



# Transferpettor

Standard Operating Procedure

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# 1. Introduction

The test instruction transfers standards relevant to the test into a practical form. It can therefore be used as a basis for test equipment monitoring according to DIN EN ISO 9001, DIN EN ISO 10012, and DIN EN ISO/IEC 17 025.

Basically, we recommend an inspection every 3...12 months. However, the testing interval may be adjusted to your individual requirements. In the case of high frequency of use or the use of aggressive media, it is advisable to check more frequently.

The following instruments can be checked using these test instructions:

Instruments	Types	Relevant standards
Transferpettor®	Fixed volume Variable volume	ISO 8655:2022

For the regular checks according to DIN EN ISO 9001, DIN EN ISO 10 012, and DIN EN ISO/IEC 17 025 as well as the GLP Guidelines, we offer a calibration service (see BRAND Calibration Service). This calibration service saves you time and internal effort, especially if you still have to perform calibrations in addition to ongoing operation.

## Legend

In order to simplify the collection of the relevant data, the SOP refers to the respective items in the test report. The following graphics indicate to these positions:

Example:



Position in the test report:






**Instrument**

In the appendix, you will also find the health clearance form required to send in equipment as well as information about our accredited calibration laboratory and EASYCAL™ 5 calibration software.

## 2. Preparation

### 2.1. Instrument type and serial number

1. Determine instrument type and nominal volume. Enter the result in the test report: 
2. Read off the serial number. The serial number is located on the Hand grip . Enter the result in the test report: 
3. Read customers identification, if available. Enter the result in the test report: 

2.2.

2.3.

2.4.

2.5.

### 3. Test instruments and accessories

- + A test room with the following features:
  - draft-free
  - low temporal and spatial temperature fluctuations
  - Taking into account the measuring tolerance of the hygrometer, a relative humidity of 45...80% should be reached.
  - Ambient temperature of max.  $20 \pm 3^{\circ}\text{C}$
- + Place the instrument to be tested with accessories unpacked in the test room for at least 2 h so that the instrument and accessories can adjust to the ambient temperature.
- + A recipient vessel filled with deionized or distilled water (e. g. Erlenmeyer flask) (water quality in accordance with ISO 3696, at least quality 3) Consider the following aspects:
  - Adjust the water and ambient temperature by max.  $0.5^{\circ}\text{C}$ .
  - Prevent the water in the vessel from cooling down as a result of evaporation.
- + Provide a weighing vessel (e.g., Erlenmeyer flask). Fill this with a small amount of water.
  - Make sure at least the bottom is covered.
  - Provide evaporation protection for  $< 100 \mu\text{l}$  test volume.
- + Measuring instruments in accordance with DIN ISO 8655-6:

Instrument	Resolution:
Thermometer for liquids	$0.1^{\circ}\text{C}$
Thermometer for ambient temperature	$0.1^{\circ}\text{C}$
Hygrometer	1% relative air humidity
Barometer	0.1 kPa
Timer	1 s

- + Balance, recommended specifications:

Nominal volume of the instrument to be tested	Resolution of the display	Repeatability and linearity <sup>a</sup>
<b>V</b>	<b>mg</b>	<b>mg</b>
$0.5 \leq V < 20 \mu\text{l}$	$0.001^{\text{b}}$	$0.006^{\text{b}}$
$20 \mu\text{l} \leq V < 200 \mu\text{l}$	0.01	0.025
$200 \mu\text{l} \leq V \leq 10 \text{ ml}$	0.1	0.2

<sup>a</sup> The repeatability in this table applies to the volume determination of a single-channel instrument. If a single-channel balance is used exclusively for the volume determination of multichannel pipettes, the repeatability is twice as high as specified in this table.

<sup>b</sup> single channel balance

#### Traceability of test results to the national standard

By using calibrated test equipment (balance and thermometers), the requirement of DIN EN ISO 9001, DIN EN ISO 10 012, and DIN EN ISO/IEC 17 025 for traceability of the test to the national standard is fulfilled. The calibration of the balance can be done by DAkkS calibration, a direct official calibration of the balance, or by calibrating the balance with correspondingly traced weights (corresponding precision). The thermometer can also be calibrated by means of a DAkkS calibration, an official calibration, or by comparison with corresponding traceable thermometers (under defined conditions).

