

## Water Hardness Calcium/Magnesium

### Principle

Calcium and magnesium ions react with metal phthalein to give a violet dye.

### Range of Application

Raw and drinking water, surface water, boiler water, process control

### Storage Information

The test reagents are stable at +15 to +25°C up to the expiry date given on the package.

### Interferences

There are no known interferences when the tests are used with drinking water and boiler water.

At extremely low magnesium concentrations and high calcium levels the Cuvette Test LCK 326 magnesium is to be preferred for magnesium determination.

The measurement results must be subjected to plausibility checks (dilute and/or spike the water sample).

### For your Information

Calcium and magnesium levels below the measuring range given here (< 1 °dH) can be determined with the Cuvette Test LCK 427 residual hardness.

### Special note

Measurement units of water hardness (°dH):

#### Definition:

- 1 degree water hardness, german (°d) = 10 mg CaO/L
- 1 degree water hardness, french (°f) = 10 mg CaCO<sub>3</sub>/L
- 1 degree water hardness, english (°e) = 14.3 mg CaCO<sub>3</sub>/L

#### Conversion table

|                            | mmol/L CaCO <sub>3</sub> | °d    | °f    | °e    |
|----------------------------|--------------------------|-------|-------|-------|
| 1 mmol/L CaCO <sub>3</sub> | 1.00                     | 5.60  | 10.00 | 7.02  |
| 1 °d                       | 0.18                     | 1.00  | 1.78  | 1.25  |
| 1 °f                       | 0.10                     | 0.560 | 1.00  | 0.702 |
| 1 °e                       | 0.14                     | 0.798 | 1.43  | 1.00  |

### pH/Temperature

The pH of the water sample must be between pH 4 and pH 9. The temperature of the water sample and reagents must be between 15 and 25°C.

### Safety Advice

On grounds of quality and reliability, the analysis should be carried out only with original HACH LANGE accessories.

### CADAS 100 (LPG 185 / ≥ LPG 210)

If this test is not already stored in your instrument please ask your HACH LANGE Agency for programming instructions.

**Applies to all types of photometer**

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|  |        |
|--|--------|
| Pipette into the cuvette test  |        |
| Buffer solution A (LCK 327 A)  | 4.0 mL |
| Close cuvette and invert a few times until the freeze-dried contents are dissolved. After <b>2 min</b> thoroughly clean the outside of the cuvette and evaluate. |        |

|  |                |
|--|----------------|
| <b>LP2W</b>  | <b>06/1997</b> |
| °dH • F <sub>1</sub> = -32.5 • F <sub>2</sub> = 32.5 • K = 0.455   |                |
| °dH/Ca/Mg • F <sub>1</sub> = 32.5 • F <sub>2</sub> = 235 • F <sub>3</sub> = 140 • K = 0  |                |
| <b>CADAS 30/30S/50/50S</b>   | <b>06/1997</b> |
| °dH • λ: 572 nm • Pro.: 1 • F <sub>1</sub> = -22.91 • F <sub>2</sub> = 22.91 • K = 0.860   |                |
| °dH/Ca/Mg • λ: 572 nm • Pro.: 7 • F <sub>1</sub> = 22.91 • F <sub>2</sub> = 159.8 • F <sub>3</sub> = 119   |                |
| <b>ISIS 6000/9000</b>  | <b>06/1997</b> |
| °dH • λ: 565 nm • Pro.: 1 • F <sub>1</sub> = -23.86 • F <sub>2</sub> = 23.86 • K = 0.731   |                |
| °dH/Ca/Mg • λ: 565 nm • Pro.: 7 • F <sub>1</sub> = 167.5 • F <sub>2</sub> = 108.6 • K <sub>1</sub> = 2.866 • K <sub>2</sub> = -4.647   |                |
| <b>CADAS 100 / LPG 185</b>   | <b>06/1997</b> |
| °dH/Ca/Mg • λ: 572 nm • F <sub>1</sub> = -23.4 • F <sub>2</sub> = 23.4 • F <sub>3</sub> = 0.67 • F <sub>4</sub> = 150 • F <sub>5</sub> = -150 • F <sub>6</sub> = -5.1 • F <sub>7</sub> = 111.3 • F <sub>8</sub> = -111.3 • F <sub>9</sub> = 6.67 |                |
| <b>CADAS 100 / ≥ LPG 210</b>   | <b>06/1997</b> |
| °dH • λ: 572 nm • F <sub>1</sub> = -23.4 • F <sub>2</sub> = 23.4 • K = 0.67  |                |
| °dH/Ca/Mg • λ: 572 nm • F <sub>1</sub> = 150 • F <sub>2</sub> = 5.1 • F <sub>3</sub> = 111.3 • F <sub>4</sub> = 6.67 • F <sub>5</sub> = 23.4 • F <sub>6</sub> = 0.67   |                |

