

# PhotoFlex<sup>®</sup> Series

TEST INSTRUCTIONS AND SPECIFICATIONS, PROG. V 2.02 Y



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# 1 Practical part

## 1.1 For your safety

When developing test sets YSI carefully sees that the tests can be carried out as safely as possible. Some hazards by dangerous substances, however, cannot always be avoided.



### Caution

**Improper handling of certain reagents can cause damage to your health.**

**In any case follow the safety labels on the packing and the safety instructions of the package insert.**

**Protective measures specified there have to be followed exactly.**

### Qualification of the user

We assume that, due to their professional training and experience, the users are able to correctly understand the safety labels and safety instructions and to appropriately follow the protective measures specified there.

## 1.2 General information on test sets

Test sets contain special reagents that are added to the test sample according to a certain specification (analysis specification). These reagents react with the test sample. After the reaction the prepared product is inserted in the cell shaft of the photometer in a cell and the photometric measurement is carried out.

In addition to the reagents in the test set, further common laboratory auxiliary reagents can be required such as acids or lyes to adjust a certain pH value.

### Categories

The test sets can be divided into two categories depending on the way they are carried out:

- Reaction cell tests

They provide highest convenience. All the special reagents required are prepared in a measuring cell. Normally, a certain quantity of sample has just to be added (with some reaction cell tests, a dose of reagent as well).

- Reagent tests

They contain all reagents required for measurement. Mostly, the sample and reagents can be prepared directly in the cell. An empty cell is required to carry out a reagent test (diameter, see analysis specification).

### 1.3 Carrying out photometric measurements

#### 1.3.1 The analysis specifications


Following the present practical part are the analysis specifications for all photometric measurements that can be carried out with this photometer.


#### Program number

In order to measure, you have to enter on the photometer the program number quoted in the analysis specification. If you have connected a bar code reader, you can read in the program number from the analysis specification with it.

Program number


Program number as bar code

**COD MR**  
Program no. **310** 


  
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YSI model no.:	COD2 TC (MR)
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	20 - 1500 mg/l COD


**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.




Shake the reaction cell so that sediment is



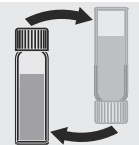
Carefully pipette 2.0 ml of sample into the cell,



Heat the cell in the thermoreactor for two



Remove the cell from the thermoreactor and let it



After approx. 10 min cooling time sway the

#### Further specifications

- YSI model number
- Category
- Cell to be used. Use suitable cells from the YSI product range only
- Measuring ranges and citation forms. After measurement you can switch between the stated citation forms.



#### Note

The measuring ranges specified in this Analysis Manual are valid especially for measurements with the pHotoFlex® Series photometers and can be different from other data, e. g. on the package insert.

### 1.3.2 Reagent blank values

The evaluation of the photometric measurement always refers to the comparison value of a sample without the substance to be determined (reagent blank value). Thus the influence of the basic absorbance of the reagents on photometric measurement is compensated for.

In practice, measurement of the reagent blank value is carried out with the same amount of deionized water instead of sample.

#### Default reagent blank values

For most tests, the reagent blank value is a constant value. It was determined in the factory and stored in the photometer. You can, however, measure the reagent blank value yourself. The default reagent blank value is then overwritten. The default reagent blank values are restored when the photometer is reset to default settings.

#### Reagent blank values without factory default

For some tests, it does not make sense to store a default reagent blank value in the factory, e.g. if a change of certain test elements during the storing period cannot be excluded. In this case, a reagent blank value has to be determined before the first measurement with a new photometer. The photometer informs you if no valid reagent blank value is available. The measured reagent blank value remains stored in the meter until a new reagent blank value is determined. When the photometer is reset to default, all reagent blank values that were not stored in the factory are erased.



#### Note

You can increase accuracy if you determine the reagent blank value with a test of a newly started reagent package and use the reagent blank value for all tests of this package.