## 4. Gravimetric calibration

### 4.1. Gravimetric test for Transferpettor with nominal volume > 50 µl

1. Set the nominal volume.
2. Determine the temperature of the deionized water. Enter the result in the test report [4](#).
3. Pre-rinse cap/capillary once. Take up test liquid and dispense it again; there should be no more air bubbles in the cap/capillary.
4. Place the weighing vessel (containing a small amount of deionized water) on the balance and tare the balance.
5. Press the pipetting button as far as it will go.
6. Immerse the cap/capillary in the water. Immerse about a few millimeters vertically into the sample.
7. Take up the test liquid from the receiving vessel. Slide the pipetting knob back slowly and evenly. Keep the tip in the test liquid for approx. 1 s. Gently wipe the cap on the vessel wall at an angle of 30...45°. Capillary: make sure the meniscus lines up with the lower edge of the capillary.
8. Wipe cap/capillary on the outside. Use a lint-free cloth and do not touch the opening; otherwise, liquid will be sucked out.
9. Remove the weighing vessel from the balance.
10. Dispense the sample into the weighing vessel. Place the cap/capillary at an angle of approx. 30...45° to the vessel wall. Press the pipetting button at a steady speed until the stop and hold it. Wipe the cap/capillary along the vessel wall over a length of approx. 10 mm; pull the pipette away upwards. Allow the pipetting button to steadily move back to its original position.
11. Place the weighing vessel onto the balance. Enter the result in the test report [5](#).
12. Re-tare the balance.
13. Repeat steps 5...10 times. Enter the result in the test report [5](#).
14. Then pipette analogously at 50% and 20% of the nominal volume. Only for digital instruments! Enter the result in the test report [5](#). This results in 30 weight values (digital instrument) or 10 weighing values (fixed instrument).

### 4.2. Gravimetric test for Transferpettor with nominal volume ≤ 50 µl

#### Note on evaporation

For pipettes with a nominal volume ≤ 50 µl, the tolerance limits are usually smaller than 0.5 µl. This low tolerance limit means that the evaporation of water during the test has a relatively high influence on the measurement result. For this reason, a test method that largely prevents evaporation must be used for pipettes ≤ 50 µl. If a special pipette calibration balance with an "evaporation trap" is used, carry out the procedure as in For Transferpette® with nominal volume > 50 µl. BRAND has developed a new test method especially for this purpose. The weighing vessel used is a disposable micropipette or a micro-weighing vessel; these allow almost no evaporation.

1. Set the nominal volume.
2. Determine the temperature of the deionized water. Enter the result in the test report **4**.
3. Pre-rinse the capillary once. Take up test liquid and dispense it again; there should be no more air bubbles in the cap/capillary.
4. Clamp the disposable micropipette to the pipette holder, place on the balance, and tare the balance.
5. Press the pipetting button as far as it will go.
6. Immerse the capillary in the water. Immerse approximately 2...3 mm vertically into the sample.
7. Take up the test liquid from the receiving vessel. Slide the pipetting knob back slowly and evenly. Keep the tip in the test liquid for approx. 1 s. Gently wipe the capillary on the vessel wall at an angle of approx. 30...45°. Make sure the meniscus lines up with the lower edge of the capillary.
8. Wipe the outside of the capillary. Use a lint-free cloth and do not touch the opening; otherwise, liquid will be sucked out.
9. Remove the disposable micropipette from the balance. The pipette holder facilitates handling.
10. Dispense sample into the disposable micropipette. Hold the capillary in the opening of the disposable micropipette. Press the pipetting button at a steady speed until the stop and hold it. Pull the disposable micropipette out of the capillary while pressing the pipetting button (no wiping necessary). Allow the pipetting button to steadily move back to its original position.
11. Place the disposable micropipette on the balance; note the weight value. Enter the result in the test report **5**.
12. Tare the balance again with a new disposable micropipette.
13. Repeat steps 4 through 10 ten times. Enter the result in the test report **5**.
14. Then pipette analogously at 50% and 20% of the nominal volume. Only for digital instruments! Enter the result in the test report **5**. This results in 30 weight values (digital instrument) or 10 weighing values (fixed instrument).

