

Transferpette®

Testing Instructions (SOP)

May 2009

1. Introduction

The standards DIN EN ISO 8655 describe both the design and the testing of the piston operated pipette Transferpette®. The following Testing Instructions describe how to apply the ISO standard in practice.

We recommend a testing of piston operated pipette every 3–12 months. This interval may be adjusted to individual requirements. For example, when working very frequently or when using aggressive media, the instrument should be tested more frequently.

These Instructions may also be used as a basis for the supervision of testing devices to DIN EN ISO 9001, DIN EN ISO 10012 and DIN EN ISO/IEC 17025.

For the regular examinations required by DIN EN ISO 9001, DIN EN ISO 10012 and DIN EN ISO/IEC 17025 and the GLP Guidelines, BRAND additionally provides a calibration service (see chapter 7). Your instrument will be returned within a few days together with a test report. For more detailed information, please contact your labware supplier.



2. Preparation for testing and visual examination

2.1 Type and serial number

- Read instrument type and nominal capacity. ⇒ Enter in Test Record (1).
- Read Serial Number (embossed at the handle). ⇒ Enter number in Test Record (1).
- Read customer's identification, if present. ⇒ Enter identification in Test Record (1).

2.2 Minimal configuration of the Transferpette®

- Transferpette® ⇒ Use only manufacturer's original parts.
- Pipette tips ⇒ Use only appropriate tips. For best results, use original PLASTIBRAND®-pipette tips.
- Calibrating key (Fix type) ⇒ Transferpette® manufactured 9/93 and later.

2.3 Cleaning

Recommendation: adjust instrument before cleaning (found).

- Clean the pipette shaft. ⇒ No media residues!
⇒ Wipe off with soft cloth.
- Clean the exterior sufficiently. ⇒ Slight soiling is permissible.
- Has remaining liquid penetrated into the instrument? ⇒ Disassemble and clean the instrument
⇒ see Operating Manual.

2.4 Visual examination (damages, leaking)

- Housing ⇒ General damages?
- Pipette shaft tip ⇒ Scratches on the surface?
- Tip eject
- Piston ⇒ Scratches or soiling on the surface?
- Seal ⇒ Scratches or soiling on the surface?
⇒ Enter result in Test Record (2).

Possible faults and resulting measures:

Fault	Possible causes	Measures
Pipette tip no longer tight	■ Scratches on the pipette shaft tip	⇒ Obtain spare parts; see Operating Manual
Instrument is difficult to move and/ or leaks.	■ Seal/ piston soiled or damaged	⇒ Obtain spare parts; see Operating Manual.

2.5 Functional test

- Mount new pipette tip.
- Set the nominal volume.
- Take up the testing liquid. ⇒ Aspiration of the liquid not possible or very slow. See notes in the table below.
- Hold the filled pipette vertically for approx. 10 seconds and observe if a drop forms at the pipette tip. ⇒ If a drop forms: See notes in the table below.
- Release the testing liquid. ⇒ Hold pipette tip against wall of vessel and wipe off against the wall.
⇒ The pipetting lever must move smoothly and jerk-free.
- Eject the tip. ⇒ Enter findings in Test Record (3).

Possible faults and resulting measures: (for measures to rectify other faults please see Instruction Manuals)

Fault	Possible causes	Measures
Aspiration not possible or very slow	<ul style="list-style-type: none"> ■ Pipette shaft or pipette shaft tip are blocked 	⇒ Clean the instrument; see Operating Manual.
Drop forming at the pipette tip	<ul style="list-style-type: none"> ■ Pipette tip not properly mounted are blocked ■ Seal or piston are damaged ■ Pipette shaft tip no longer tightly mounted (not possible with Transferpette® electronic and Transferpette® S). 	⇒ Use new pipette tips. Mount tip tightly. ⇒ Clean or replace the seal and/or piston; see Operating Manual. ⇒ Re-tighten the pipette shaft tip.