### 1.3.3 Standard adjustment (user calibration)

The pHotoFlex® pH and pHotoFlex® STD photometers provide the standard adjustment function. With this function you can adjust the factory-set calibration curve for some tests in order to optimize the accuracy if necessary. The standard adjustment especially compensates for lot specific deviations and age-related influences on the reagents.

For which tests the standard adjustment can be used is given in the LIST OF AVAILABLE PHOTOMETRIC TEST SETS on page 13.

### 1.3.4 Dosing of sample and reagents

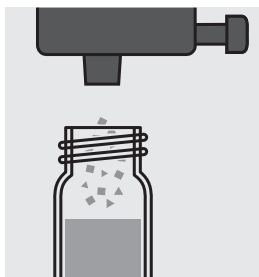
The exact dosing of the individual reagents is a precondition for the successful carrying out of a test. The test sets contain simple accessories for correct dosing.

#### Instructions on using dosing accessories provided with test sets



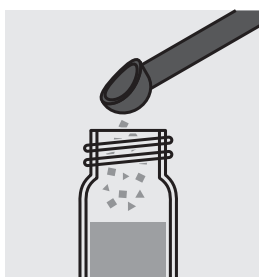
#### Dropping bottles (liquid dosing)

Hold the dropping bottle in an exactly vertical position with the dropping tip downward and let the reagent drip out slowly so the correct drop size forms.



#### Dosing tops/measurers (powder dosing)

Screw the dosing top on the reagent bottle instead of the screw cap. For dosing, hold the reagent bottle in a vertical position and for each specified dose press the lateral slide into the measurer up to the stop once. Subsequently, close the reagent bottle with the original screw cap so the contents cannot become moist.



#### Microspoon (powder dosing)

Microspoons are integrated in the screw cap of the reagent bottles. They are available in several colors for several dosing quantities.

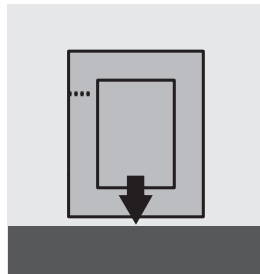
#### Precise dosing of liquids

Exact dosing of the sample (and of certain reagents) is especially important. Use suitable laboratory pipettes for this.

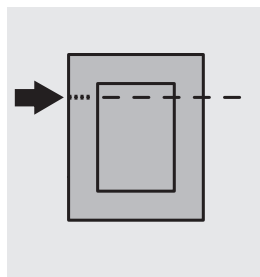


**Use of powder packs**

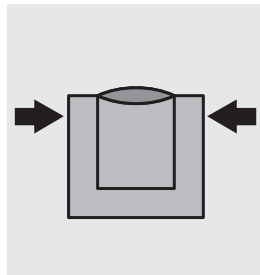
Some test sets contain reagents readily dosed as powder in small packs. Use the powder packs as follows:



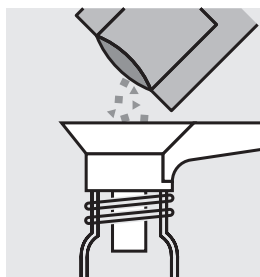
- Hold the powder pack in a vertical position as shown in the picture (perforation up) and hit it slightly against a solid base so the powder collects in the lower part.



- Cut open the pack (tear if necessary) along a horizontal line, starting at the perforation.



- Slightly press the pack from both sides so that a wide opening forms.



- Empty the pack completely. For narrow vessel openings use a suitable funnel top.

## 1.4 Working with the analysis timer

Many determination procedures include steps that need certain periods of time to expire. All these periods are stored in the photometer. If the analysis timer is switched on, a corresponding timer is activated for each time-critical step according to the proceeding described in the analysis specification. Only after all timers have expired can the photometric measurement be started.