**Water Hardness**

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**Evaluation**

**Water hardness determination**

1. Insert program filter with relevant symbol (see below).
2. Select test with relevant key.
3. Check program control number: **\_\_ : 16**
4. Insert sample cuvette (see procedure).
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result is displayed in °dH.

| Parameter            | Symbol | Meas. range |
|----------------------|--------|-------------|
| Water hardness (°dH) | 327    | 1–20 °dH    |

**Water Hardness** Calcium/Magnesium

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**Evaluation**

**Water hardness, calcium and magnesium determination**

1. Insert program filter with relevant symbol (see below).
2. Select test with relevant key.
3. Check program control number: **\_\_ : 16**
4. Insert sample cuvette (see procedure).
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result is displayed in °dH. Then press the key for LCK 327 again.

7. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

8. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result for calcium is displayed, followed by the result for magnesium. Each result is displayed for 20 sec, and is expressed in mg/L.

| Parameter            | Symbol | Meas. range |
|----------------------|--------|-------------|
| Water hardness (°dH) | 327    | 1–20 °dH    |
| Calcium (Ca)         |        | 5–100 mg/L  |
| Magnesium (Mg)       |        | 3–50 mg/L   |

Water Hardness Calcium/Magnesium

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## Evaluation

1. Select »TEST« mode.
2. Select symbol (see below).
3. Select symbol » > «.
4. Check factors and measuring wavelength in memory »Mem«.
5. Close cuvette compartment – without cuvette – and press "NULL" (zero) key.
6. Insert sample cuvette (see procedure) and press "MESS" (measure) key.
7. Remove sample cuvette. Close cuvette compartment – without cuvette – and press "NULL" (zero) key.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

8. After **30 sec** insert sample cuvette again and press "MESS" (measure) key.
9. Remove sample cuvette. Close cuvette compartment – without cuvette – and press "NULL" (zero) key.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

10. After **30 sec** insert sample cuvette again and press "MESS" (measure) key.

The result is printed out in °dH, Ca, and Mg.

If more than one sample is to be measured start the next evaluation at point 5.

| Parameter            | Symbol   | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | \$ 327 G | 1–20 °dH    |
| Calcium (Ca)         |          | 5–100 mg/L  |
| Magnesium (Mg)       |          | 3–50 mg/L   |

## Water Hardness

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## Evaluation

## Water hardness determination

1. Select »Barcode Programs«.
2. Select test number: **327 Hardness**.
3. Control number must be **4**.
4. Insert sample cuvette (see procedure) and press »Read 1«.
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. After **30 sec** insert sample cuvette again and press »Read 2«.

If more than one sample is to be measured start the next evaluation at point 4.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1–20 °dH    |

Water Hardness Calcium/Magnesium

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## Evaluation

1. Select »TEST« mode.
2. Select symbol (see below).
3. Control number must be **2** (°dH) or **5** (°dH/Ca/Mg).
4. Close cuvette compartment – without cuvette – and press "NULL" (zero) key.
5. Insert sample cuvette (see procedure) and press "MESS" (measure) key.
6. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

7. After **30 sec** insert sample cuvette again and press "MESS" (measure) key.
8. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

9. After **30 sec** insert sample cuvette again and press "MESS" (measure) key.

The result is printed out in °dH, Ca, and Mg.

