

Titration

Fast, Simple, Reliable and Accurate

When titration is a critical, repetitive part of work either in process monitoring during production, quality control in chemistry and pharmaceutical industries or in research and development, two common properties are desirable:

The equipment used should be easy and reliable to operate and the results must be available quick and they have to be accurate.



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For titrations with visual detection of the endpoint, e.g., by changing color of the indicator or the formation of a precipitate, bottle-top or glass burettes are typically used.

The advantages of bottle-top burettes over glass burettes, the elimination of meniscus-reading error and avoidance of poured-transfer risks, are well known. But the accuracy achievable under real lab conditions is often overestimated. This risk is accentuated with multi-digit displays that may present volumes that suggest a resolution greater than the instrument can deliver.

Demanding users are well aware of that problem. Therefore, when high accuracy is required, they have historically relied on Class A glass burettes. An example of such a case would be a titration according to the European Pharmacopeia (Chapter 4.2.2) which requires that the molarity of the volumetric solutions be determined by an appropriate number of titrations, in which the repeatability (CV) should not exceed 0.2%. This is not an easy task if lion's share of the CV 'budget' is already consumed by the limitations of the bottle-top burette, especially with partial volumes. (CV value calculation of a conventional 50 ml bottle-top burette according DIN EN ISO 8655, with an partial volume of 32 ml: $CV = 50/32 \times \leq 0,1\% = \leq 0,16\%$).

With the new Titrette bottle-top burette from Brand, it has become possible for the first time not only to do better than the error margins demanded by DIN EN ISO 8655-3 for bottle-top burettes, but also to satisfy even the error margins of Class A glass burettes according DIN EN ISO 385.

That technical progress was possible by the development of an innovative magneto-resistive

measuring system. This system detects the movement of the piston head for dispensing by means of a magnetic strip directly on the piston rod. The detected changes of the magnetic field is transformed into electrical signals, which are then calculated into volume units, and shown on the LCD screen. If needed, the digital display of the titrated volume can be selectively set to show 2 or 3 decimal places. (Above 20 ml the display will automatically change to two decimal places).

Beyond the instrument's accuracy, the light weight and compact design of the bottle-top burette are important features, since they contribute to a low center of gravity that enhances stability on the lab bench.

Furthermore, the instrument can be disassembled easily by the user in a matter of minutes for cleaning purposes or to replace the batteries. The design even permits the replacement of the piston or cylinder should the instrument be dropped and broken. This saves time for shipment to the manufacturer's service provider and avoids service and repair costs.

Another new feature of the newly developed bottle-top burette is the smooth gearing mechanism for precise drop-wise titrations. The instru-

ment also detects automatically the direction of rotation, and thereby eliminates the risk of forgetting to switch between filling and dispensing. Another convenient feature is the amber tinted inspection windows (included) that can be quickly and easily replaced for the protection of light-sensitive titrants. A variety of helpful electronic functions provide for easy calibration adjustment, scheduling of the next calibration date, or time-setting for automatic power-off to save battery power.

The instrument is also available with an optional RS 232 communication interface. The data transmission directly to the PC saves time and eliminates transcription errors while recording primary data from each titration.

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Volume	BRAND Titrette Bottle-top burette				Bottle-top burette DIN EN ISO 8655-3				Glass Burette, Class A, DIN EN ISO 385
	Accuracy		Coefficient of Variation (CV)		Accuracy		Coefficient of Variation (CV)		Error Limit (EL)
ml	$\leq \pm \%$	$\leq \pm \mu\text{l}$	$\leq \%$	$\leq \mu\text{l}$	$\leq \pm \%$	$\leq \pm \mu\text{l}$	$\leq \%$	$\leq \mu\text{l}$	$\pm \mu\text{l}$
25	0,07	18	0,025	6	0,2	50	0,1	25	30
50	0,06	30	0,02	10	0,2	100	0,1	50	50

EL = A + 2CV