3. Equipment required for testing

3.1 For Transferpette® with nominal volume > 50 µl

- **Recipient vessel** filled with deionised or distilled water. (e.g., Erlenmeyer flask) (according ISO 3696, at least quality 3). ⇒ Match temperature of room, water and instrument
- **Weighing vessel** filled with some water. (e.g., Erlenmeyer flask). ⇒ Bottom must be covered at least. In case of testing volumes < 100 µl, protect against evaporation (see 2.6.2).
- Required **accuracy of the balance:** ⇒ Approx. 10 times the accuracy of the instrument.

Testing volume	Balance display	Reproducibility and linearity
> 10 to 100 µl	5-digit	± 0.02 mg
> 100 to 1000 µl	4-digit	± 0.2 mg
> 1 to 10 ml	4-digit	± 0.2 mg
> 10 to 50 ml	3-digit	± 2 mg

- **Thermometer** with accuracy: 0,2 °C
- **Hygrometer:** Considering the measuring tolerance of the hygrometer a relative atmospheric humidity of at least 35 % should be reached.
- Place the Transferpette® including accessories into the testing room for at least 2 hours (unpacked). ⇒ Allow instrument to adjust to room temperature.

3.2 For Transferpette® with nominal volume < 50 µl

- **Recipient vessel** filled with deionised or distilled water (e.g., Erlenmeyer flask) (according ISO 3696, at least quality 3). ⇒ Match temperature of room, water and instrument.
- **Disposable micro pipettes** intraEND 100 µl; Pipette holder. ⇒ Supplier:: BRAND GMBH + CO KG
Postfach 11 55
97861 Wertheim
⇒ Ordering information: IntraEND 100 µl Cat. No. 7091 44
Pipette holder Cat. No. 7086 05
Micro-weighing container ≤ 20 µl Cat. No. 708470
- Required **accuracy of the balance:** ⇒ Approx. 10 times the accuracy of the instrument.

Testing volume	Balance display	Reproducibility and linearity
0,1 to <10 µl	6-digit	± 0.002 mg
10 to 100 µl	5-digit	± 0.02 mg

- **Thermometer** with accuracy: 0.2 °C
- **Hygrometer:** Considering the measuring tolerance of the hygrometer a relative atmospheric humidity of at least 35 % should be reached.
- Place the Transferpette® including accessories into the testing room for at least 2 hours (unpacked). ⇒ Allow instrument to adjust to room temperature.

Traceability of test results to national standards

Through the use of calibrated testing devices (balance and thermometer), the requirement of DIN EN ISO 9001, DIN EN ISO 10012 and DIN EN ISO/IEC 17025 to refer the test to the national standard is fulfilled. The calibration of the balance e.g. can be carried out either by DKD calibration or official certification of the balance, or by calibrating the balance with appropriate weights that are traced to the national standard. The calibration of the thermometer can also be carried out by DKD calibration or official certification, or by a comparison with thermometers that are traced to the national standard (under defined conditions).