If more than one sample is to be measured start the next evaluation at point 5.

If only the water hardness is to be determined the evaluation should be stopped after point 7.

| Parameter            | Symbol | Meas. range |
|----------------------|--------|-------------|
| Water hardness (°dH) | 327 H  | 1–20 °dH    |

| Parameter            | Symbol | Meas. range |
|----------------------|--------|-------------|
| Water hardness (°dH) | 327 G  | 1–20 °dH    |
| Calcium (Ca)         |        | 5–100 mg/L  |
| Magnesium (Mg)       |        | 3–50 mg/L   |

Water Hardness Calcium/Magnesium

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## Evaluation

## Water hardness, calcium and magnesium determination

1. Select »Barcode Programs« mode.
2. Select test number: **327 °dH/Ca/Mg**.
3. Control number must be **4**.
4. Insert sample cuvette (see procedure) and press »Read 1«.
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. After **30 sec** insert sample cuvette again and press »Read 2«.
7. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

8. After **30 sec** insert sample cuvette again and press »Read 3«.

If more than one sample is to be measured start the next evaluation at point 4.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1–20 °dH    |
| Calcium (Ca)         |          | 5–100 mg/L  |
| Magnesium (Mg)       |          | 3–50 mg/L   |

## Water Hardness

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## Evaluation

## Water hardness determination

1. Insert filter **588 nm**.
2. Select »Dr. Lange« mode.
3. Select test number: **327 Hardness**.
4. Control number must be **4**.
5. Insert sample cuvette (see procedure) and press green key.
6. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

7. After **30 sec** insert sample cuvette again and press green key.

If more than one sample is to be measured start the next evaluation at point 5.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1– 20 °dH   |

Water Hardness Calcium/Magnesium

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## Evaluation

## Water hardness, calcium and magnesium determination

1. Insert filter **588 nm**.
2. Select »Dr. Lange« mode.
3. Select test number: **327 °dH/Ca/Mg**.
4. Control number must be **4**.
5. Insert sample cuvette (see procedure) and press green key.
6. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

7. After **30 sec** insert sample cuvette again and press green key.
8. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

9. After **30 sec** insert sample cuvette again and press green key.

If more than one sample is to be measured start the next evaluation at point 5.

| Parameter            | Test-No. | Meas. range  |
|----------------------|----------|--------------|
| Water hardness (°dH) | 327      | 1– 20 °dH    |
| Calcium (Ca)         |          | 5 – 100 mg/L |
| Magnesium (Mg)       |          | 3 – 50 mg/L  |

## Water Hardness

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## Evaluation

## Water hardness determination

1. Insert program filter **550 nm**.
2. Press "Tests" key until display (see below) appears.
3. Control number must be **7**.
4. Press "Null" (zero) key.
5. Insert sample cuvette (see procedure) and press "Ergebnis" (result) key.
6. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

7. After **30 sec** insert sample cuvette again and press "Ergebnis" (result) key.

| Parameter            | Display      | Meas. range |
|----------------------|--------------|-------------|
| Water hardness (°dH) | Hard LCK 327 | 1– 20 °dH   |

Water Hardness Calcium/Magnesium

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## Evaluation

## Water hardness, calcium and magnesium determination

1. Insert program filter **550 nm**.
2. Press "Tests" key until display (see below) appears.
3. Control number must be **7**.
4. Press "Null" (zero) key.
5. Insert sample cuvette (see procedure) and press "Ergebnis" (result) key.
6. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

7. After **30 sec** insert sample cuvette again and press "Ergebnis" (result) key.
8. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

9. After **30 sec** insert sample cuvette again and press "Ergebnis" (result) key.

The results for calcium/magnesium/hardness can be called up one after another by pressing the key  $\uparrow$ . If more than one sample is to be measured start the next evaluation at point 5.