## 5. Evaluation of gravimetric test results

The weight values obtained during the gravimetric test are only the mass values of the dispensed volume. In order to obtain the actual volume, an adjustment calculation must be carried out. The following calculations must be carried out:

Step	Calculation	Remark
1.	<b>Mean weight:</b> (Example for 10 weight values) $\bar{x} = \frac{x_1 + x_2 + x_3 + x_4 + x_5 + x_6 + x_7 + x_8 + x_9 + x_{10}}{10}$	
2.	<b>Mean volume:</b> $\bar{V} = \bar{x} * Z$	Factor Z (see Table 1). Enter the result in the test report <a href="#">6a</a> .
3.	<b>Standard deviation:</b> $s = Z * \sqrt{\frac{\sum(x_i - \bar{x})^2}{n - 1}}$	Factor Z (see Table 1). Enter the result in the test report <a href="#">6b</a> .
4.	<b>Accuracy:</b> $A\% = \frac{\bar{V} - V_0}{V_0} * 100$	Enter the result in the test report <a href="#">6c</a> .
5.	<b>Coefficient of variation:</b> $CV\% = \frac{100 s}{\bar{V}}$	Enter the result in the test report <a href="#">6d</a> .
	<b>Actual/nominal value comparison:</b> For error limits, see and the following accuracy tables for the respective instrument, or define your own error limits.	Enter the result in the test report <a href="#">6e</a> .
	<b>Result:</b>	Enter the result in the test report <a href="#">6g</a> .

If the calculated values (A% and CV%) are less than or equal to the error limits, the instrument is in good working order.

We recommend using software to help perform the calculation and evaluation. For this purpose, BRAND offers the EASY-CAL™ calibration software (see [here](#)). This convenient software runs on Windows and speeds up the calculation considerably.

### 5.1. Possible volume error

Possible volume errors and the following measures:

Error	Possible causes	Measures
Volume too small	Pipetting button not pressed to the stop	Press the pipetting button as far as it will go.



Error	Possible causes	Measures
	Cap/capillary is not positioned correctly	Mount cap/capillary correctly; see instructions for use
	Liquid remains in cap/capillary	Cap/capillary or seal defective; replace according to instructions for use, and mount cap correctly
Volume too large	Air bubbles in the liquid taken up	Liquid taken up too quickly.
	Cap/capillary is not mounted correctly	Mount cap/capillary correctly; see instructions for use.

## 5.2. Temperature and factor Z

Extract from DIN EN ISO 8655

Table refers to 1,013 hPa.

In the validity range from 950 hPa to 1040 hPa.

Temperature: ° C	Factor Z ml/g		Temperature: ° C	Factor Z ml/g
15	1.0020		23	1.0035
15.5	1.0020		23.5	1.0036
16	1.0021		24	1.0038
16.5	1.0022		24.5	1.0039
17	1.0023		25	1.0040
17.5	1.0024		25.5	1.0041
18	1.0025		26	1.0043
18.5	1.0026		26.5	1.0044
19	1.0027		27	1.0045
19.5	1.0028		27.5	1.0047
20	1.0029		28	1.0048
20.5	1.0030		28.5	1.0050
21	1.0031		29	1.0051
21.5	1.0032		29.5	1.0052
22	1.0033		30	1.0054
22.5	1.0034			

## 5.3. Manufacturer limits for Transferpettor

### Transferpettor macro

Enter in the test report at .

Volume	Accuracy R ≤ ±		Coefficient of variation CV ≤		Graduation
	%	µl	%	µl	
100–500 µl	0.5	2.5	0.2	1.0	1.0 µl
200–1000 µl	0.5	5.0	0.2	2.0	1.0 µl
1–5 ml	0.5	25.0	0.2	10.0	0.01 ml
2–10 ml	0.5	50.0	0.2	20.0	0.01 ml

### Transferpettor micro

Enter in the test report at .

Volume	Accuracy <sup>1</sup> A ≤ ±		Variation coefficient VC ≤	
	%	µl	%	µl

Volume Variable	Accuracy <sup>1</sup> A ≤ ±		Variation coefficient VC ≤	
2.5–10	3.0	0.3	0.8	0.08
5–25	2.4	0.6	0.5	0.125
10–50	1.8	0.9	0.4	0.2
20–100	1.5	1.5	0.4	0.4
<b>Fixed</b>				
1	12.0	0.12	4.0	0.04
2	7.5	0.15	2.0	0.04
5	3.0	0.15	0.8	0.04
10	3.0	0.3	0.8	0.08
20	2.4	0.48	0.5	0.1
25	2.4	0.6	0.4	0.1
50	1.8	0.9	0.4	0.2
100	1.5	1.5	0.4	0.4
200	1.5	3	0.2	0.4

#### 5.4. ISO error limits for pipettes

Nominal volume	A ≤ ± %	CV ≤ %
1 to 3 µl	2.5	2
> 3 to 5 µl	2.5	1.5
> 5 to 10 µl	1.2	0.8
> 10 to 50 µl	1.0	0.5
> 50 to 5,000 µl	0.8	0.3
> 5,000 to 10,000 µl	0.6	0.3

Laboratory instruments Transferpettor up to a volume range of 200 µl cannot comply with the tolerances of ISO 8655. Nevertheless, we also recommend gravimetric volume testing as a test method for these laboratory instruments as described, for example, in DIN EN ISO 8655 Part 6.