4. Gravimetric test

4.1 For mechanical and electronic Transferpette® with nominal volume > 50 µl

1. Set the nominal volume.
2. Determine temperature of the deionized water for testing. ⇒ Enter temperature into Test Record (4).
3. Mount a new pipette tip. ⇒ Conditioning increases accuracy of the test.
Condition the instrument: Take up and release testing liquid five times. Eject the pipette tip.
4. Mount a new pipette tip.
5. Pre-rinse the pipette tip once. ⇒ Take in testing liquid once, and release again.
6. Place the weighing vessel (filled with some deionized water) on the balance and tare the balance.
7. Take up testing liquid from the recipient. ⇒ Press pipetting lever of mechanical Transferpette® to first stop (not necessary with Transferpette® electronic).
⇒ Immerse pipette tip approx. 2 - 3 mm into the liquid, with 5 ml and 10 ml instruments approx. 5 mm.
⇒ Release pipetting lever of mechanical Transferpette® steadily. In case of Transferpette® electronic press pipetting key to aspirate liquid.
⇒ Leave tip immersed for approx. 1 second, with 5 ml and 10 ml instruments approx. 10 seconds.
8. Remove weighing vessel from the balance.
9. Release testing liquid into weighing vessel. ⇒ Lean pipette tip against wall of vessel at an angle about 30°- 45°.
⇒ Press pipetting lever of mechanical pipette at steady speed to its first stop and keep it there. In case of electronic Transferpette® press and hold the pipetting key.
⇒ Press to second stop to empty pipette tip completely. (with Transferpette® electronic this function is performed automatically).
⇒ Wipe off pipette tip against wall of vessel (approx. 8 -10 mm).
⇒ Release pipetting lever of mechanical Transferpette® steadily. Release pipetting lever of electronic Transferpette®.
10. Place weighing vessel on the balance. Read value. ⇒ Enter weighing value into Test Record (5).
11. Re-tare the balance. Eject the pipette tip.
12. Repeat steps 4 to 11 ten times. ⇒ Enter weighing values into Test Record (5).
13. Along the same lines, pipette 50 % and then 10 % resp. 20% of the nominal volume. ⇒ Only for variable type and electronic instruments!
⇒ Enter weighing values into Test Record (5), resulting in a total of 30 values (Digital type) and 10 values (Fix type).

4.2 For mechanical and electronic Transferpette® with nominal volume ≤ 50 µl

Note:

With pipettes of a nominal volume ≤ 50 µl, the tolerance limits are usually smaller than 0.5 µl. Due to this small tolerance limit, the evaporation of water during the test procedure has a relatively large influence on the result. Therefore, the testing of pipettes of this size requires a test procedure which largely prevents evaporation. For this purpose, BRAND has specially developed the following test procedure. The weighing vessels used are a disposable micropipette or a micro-weighing container which virtually eliminate evaporation.

1. Set the nominal volume.
2. Determine temperature of the deionized water for testing. ⇒ Enter temperature into Test Record (4).
3. Mount a new pipette tip. Condition the instrument: Take up and release testing liquid five times. Eject the pipette tip. ⇒ Conditioning increases accuracy of the test.
4. Mount a new pipette tip.
5. Pre-rinse the pipette tip once. ⇒ Take in testing liquid once, and release again.
6. Mount a disposable micropipette on the pipette holder. Place it resp. tare micro-weighing container upon the balance.
7. Take up testing liquid from the recipient. ⇒ Press pipetting lever to first stop (not necessary with Transferpette® electronic).
⇒ Immerse pipette tip approx. 2 - 3 mm into the liquid.
⇒ Release pipetting lever of mechanical Transferpette® steadily. In case of Transferpette® electronic press pipetting key to aspirate liquid.
⇒ Leave tip immersed for approx. 1 second.
8. Remove disposable micropipette resp. micro-weighing container from the balance. ⇒ The pipette holder facilitates handling!
9. Release testing liquid into the disposable micropipette resp. micro-weighing container. ⇒ Push the disposable micropipette upon the pipette tip as far as it will go resp. insert pipette tip into the cone of micro-weighing container
⇒ Press pipetting lever of mechanical Transferpette® at steady speed to its first stop and keep it there. In case of electronic Transferpette® press and hold the pipetting key.
⇒ Press to second stop to empty pipette tip completely (with Transferpette® electronic this function is performed automatically). An air bubble will form inside the disposable micropipette.
⇒ Keep pipetting lever resp. micro-weighing container at second stop **while pulling** the disposable micropipette off the pipette tip.
10. Place the disposable micropipette resp. micro-weighing container. on the balance. Read value. ⇒ Enter weighing value into Test Record (5).
11. Re-tare the balance with a new disposable micropipette resp. micro-weighing container. Eject the pipette tip.
12. Repeat steps 4 to 11 ten times. ⇒ Enter weighing values into Test Record (5).
13. Along the same lines, pipette 50 % and then 10 % of the nominal volume. ⇒ Only for digital type and electronic instruments!
⇒ Enter weighing values into Test Record (5), resulting in a total of 30 values (Digital type and electronic) and 10 values (Fix type).