| Parameter            | Display       | Meas. range  |
|----------------------|---------------|--------------|
| Water hardness (°dH) | Ca/Mg LCK 327 | 1– 20 °dH    |
| Calcium (Ca)         |               | 5 – 100 mg/L |
| Magnesium (Mg)       |               | 3 – 50 mg/L  |

## Water Hardness

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### Evaluation

#### Water hardness determination

1. Insert sample cuvette (see procedure).  
Display: «HARDNESS».
2. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

3. After **30 sec** insert sample cuvette again.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1–20 °dH    |

## Water Hardness Calcium/Magnesium

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### Evaluation

#### Water hardness, calcium and magnesium determination

1. Insert sample cuvette (see procedure).  
Display: «CA/MG». (**CADAS 30/50, ISIS 9000**)
2. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

3. After **30 sec** insert sample cuvette again.
4. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

5. After **30 sec** insert sample cuvette again.

#### CADAS 30/50, ISIS 9000:

The results for calcium/magnesium/hardness can be called up one after another by pressing the key under the display symbol » → «.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1–20 °dH    |
| Calcium (Ca)         |          | 5–100 mg/L  |
| Magnesium (Mg)       |          | 3–50 mg/L   |

## Water Hardness

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### Evaluation

#### Water hardness determination

1. Insert sample cuvette (see procedure).  
Display is »WATER HARDNESS VAL. 1«.
2. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

3. Insert sample cuvette again.  
After **30 sec** the result is displayed.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1–20 °dH    |

## Water Hardness Calcium/Magnesium

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### Evaluation

#### Water hardness, calcium and magnesium determination

1. Insert sample cuvette (see procedure).  
Display is »CA/MG VAL. 1«.
2. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

3. Insert sample cuvette again.  
After **30 sec** the display is »CA/MG VAL. 2«.
4. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

5. Insert sample cuvette again.  
After **30 sec** the result is displayed.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1–20 °dH    |
| Calcium (Ca)         |          | 5–100 mg/L  |
| Magnesium (Mg)       |          | 3–50 mg/L   |

**Water Hardness**

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**Evaluation****Water hardness determination**

1. Check program control number:  
— : **38 (CADAS 200)**  
— : **32 (ISIS 6000)** ⇒ Select »CUVETTE TEST« mode.
2. Select test number (see below). Display is »HARDNESS«.
3. Control number must be **4**.
4. Insert sample cuvette (see procedure) and press green key.
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. After **30 sec** insert sample cuvette again and press green key.

*If more than one sample is to be measured start the next evaluation at point 4.*

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1– 20 °dH   |

**Water Hardness** Calcium/Magnesium

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**Evaluation****Water hardness, calcium and magnesium determination**

1. Check program control number:  
— : **38 (CADAS 200)**  
— : **32 (ISIS 6000)** ⇒ Select »CUVETTE TEST« mode.
2. Select test number (see below). Display is »CA/MG«.
3. Control number must be **4**.
4. Insert sample cuvette (see procedure) and press green key.
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. After **30 sec** insert sample cuvette again and press green key.
7. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

8. After **30 sec** insert sample cuvette again and press green key.

*The results for calcium/magnesium/hardness can be called up one after another by pressing the key under the display symbol » → «. (ISIS 6000)*

*If more than one sample is to be measured start the next evaluation at point 4.*

| Parameter            | Test-No. | Meas. range  |
|----------------------|----------|--------------|
| Water hardness (°dH) | 327      | 1– 20 °dH    |
| Calcium (Ca)         |          | 5 – 100 mg/L |
| Magnesium (Mg)       |          | 3 – 50 mg/L  |

**Water Hardness**

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**Evaluation****Water hardness determination**

1. Insert sample cuvette (see procedure).  
Display: »Hardness«.
2. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

3. After **30 sec** insert sample cuvette again.

| Parameter            | Test-No. | Meas. range |
|----------------------|----------|-------------|
| Water hardness (°dH) | 327      | 1– 20 °dH   |