#### 5.5. Error limits to be defined by the user

For calibration, the applicable error limits must be defined by the user. Different methods can be applied to accomplish this:

If the application requires it and the optimized test conditions exist for measurement, the error limits specified in the can also be expected in the case of used, intact volumetric instruments.

In accordance with the German Calibration Law, however, it is also admissible to apply operational limits. The operational limits equate to double the calibration error limits. This means that the values of the manufacturer's error limits must be doubled. Users may also define their own individual error limits related to their particular application, which their calibrated (adjusted) measuring instrument should adhere to.

This procedure meets the requirements of DIN EN ISO 9001, DIN EN ISO 10 012, and DIN EN ISO/IEC 17 025.

# 6. Test report for volumetric instruments

## 1 Instrument

- Titrette®
- Burette Digital
- Dispensette®
- Transferpette®
- Transferpette® S
- Transferpette® electronic
- Transferpettor

- Type**
- fixed
  - variable
  
  - analog
  - digital

Nominal volume:

Serial number:

Customer's marking:

## 2 Damage

Nominal volume:

Serial number:

Customer's marking:

## 3 Operating defects

- Type of damage
- Damage remedied
- none
- Type of functional defect
- Functional defect eliminated

## 4 Environment

Water temperature:

Balance:

Thermometer:

Relative humidity: (at least 45%):

Correction factor Z:

Continued on next page

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## Weight values of the gravimetric test

Weight value No.	At 10% in mg	At 50% in mg	For nominal volume in mg
X <sub>1</sub> :			
X <sub>2</sub> :			
X <sub>3</sub> :			
X <sub>4</sub> :			
X <sub>5</sub> :			
X <sub>6</sub> :			
X <sub>7</sub> :			
X <sub>8</sub> :			
X <sub>9</sub> :			
X <sub>10</sub> :			

6

## Evaluation of the gravimetric test

Calculated value		At 10%	At 50%	For nominal volume
6a	$\bar{V}$			
6b	s			
6c	A [%] actual			
6d	CV [%] actual			
6e	A [%] target			
6e	CV [%] target			
6g	Result			

The test was carried out according to DIN EN ISO 8655 and DIN EN ISO 4787.

Date: Signature:

## 7. Appendix

### 7.1. Abbreviations, units, and notations

The following abbreviations are used in this or other test instructions:

Symbol	A < B: A is less than B A ≤ B: A is less than or equal to B
Ranges	Example: 980...1000 hPa Avoids sign confusion: Hyphen as a minus sign  Example: 20 µl < V < 100 µl The volume V is between 20 µl and 100 µl (V is larger than 20 µl and smaller than 100 µl).
Materials	PFP: Perfluorinated pentacene PMP Polymethylpentene PFA Perfluoroalkoxy polymer Boro 3.3 Borosilicate glass AR-GLAS®: A soda-lime glass from SCHOTT AG, 55122 Mainz, Germany PUR: Polyurethane
W <sub>1</sub>	Tare weight of the weighing vessel
W <sub>2</sub>	Weight of the weighing vessel filled with the medium to be weighed.
A	Accuracy
CV	Coefficient of variation:
V	Volume
s	Second
l	Liter
ml	Milliliter(s)
µl	Microliters
g	Gram(s)
mg	Milligrams(s)

### 7.2. Declaration on the Absence of Health Hazards

Please enclose with the instrument or send as an e-mail to [service@brand.de](mailto:service@brand.de).

BRAND GMBH + CO KG

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97877 Wertheim

[service@brand.de](mailto:service@brand.de)

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We are required by law to protect our employees against hazards caused by contaminated instruments. Therefore, we thank you for understanding that we can only perform calibrations| repairs when this declaration is completed, signed and provided to us.

CAUTION! If you are a customer outside of Germany, please contact our local service partner in your country. Please send in instruments from outside Germany only after being requested to do so. Unsolicited instruments cannot be processed.