5. Evaluation of gravimetric test results

The values obtained by weighing during the gravimetric test are only the mass values of dispensed volume without correction of air buoyancy. In order to obtain the actual volume, an adjustment calculation to account for water density and air buoyancy must be

carried out. To facilitate your calculations and evaluations, we recommend the use of the Windows-compatible calibration software EASYCAL™ from BRAND.

The following calculations must be carried out:

1. Mean weighing values:

(Example for ten weighing 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. Mean volume:

$$\bar{V} = \bar{x} \cdot Z$$

⇒ For factor Z, see Table 1.

⇒ Enter value into Test Record (6a).

3. Standard deviation volume:

$$s = Z \cdot \sqrt{\frac{(x_1 - \bar{x})^2 + (x_2 - \bar{x})^2 + (x_3 - \bar{x})^2 + (x_4 - \bar{x})^2 + \dots + (x_{10} - \bar{x})^2}{9}}$$

⇒ For factor Z, see Table 1

⇒ Enter value into Test Record (6b)

4. Accuracy:

$$A [\%] = \frac{\bar{V} - V_{\text{nominal value}}}{V_{\text{nominal value}}} \cdot 100$$

⇒ Enter value into Test Record (6c)

5. Coefficient of variation:

$$CV [\%] = \frac{s \cdot 100}{\bar{V}}$$

⇒ Enter value into Test Record (6d)

Comparison actual/nominal values:

- See tables of error limits and accuracy for each instrument on the following pages, or define your own error limits.

⇒ Enter value into Test Record (6e, f)

Result:

⇒ Enter value into Test Record (6g).

If calculated values A [%] and CV [%] are smaller than or equal to the error limits of 0.3 %, the instrument is in good working order.

If the calculated values are **larger** than the error limits:

- Verify if the above instructions have been carefully followed step by step.
- Observe the suggestions under "Troubleshooting" in the Operating Manual.
- Calibrate the Transferpette®, Transferpette® S resp. Transferpette® electronic as described in the Operating Manual (recalibration is only possible with recent models).

If these measures are not successful, we offer you the possibility to have your instruments calibrated by the BRAND Calibration Service (see page 12).

Possible volumetric errors and resulting measures:

Fault	Possible causes	Measures
Volume too small	<ul style="list-style-type: none"> ■ Pipette tip not mounted properly. ■ Faulty seal or piston. ■ Pipette shaft tip no longer tightly mounted (not possible with Transferpette® electronic and Transferpette® S). 	<ul style="list-style-type: none"> ⇒ Use a new pipette tip and mount it tightly. ⇒ Clean or replace the seal and/or piston; see Operating Manual. ⇒ Re-tighten the pipette shaft tip.
Volume too large	<ul style="list-style-type: none"> ■ Pipetting lever pressed too far. 	<ul style="list-style-type: none"> ⇒ Do not press beyond the first stop!
Other causes	<ul style="list-style-type: none"> ■ Instrument calibrated wrongly ■ Temperature adjustment between instrument, room and water temperature not completed 	<ul style="list-style-type: none"> ⇒ Revert to original calibration. ⇒ Carry out temperature adjustment.

Table 1:

Excerpt from DIN EN ISO 8655, Part 6.
Table refers to 1013 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		

Table 2:

Excerpt from DIN EN ISO 8655, Part 2.

Nominal volume	µl	1	2	5	10	20	50	100	200	500
A ≤ ±	%	5.0	4.0	2.5	1.2	1.0	1.0	0.8	0.8	0.8
CV ≤	%	5.0	2.0	1.5	0.8	0.5	0.4	0.3	0.3	0.3
Nominal volume	ml	1	2	5	10					
A ≤ ±	%	0.8	0.8	0.8	0.6					
CV ≤	%	0.3	0.3	0.3	0.3					

Table 3:

Volume error limits for piston operated pipettes:

The stated volume error limits are final test values relative to the nominal capacity. These error limits refer to new instruments under optimized testing conditions (qualified operators and standardized ambience conditions). **Typically these tolerances are two times better under ideal testing conditions (experience of the manufacturer).** For partial volumes, the absolute value (µl) corresponding to the nominal volume is applied.