## 1.5 Sample dilution

Diluting the sample can be required for the following reasons:

- The expected concentration of the substance to be determined is near or above the upper measuring range limit
- Other substances in the sample cause the measured values to be too high or too low due to matrix interferences

With the pHotoFlex® Series you can measure diluted samples without having to multiply the measured value by the dilution factor afterwards. The measuring range is extended automatically. To do so, enter the dilution number in the photometer before measuring. Admissible are dilution numbers from 1+1 up to 1+99 (volume parts water + volume parts test sample) in whole number steps.

For diluting, use deionized water and common laboratory dosing equipment with sufficient dosing accuracy (volumetric flasks, pipettes etc.).



### Note

Note that the dilution error can increase with an increasing dilution. Therefore, check whether a different test or method with a suitable measuring range can be used instead of diluting the sample.

## 1.6 Minimizing interfering effects

### 1.6.1 General information

The following factors can affect photometric determination and cause incorrect measurement results:

- Unsuitable pH value of the sample
- Turbidity
- Interferences due to certain water substances (e.g. complexing agents often disturb the determination of metals)
- Adverse temperature
- Improper, especially not representative, sampling
- Change of the sample due to too long storing period or unsuitable storing conditions until measurement

Many tests have package inserts included. Read these package inserts thoroughly. They inform you of special features to be noted during sampling, preparing the sample and carrying out the test and of possible interferences.

The following chapters provide a detailed description of important influencing factors and practical instructions on remedial actions.

### 1.6.2 Influence of the pH value

The pH value can affect the course of chemical reactions in a photometric determination. For some tests the pH value of a solution has to be in a certain range. With these tests, the analysis specification informs you of the necessity to check and if necessary adjust the pH value.

#### Adjusting the pH value

Observe the following points when adjusting the pH range:

- Measure the pH value with the aid of a pH meter or pH indicator
- Use the acids and lyes specified in the analysis specification
- Add the acid or lye drop by drop and measure the pH value after each drop added. Thus the volume of the sample does not increase (is not diluted) too much
- The volume increase by the drops is negligible if the resulting dilution is less than 2 %. With a greater dilution, the measurement result should be converted accordingly. Adding up to five drops per 10 ml of solution is uncritical as a rule of thumb.

### 1.6.3 Influence of turbidity

With samples that are visibly turbid, measured values can be oscillating or too high or too low during photometrical determination.

#### Compensating for turbidity

Depending on the type of sample or substance to be determined, the influence of turbidity can be compensated for in different ways:

- If you are positive that the substance to be determined is exclusively in the dissolved part, the sample can be filtrated before carrying out determination. For filtrating, simple common laboratory paper filters or membrane filters (recommended pore size 0.45 µm) can be used.
- If you assume that a considerable part of the substance to be determined is bound in the solid part of the sample, the substance has to be brought into an analysable form before carrying out the photometric determination. This is done in a chemical digestion procedure. Suitable digestion reagents can be found in the YSI catalog. With some procedures, the critical solid substance part is digested during the determination itself (e. g. COD measurement in aqueous samples with suspended matter with parts of organic compounds). Here it is important for an exact determination that the part of suspended matter be representative for the sample. For this the sample has to be homogenized, e.g. with a disperser.

### 1.6.4 Influence of complexing agents

Complexing agents can disturb the determination of metals by forming very stable compounds with them. In this form the metals cannot be analyzed. Here, a digestion has to be carried out prior to photometric determination. Suitable digestion reagents can be found in the YSI catalog.

