  
TEL : +81-(0)6-6841-2161  
FAX : +81-(0)6-6841-2767  
<http://www.microtrac-bel.com>  
E-mail : international@microtrac-bel.com

● Distributor

NIKKISO Group