Values from Operating Manual
Transferpette® electronic:

Nominal volume µl	Accuracy Value 6e ≤ ± %	Coefficient of variation Value 6f ≤ %
10/5/1	1.0/1.5/5.0	0.4/0.8/2.0
20/10/2	1.0/1.5/5.0	0.4/0.8/2.5
200/100/20	0.8/1.2/4.0	0.2/0.3/0.6
1000/500/100	0.6/1.0/3.0	0.2/0.3/0.6
5000/2500/500	0.6/1.0/3.0	0.2/0.3/0.6

Values from Operating Manual
Transferpette® (mechanical):

Nominal volume µl	Accuracy Value 6e ≤ ± %	Coefficient of variation Value 6f ≤ %
Fix type		
5	1	0.8
10	1	0.8
20	0.8	0.4
25	0.8	0.4
50	0.8	0.4
100	0.6	0.2
200	0.6	0.2
250	0.6	0.2
500	0.6	0.2
1000	0.6	0.2
2000	0.6	0.2
Digital type		
1/0.5/0.1	2/4/20	1.2/2.4/12
10/5/1	1/2/10	0.8/1.6/8
20/10/2	0.8/1.6/8	0.4/0.8/4
50/25/5	0.8/1.6/8	0.4/0.8/4
100/50/10	0.6/1.2/6	0.2/0.4/2
200/100/20	0.6/1.2/6	0.2/0.4/2
250/125/25	0.6/1.2/6	0.2/0.4/2
1000/500/100	0.6/1.2/6	0.2/0.4/2
5000/2500/500	0.6/1.2/6	0.2/0.4/2

Values from Operating Manual Transferpette® S (mechanical):

Nominal volume μl	Accuracy Value 6e $\leq \pm \%$	Coefficient of variation Value 6f $\leq \%$
Fix type		
10	1	0.5
20	0.8	0.4
25	0.8	0.4
50	0.8	0.4
100	0.6	0.2
200	0.6	0.2
500	0.6	0.2
1000	0.6	0.2
Digital type		
1/0.5/0.1	2/4/20	1.2/2.4/12
10/5/0,5	1/1.6/7	0.5/1/4
20/10/2	0.8/1.2/5	0.4/0.7/2
100/50/10	0.6/0.8/3	0.2/0.4/1
200/100/20	0.6/0.8/3	0.2/0.3/0.6
1000/500/100	0.6/0.8/3	0.2/0.3/0.6
5000/2500/500	0.6/0.8/3	0.2/0.3/0.6
10000/5000/1000	0.6/0.8/3	0.2/0.3/0.6

For calibration, the error limits to be observed by the operator must be individually defined by the user. For this purpose, the following methods can be applied:

- If required by the application and if the optimized conditions for measuring are present, the stated tolerances can also be expected in the case of used volumetric instruments in good working order.
- In analogy to the German regulations for official testing, it is also admissible to apply the limits which are typical for practice. These practice limits correspond to double the limits for official testing. In this case, the values found in Table 3 should be **doubled**.
- The user may also define his own individual tolerance limits corresponding to his particular application, and apply these error limits for the calibration of his instrument.

The above procedures fulfil the requirements of DIN EN ISO 9001, DIN EN ISO 10012 and DIN EN ISO/IEC 17025

Test Record for Volumetric Instruments (EX)

1. Instrument:

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

Type:

- fix
- analog
- digital

Nominal capacity: _____

Serial number: _____

Customers identification: _____

2. Damage:

- None
- Type of damage: _____
- Damage repaired

3. Functional defects:

- None
- Type of functional defect: _____
- Functional defect repaired

4. Water temperature: _____ °C

Balance: _____

Thermometer: _____

Air pressure: _____

Corrective factor Z: _____

Relative atmospheric humidity (at least 35%): _____

5. Results of gravimetric test

Weighing No.	Nominal volume	50 %	10 % (resp 20 %)
x ₁			
x ₂			
x ₃			
x ₄			
x ₅			
x ₆			
x ₇			
x ₈			
x ₉			
x ₁₀			

6. Evaluation of gravimetric test

Procedure	Nominal volume	50 %	10 % (resp. 20 %)
a	\bar{V}		
b	s		
c	A [%] Found		
d	CV [%] Found		
e	A [%] Nominal		
f	CV [%] Nominal		
g	result		

The testing was carried out according to DIN EN ISO 8655.