## 2 Analysis specifications

### List of available photometric test sets

Name	Prog	Model	Order no.	Measuring range (main citation form)	Cell	Type <sup>(1)</sup>	Blank value	P.
Aluminium	323 <sup>(5)</sup>	Al-1 TP	251400Y	0.002 - 0.250 mg/l Al	28 mm	RT	required	15
Ammonia (free)	347	MCA-1 TP	251419Y	0.010 - 0.500 mg/l NH <sub>3</sub> -N (f)	28 mm	RT		16
Ammonia <sup>(4)</sup>	341	NH4-1 TP	251408Y	(0.01 - 0.50 mg/l NH <sub>4</sub> -N)	28 mm	RT	required	17
Ammonia <sup>(4)</sup>	339	NH4-2 TC (LR)	251997Y	(0.02 - 2.50 mg/l NH <sub>4</sub> -N)	16 mm	KT	required	18
Ammonia <sup>(4)</sup>	340	NH4-3 TC (HR)	251998Y	(0.4 - 50.0 mg/l NH <sub>4</sub> -N)	16 mm	KT	required	19
Ammonium vario	324 <sup>(5)</sup>	NH4-1 TP	251408Y	0.01 - 0.50 mg/l NH <sub>4</sub> -N	28 mm	RT	required	20
Ammonium vario HR	313 <sup>(5)</sup>	NH4-3 TC (HR)	251999Y	0.4 - 50.0 mg/l NH <sub>4</sub> -N	16 mm	KT	required	21
Ammonium vario LR <sup>3)</sup>	312 <sup>(5)</sup>	NH4-2 TC (LR)	251997Y	0.02 - 2.50 mg/l NH <sub>4</sub> -N	16 mm	KT	required	22
Chlorine (free) vario	325	Cl2-1 TP	251402Y	0.02 - 2.00 mg/l Cl <sub>2</sub>	28 mm	RT	required	23
Chlorine (free) vario	326	Cl2-2 TP	251402Y	0.5 - 5.0 mg/l Cl <sub>2</sub>	28 mm	RT	required	24
Chlorine (total) vario	327	Cl2-3 TP	251414Y	0.02 - 2.00 mg/l Cl <sub>2</sub>	28 mm	RT	required	25
Chlorine (total) vario	328	Cl2-4 TP	251415Y	0.5 - 5.0 mg/l Cl <sub>2</sub>	28 mm	RT	required	26
COD HR	311 <sup>(5)</sup>	COD3 TC (HR)	251997Y	200 - 15000 mg/l COD	16 mm	KT	required	27
COD LR	309 <sup>(5)</sup>	COD1 TC (LR)	251991Y	3 - 150 mg/l COD	16 mm	KT	required	28
COD MR	310 <sup>(5)</sup>	COD2 TC (MR)	251992Y	20 - 1500 mg/l COD	16 mm	KT	required	29
Coloration at 435 nm (FB436)	43	FB436	<sup>(3)</sup>	0.5 - 50.0 m <sup>-1</sup>	28 mm			30
Coloration at 517 nm (FB517)	44	FB517	<sup>(3)</sup>	0.5 - 50.0 m <sup>-1</sup>	28 mm			31
Coloration at 610 nm (FB610)	45	FB610	<sup>(3)</sup>	0.5 - 50.0 m <sup>-1</sup>	28 mm			32
Copper vario	302 <sup>(5)</sup>	Cu-1 TP	251406Y	0.04 - 5.00 mg/l Cu	28 mm	RT	required	33
DEHA vario	335	DEHA-1 TP	251421Y	0.004 - 0.450 mg/l DEHA	28 mm	RT	required	34
Hydrazine vario	329 <sup>(5)</sup>	N2H4-1 TP	250416Y	0.004 - 0.600 mg/l N <sub>2</sub> H <sub>4</sub>	28 mm	RT	required	35
Iron vario	301 <sup>(5)</sup>	Fe-2 TP	251403Y	0.02 - 3.00 mg/l Fe	28 mm	RT	required	36
Iron vario TPTZ	300 <sup>(5)</sup>	Fe-1 TP	251405Y	0.012 - 1.800 mg/l Fe	28 mm	RT	required	37
Manganese vario	303 <sup>(5)</sup>	Mn-1 TP	251406Y	0.2 - 20.0 mg/l Mn	28 mm	RT	required	38
Manganese vario	330 <sup>(5)</sup>	Mn-2 TP	251417Y	0.007 - 0.700 mg/l Mn	28 mm	RT	required	39
Molybdate vario	304 <sup>(5)</sup>	Mo-1 TP	251407Y	0.3 - 35.0 mg/l Mn	28 mm	RT	required	40
Molybdenum vario	331 <sup>(5)</sup>	Mo-2 TP	251418Y	0.3 - 40.0 mg/l Mo	28 mm	RT	required	41
Monochloramine (MCA)	345	MCA-1 TP	251419RP1Y	0.04 - 3.00 mg/l Cl <sub>2</sub> (MCA)	28 mm	RT		42
Monochloramine (MCA)	344	MCA-1 TP	251419RP1Y	0.04 - 4.50 mg/l Cl <sub>2</sub> (MCA)	16 mm	RT		43
Nitrate	314 <sup>(5)</sup>	NO3-1 TC	251989Y	0.2 - 30.0 mg/l NO <sub>3</sub> -N	16 mm	KT	required	44
Nitrite HR	317 <sup>(5)</sup>	NO2-2 TC	251994Y	0.30 - 3.00 mg/l NO <sub>2</sub> -N	16 mm	KT	required	45
Nitrite LR	318 <sup>(5)</sup>	NO2-2 TC	251995Y	0.03 - 0.60 mg/l NO <sub>2</sub> -N	16 mm	KT	required	46