To the equipment shipment from  | To the delivery note number

Instrument  | Serial Number

The undersigned hereby declares:

- + That the instruments have been carefully cleaned and decontaminated before shipment.
- + That the instruments pose no danger through bacteriological, viral, chemical, and/or radioactive contamination.

Applications

Media used:

 Acids

 Bases

 Solvents

 Serum, blood

 Cell culture media, buffers

 Other:

Measures for decontamination:

Company / laboratory (official stamp)

Name:

Pos.

Date / legally binding signature:

Tel. / fax / e-mail

### 7.3. BRAND Calibration Service

BRAND offers a complete service that includes calibration and adjustment of BRAND and third-party instruments as well as any necessary maintenance and repair of BRAND instruments. This saves time and money, with the added benefit of testing by an independent laboratory. Find more information and the order form for the repair and calibration service on [brand.de](http://brand.de).

#### 7.3.1. Range of instruments

1. Piston-operated pipettes (single- and multi-channel)
2. Bottle-top dispensers
3. Bottle-top burettes
4. Repetitive pipettes

### 7.3.2. Testing in accordance with DIN EN ISO 8655

A team of qualified staff, working in temperature and humidity controlled rooms and using state-of-the-art balances and calibration software, calibrates Liquid Handling instruments, regardless of their make, in accordance with DIN EN ISO 8655.

Variable volume instruments such as the HandyStep®Touch, HandyStep®Touch S, HandyStep® electronic, Transferpette®, Transferpette®S, Transferpette®electronic, Transferpette®-8/-12, Transferpette®-8/-12 electronic, Transferpette®S-8/-12, Transferpettor, Dispensette®, digital burettes, or Titrette® are checked at nominal volume, 50% of the nominal volume, and at 10% or 20% of the nominal volume.

To document the results, a detailed test report that fully complies with all relevant regulations is compiled.

The BRAND Calibration Service provides:

1. Calibration of Liquid Handling instruments, regardless of their make
2. Detailed calibration certificate
3. Return of instrument within a few working days
4. Cost-efficient implementation

### 7.4. EASYCAL™ Calibration software – test equipment monitoring made easy



The [EASYCAL™ 5](#) calibration software facilitates the monitoring of liquid handling instruments (piston-stroke instruments such as pipettes, dispensers, burettes, and manual dispensers) as well as volumetric instruments made of glass or plastic according to GLP/GMP and DIN EN ISO 9001. EASYCAL™ 5 can be used not only for BRAND instruments but also for the instruments of all manufacturers.

EASYCAL™ 5 performs all calculations automatically and compares them with the tolerances from the current standards or their individually defined limits. The tolerances of numerous instruments and the interface settings of over 100 test instruments (e.g., balances) are already stored for you.

Choose between a stand-alone version for working on one workstation (recommended for small laboratories where calibration is done by a single person) or a client/server version for parallel, distributed work on multiple workstations (floating licenses are installed on the server).

#### Functions:

- + Testing of liquid handling instruments and volumetric instruments made of glass and plastic in accordance with ISO 8655, ISO 4787, and others.
- + Open software, suitable for all volumetric instruments – regardless of manufacturer.
- + Extensive library with instrument specifications from well-known manufacturers can be expanded and modified by the user.
- + Scope of testing can be individually defined by the user via test plans. An extensive library of test plans is included to help you get started with EASYCAL™ 5 and minimize data entry time.
- + Instrument management – quickly and easily search and find the owner, test history, and next test date.
- + Continuous control of the current actual state during the test by graphical representations and ad hoc calculation of statistical values.  
Reminder function for upcoming tests with automatic notification of the instrument owner via e-mail.
- + Integration of the address data of your customers and suppliers in a business partner database User administration with user roles (e.g., auditor, supervisor, system administrator) and access restriction to EASYCAL functions.  
Dual-control principle for the release of critical data such as test plans, calibration orders before certificate printing, and instrument specification.

- + Interface connection via RS232 of measuring instruments such as balances, thermometers, barometers, and hygrometers with automatic transmission of the measured values.
- + In the integrated certificate editor, you can customize the certificates, and test reports supplied to your needs and create the design.



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Technical changes, errors and misprints excepted.



At store.brand.de you will find accessories and spare parts, user manuals, test instructions (SOP) and videos for the product.



For more information on products and applications, please visit our Youtube channel my-labBRAND.

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