Date _____

Signature _____

ISO
9001:14001
CERTIFIED



6. Declaration on the Absence of Health Hazards

To be sent together with the instruments or via Mail (if urgent by Fax in advance).

To
BRAND GMBH + CO KG
Otto-Schott-Straße 25
97877 Wertheim
Fax: 09342 808-354

We intend to give our staff a maximum of protection from health hazards caused by contaminated instruments. We therefore ask for your understanding that we cannot carry out any calibration / repair unless this declaration is submitted completed and signed.

Re: Instrument Consignment dated _____ / Re: Delivery Note No. _____

The Undersigned hereby declares:

- That the instruments have been carefully cleaned and decontaminated before shipment.
- That the instruments pose no danger through bacteriological, chemical, radiological or viral contamination.
- To be authorised to make declarations on behalf of the Institution represented.
- For calibrating service only: minor repairs of a value up to € 25,- + VAT will be carried out and invoiced without further queries (cross out if not applicable).

Company / Laboratory (Stamp)

Tel. / Fax / E-Mail

Name

Position

Date, Signature

- In case of Return for Repair, please provide us with the following supplementary information:

Detected defect _____

Media which the instrument has been used with: _____

7. Calibration Service from BRAND

BRAND offers a full service including calibration and adjustment of Brand- and foreign instruments as well as maintenance and repair if necessary - only for BRAND- instruments. This saves money and adds the benefit of an independent review organisation for the calibration of the instruments. Further information and the order form for repair- and calibration service are found on www.brand.de.

7.1 Range of instruments covered

1. Piston-operated pipettes (single- and multichannel)
2. Bottletop dispensers
3. Piston burettes (bottle-top burettes)
4. Repetitive pipettes

7.2 Testing according to DIN EN ISO 8655

At BRAND, a team of qualified staff, working in temperature and humidity controlled rooms and using the state-of-the-art balances and calibration software, calibrates Liquid Handling instruments, regardless of their make, according to ISO 8655.

Instruments with adjustable volumes such as HandyStep® electronic, Transferpette®, Transferpette® S, Transferpette® electronic, Transferpette®S -8/-12, Transferpettor, Dispensette®, Digital Burette or Titrette® are tested at nominal volume, and at 50%, 10% or 20% of nominal volume.

To document the results, a detailed Test Report is compiled which fully complies with all relevant regulations.

The BRAND Calibration Service provides:

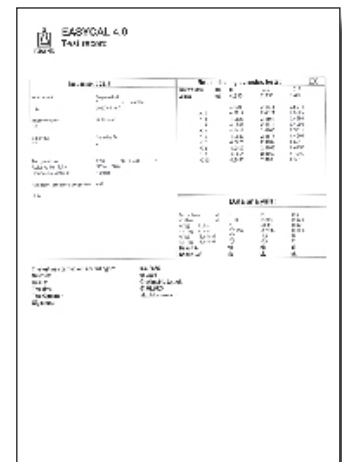
1. Calibration of Liquid Handling instruments, regardless of their make
2. Detailed calibration certificate
3. Return of instrument within a few working days
4. Cost-efficient handling

8. EASYCAL™ Software – advanced calibration technology

8.1 For liquid handling instruments and glass or plastic volumetric instruments

EASYCAL™ simplifies the tedious task of calibrating liquid handling instruments and glass or plastic volumetric instruments to DIN EN ISO 9001, DIN EN ISO 10012, DIN EN ISO/IEC 17025 and GLP standards. The procedures are outlined step-by-step, and all calculations are performed automatically. Reports are generated to document the calibration. All you need is an analytical balance, a PC Windows® 98/2000, NT (SP6), printer (optional) and EASYCAL™ software.