<sup>(1)</sup> KT = reaction cell test; RT = reagent test; CV = ampoule test

<sup>(2)</sup> Analysis specification, see package insert.

<sup>(3)</sup> No test set is required to determine coloration.

<sup>(4)</sup> This programm includes a pH measurement by means of the integrated pH function of the meter. Thus the programm cannot be used with the pHotoFlex® STD.

<sup>(5)</sup> Standard adjustment (user calibration) is possible.

Name	Prog	Model	Order no.	Measuring range (main citation form)	Cell	Type <sup>(1)</sup>	Blank value	P.
Nitrite vario	305 <sup>(5)</sup>	NO2-1 TP	251410Y	0.002 - 0.300 mg/l NO <sub>2</sub> -N	28 mm	RT	required	47
Nitrite vario	334 <sup>(5)</sup>	NO2-3 TP	251420Y	0.002 - 0.300 mg/l NO <sub>2</sub> -N	28 mm	RT	required	48
Nitrogen, total HR	320 <sup>(5)</sup>	Ntot2 TC (HR)	251411Y	10 - 150 mg/l N	16 mm	KT	required	50
Nitrogen, total LR	319 <sup>(5)</sup>	Ntot1 TC (LR)	251996Y	0.5 - 25.0 mg/l N	16 mm	KT	required	51
Phosphate vario (ortho)	306 <sup>(5)</sup>	PO4-1 TP	251412Y	0.007 - 0.800 mg/l PO <sub>4</sub> -P	28 mm	RT	required	52
Phosphate, acid hydrolyzable	336 <sup>(5)</sup>	PO4-4 TC	251987Y	0.06 - 3.50 mg/l PO <sub>4</sub>	16 mm	KT	required	53
Phosphate, ortho	315 <sup>(5)</sup>	PO4-2 TC	251988Y	0.06 - 5.00 mg/l PO <sub>4</sub>	16 mm	KT	required	54
Phosphate, total	316 <sup>(5)</sup>	PO4-3 TC	251994Y	0.06 - 3.50 mg/l PO <sub>4</sub>	16 mm	KT	required	55
Phosphate, total	336	PO4-4 TC	251987Y	0.06 - 3.50 mg/l PO <sub>4</sub>	16 mm	KT	required	56
Silica HR vario	307	Si-2 TP (HR)	251412Y	0.7 - 70.0 mg/l SiO <sub>2</sub>	28 mm	RT	required	57
Silica HR vario	308 <sup>(5)</sup>	Si-2 TP (HR)	251990Y	1 - 100 mg/l SiO <sub>2</sub>	16 mm	RT	required	58
Silica HR vario	337 <sup>(5)</sup>	Si-3 TP (HR)	251422Y	1 - 75 mg/l SiO <sub>2</sub>	28 mm	RT	required	59
Silica LR vario	321 <sup>(5)</sup>	Si-1 TP (LR)	251413Y	0.01 - 1.60 mg/l SiO <sub>2</sub>	28 mm	RT	required	60
Sulfate vario	322 <sup>(5)</sup>	SO4-1 TP	251400Y	2 - 70 mg/l SO <sub>4</sub>	28 mm	RT	required	61
Sulfate vario	338 <sup>(5)</sup>	SO4-1 TP	251423Y	2 - 70 mg/l SO <sub>4</sub>	28 mm	RT	required	62