**Water Hardness** Calcium/Magnesium

Edition 06/1997

**Evaluation****Water hardness, calcium and magnesium determination**

1. Insert sample cuvette (see procedure).  
Display: »°dH / Ca/ Mg«.
2. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

3. After **30 sec** insert sample cuvette again.
4. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

5. After **30 sec** insert sample cuvette again.

| Parameter            | Test-No. | Meas. range  |
|----------------------|----------|--------------|
| Water hardness (°dH) | 327      | 1– 20 °dH    |
| Calcium (Ca)         |          | 5 – 100 mg/L |
| Magnesium (Mg)       |          | 3 – 50 mg/L  |



## Water Hardness

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### Evaluation

#### Water hardness determination

1. Press "Mode" key and check program control number: **\_\_ : 18**
2. Insert program filter **560 nm**.
3. Select test with "Mode" key.
4. Insert sample cuvette (see procedure).
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result is displayed in °dH.

| Parameter            | Display      | Meas. range |
|----------------------|--------------|-------------|
| Water hardness (°dH) | Hard LCK 327 | 1–20 °dH    |

## Water Hardness Calcium/Magnesium

Edition 06/1997

### Evaluation

#### Water hardness, calcium and magnesium determination

1. Press "Mode" key and check program control number: **\_\_ : 18**
2. Insert program filter **560 nm**.
3. Select test with "Mode" key.
4. Insert sample cuvette (see procedure).
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result is displayed in °dH.

Then press the \* key.

7. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

8. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result for calcium is displayed, followed by the result for magnesium and then the result for °dH. Each result is displayed for 20 sec, and the first two are expressed in mg/L.

| Parameter            | Display      | Meas. range |
|----------------------|--------------|-------------|
| Water hardness (°dH) | Hard LCK 327 | 1–20 °dH    |
| Calcium (Ca)         |              | 5–100 mg/L  |
| Magnesium (Mg)       |              | 3–50 mg/L   |

## Water Hardness

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### Evaluation

1. Press any key.
2. Check program control number: ( $\geq$ ) **\_\_ : 39 b**
3. Select test with  $\uparrow$  or  $\downarrow$  key.
4. Insert sample cuvette (see procedure).
5. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

6. Insert sample cuvette again. After **30 sec** an acoustic signal is heard and the result is displayed in °dH.

| Parameter            | Display      | Meas. range |
|----------------------|--------------|-------------|
| Water hardness (°dH) | Hard LCK 327 | 1–20 °dH    |

## Water Hardness Calcium/Magnesium

Edition 06/1997

### Evaluation

1. Insert filter **550 nm**.
2. Press "Null" (zero) key.
3. Insert sample cuvette (see procedure) and press "Extinktion" (extinction) key. Make a note of the display - **Ext. 1**
4. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Water sample   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

5. After **30 sec** insert sample cuvette again and press "Extinktion" (extinction) key. Make a note of the display - **Ext. 2**
6. Remove sample cuvette.

|  |        |
|--|--------|
| Into the same cuvette pipette  |        |
| Masking solution B (LCK 327 B)   | 0.2 mL |
| Close cuvette, invert a few times and thoroughly clean the outside of the cuvette. |        |

7. After **30 sec** insert sample cuvette again and press "Extinktion" (extinction) key. Make a note of the display - **Ext. 3**

*If only the water hardness is to be determined the evaluation should be stopped after point 5.*

#### Calculation:

$$\begin{aligned} \text{Water hardness (°dH)} &= (\text{Ext. 2} - \text{Ext. 1} + 0.014) \times 32.5 \\ \text{mg/L calcium (Ca)} &= (\text{Ext. 2} - \text{Ext. 3}) \times 235 \\ \text{mg/L magnesium (Mg)} &= (\text{Ext. 3} - \text{Ext. 1} + 0.014) \times 140 \end{aligned}$$

| Parameter            | Meas. range |
|----------------------|-------------|
| Water hardness (°dH) | 1–20 °dH    |
| Calcium (Ca)         | 5–100 mg/L  |
| Magnesium (Mg)       | 3–50 mg/L   |