- Suitable for instruments from all manufacturers.
- Specifications of many instruments preloaded.
- Testing according to ISO 4787, ISO 8655, etc.



8.2 Data Entry

- Connect PC and balance (optional), then start the EASYCAL™ software.
- 40 common balances are preprogrammed for ease of installation.

8.3 Documentation – clearly arranged

The calibration certificate contains all important test data on one page, including a graphic representation of test results.

9. DKD-Calibration from BRAND for Volumetric Instruments

9.1 DKD – German Calibration Service

DKD The DKD was founded in 1977 as a joint task of state and economy and constitutes the link between the measuring equipment in industrial and research laboratories, testing institutions and authorities and the national standards of the PTB (the German Institute of Physics and Metrology). It effectively supplements the existing verification system which serves above all the purposes of consumer protection.



9.2 DKD-Calibration Certificate and DKD-Calibration Symbol

The DKD-Calibration Certificate with the DKD-Calibration Symbol documents officially on a high level the traceability of measuring results to national and international standards and to international SI-units, as required by standards as DIN EN ISO 9001, DIN EN ISO 10012, DIN EN ISO/IEC 17025 and DIN EN 45000 for monitoring of measuring devices.

The major difference between traditional works calibration services and DKD-accredited calibration laboratories is the accurate determination of uncertainty of each measurement, guaranteed by the accredited laboratory and supervised by the DKD.

DKD-Calibration Certificates are issued when calibrations of an accredited laboratory are requested, when high level calibrations are necessary, when national and international standards are demanded and when reference instruments have to be calibrated.

9.3 Internationally recognized

The DKD is a member of the European Cooperation for Accreditation (EA). A multilateral agreement assures obligatory recognition of the DKD calibration certificate in a variety of countries.

In addition, since November 2000, over 50 accreditation bodies in over 40 countries – including the DKD – have signed the first international convention for reciprocal recognition, the „Mutual Recognition Arrangement“ (MRA) of the International Laboratory Accreditation Corporation (ILAC). Under this convention, the subscribing bodies agree to reciprocal recognition and to promote acceptance of calibration certificates and test reports from the laboratories accredited by the signatories. (More information can be found on the Internet at www.ilac.org.)

9.4 DKD-K-20701

In 1998 a calibration laboratory for volumetric instruments at BRAND has been accredited by DKD according to DIN EN ISO/IEC 17 025, registration number DKD-K-20701. Our calibration laboratory is therefore authorized to issue DKD Calibration Certificates for the volumetric instruments listed below. Calibration is available for new instruments directly from the factory as well as for those already in use – regardless of their make. Furthermore we offer adjustment and – for BRAND-products – repair.

For ordering information on DKD Calibration Certificates for volumetric instruments please consult our General Catalog.

9.5 Volumetric instruments for which you can obtain DKD Calibration Certificates from BRAND

BRAND calibrates the following volumetric instruments (new or already in use and regardless of their make):

- **Piston-operated pipettes**, from 0.1 µl to 10 ml
- **Multichannel piston-operated pipettes**, from 0.1 µl to 300 µl
- **Piston-operated burettes**, from 5 µl to 200 ml
- **Dispensers, Dilutors**, from 5 µl to 200 ml
- **Volumetric instruments of glass**, calibrated to contain (TC, In) from 1 µl to 10000 ml
- **Volumetric instruments of glass**, calibrated to deliver (TD, Ex) from 100 µl to 100 ml
- **Volumetric instruments of plastic**, calibrated to contain (TC, In) from 1 ml to 2000 ml
- **Volumetric instruments of plastic**, calibrated to deliver (TD, Ex) from 1 ml to 100 ml
- **Density bottles of glass**, from 1 cm³ to 100 cm³