<sup>(1)</sup> KT = reaction cell test; RT = reagent test; CV = ampoule test

<sup>(2)</sup> Analysis specification, see package insert.

<sup>(3)</sup> No test set is required to determine coloration.

<sup>(4)</sup> This programm includes a pH measurement by means of the integrated pH function of the meter. Thus the programm cannot be used with the pHotoFlex® STD.

<sup>(5)</sup> Standard adjustment (user calibration) is possible.

# Aluminium

Program no.

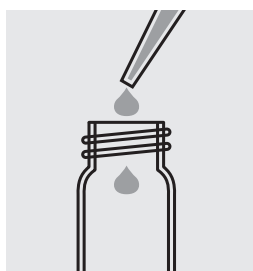
**323**



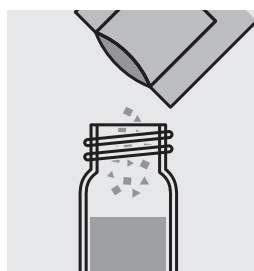
a xylem brand

YSI model no.:	Al-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.002 - 0.250 mg/l Al

**Note:** Before using this test with your photometer for the first time, determine the reagent blank value (see notes below).



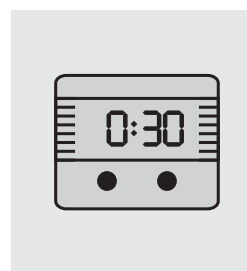
Pipette 20.0ml sample into the empty cell.



Add the contents of a **VARIO Aluminium ECR F20** powder pack and close the cell with the screw cap.



Dissolve the powder by shaking.



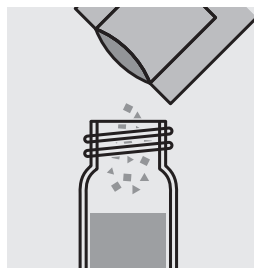
Allow to react for 30 seconds.



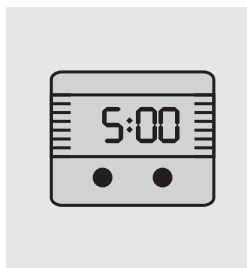
Add the contents of a **VARIO Hexamine F20** powder pack and close the cell with the screw cap.



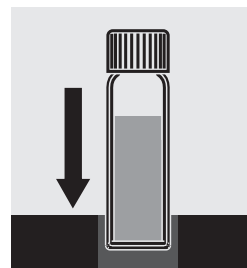
Dissolve the powder by shaking.



For reagent blank value only:  
Add 2 drops of **VARIO ECR-Masking RGT**, close the cell with the screw cap and mix.



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- To avoid errors due to contamination, rinse the equipment with hydrochloric acid solution (approx. 20%), then deionized water beforehand.
- Adding the **VARIO ECR-Masking RGT** masking reagent is only required when determining the reagent blank value.
- The sample temperature has to be between 20 and 25 °C.
- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Ammonia (free)

Program no.

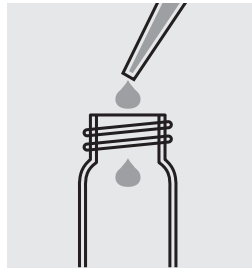
**347**



a xylem brand

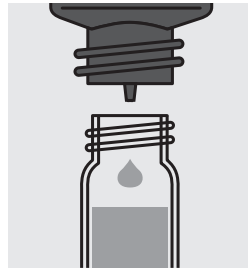
<b>YSI model no.:</b>	MCA-1 TP
<b>Category:</b>	RT (reagent test)
<b>Cell:</b>	28 mm
<b>Measuring range:</b>	0.010 - 0.500 mg/l NH <sub>3</sub> -N (f)
	0.012 - 0.610 mg/l NH <sub>3</sub> (f)
	Display in mmol/l possible

**CAL / ZERO 2**

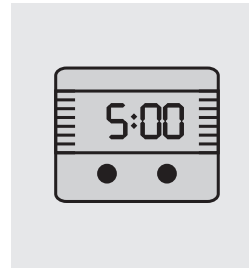


Perform a zero adjustment using a **28 mm** cell filled with **sample**.

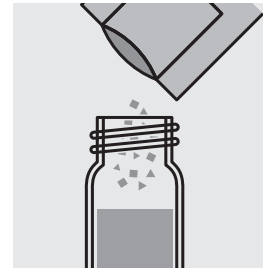
Pipette 10.0 ml sample into an empty **28 mm** cell.



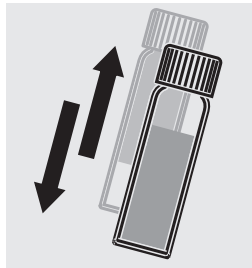
Add 1 drop of **Free Ammonia Reagent** solution, close the cell with the screw cap and mix.



Allow to react for 5 minutes.



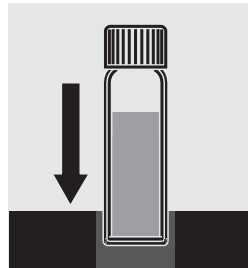
Add the contents of a **Vario Monochlor F RGT** powder pack and close the cell with the screw cap.



Shake the cell vigorously for about 20 seconds to dissolve solids.



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**CAL / ZERO 2**

When switching to another program restore the zero adjustment by performing a new zero adjustment using a **28 mm** cell filled with **deionized water**.

**Note: Failing to restore the zero adjustment will result in all future measurements being erroneous!**

## Notes:

- Collect samples in clean glass bottles and analyze as soon as possible.
- The 5 minutes reaction times refer to a sample temperature of 18-20 °C (64-68 °F). For other sample temperatures adjust the reaction time according to the following table:

Sample temperature		Reaction time (minutes)
°C	°F	
5	41	10
10	50	8
16	61	6

Sample temperature		Reaction time (minutes)
°C	°F	
20	68	5
23	73	2.5
25	77	2

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

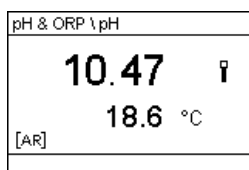




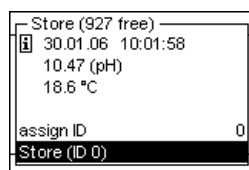
<b>YSI model no.:</b>	NH4-1 TP
<b>Category:</b>	RT (reagent test)
<b>Cell:</b>	28 mm
<b>Measuring range:</b>	Corresponding to 0.01 - 0.64 mg/l NH <sub>4</sub> or 0.01 - 0.50 mg/l NH <sub>4</sub> -N
	Measuring ranges for NH <sub>3</sub> or NH <sub>3</sub> -N depending on pH value and temperature, Example: 0.002 - 0.092 mg/l NH <sub>3</sub> at pH 8.5 and 25 °C.

**Note:** Before using tYSIhe test with your photometer for the first time, determine the reagent blank value. To determine the reagent blank value it is not necessary to measure the pH and temperature.

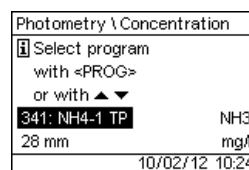
*Step 1: pH and temperature measurement*



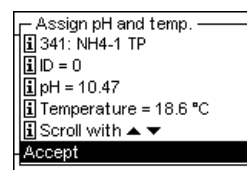
Measuring mode, *pH & ORP*:  
Measure pH value and temperature immediately after sampling.



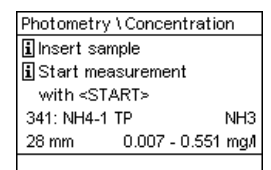
Store measured values with <STO>. If necessary, assign an ID for easier retrieving.



Switch to the *Photometry* measuring mode and select program no. 341.

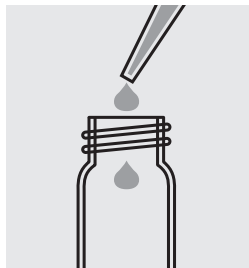


When the prompt *Assign pH und temp.* appears, select and accept the stored values from the pH and temperature measurement.

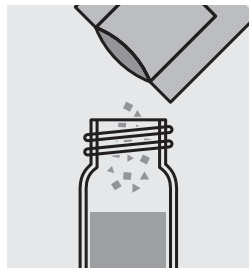


The meter is ready for the photometric measurement (step 2). The measuring range is shown on the display.

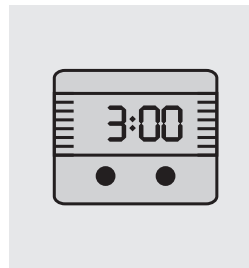
*Step 2: photometric measurement*



Pipette 10.0 ml of sample into the empty cell.



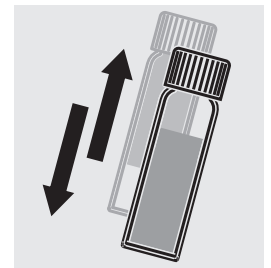
Add the contents of a **VARIO AMMONIA Salicylate F10** powder pack and close the cell with the screw cap.



Allow to react for 3 minutes (reaction time).



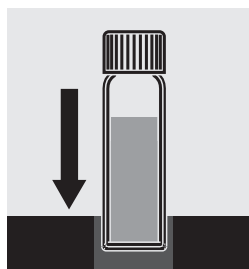
Add the contents of a **VARIO AMMONIA Cyanurate F10** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 15 minutes (reaction time).



Insert the cell in the photometer cell shaft and start measurement.

**Notes:**

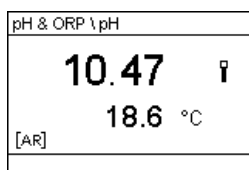
- The measuring range depends largely on the pH and temperature. On the basis of the pH and temperature measurement, it is individually calculated and displayed for each determination.
- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started. To determine the reagent blank value it is not necessary to measure the pH and temperature.
- For further notes please refer to the package insert of the test.



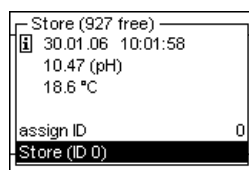
<b>YSI model no.:</b>	NH4-2 TC (LR)
<b>Category:</b>	KT (reaction cell test)
<b>Cell:</b>	16 mm
<b>Measuring range:</b>	Corresponding to 0.03 - 3.20 mg/l NH <sub>4</sub> or 0.02 - 2.50 mg/l NH <sub>4</sub> -N
	Measuring ranges for NH <sub>3</sub> or NH <sub>3</sub> -N depending on pH value and temperature, Example: 0.005 - 0.447 mg/l NH <sub>3</sub> at pH 8.5 and 25 °C.

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value. To determine the reagent blank value it is not necessary to measure the pH and temperature.

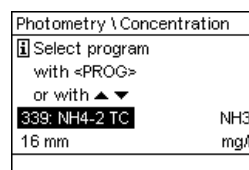
*Step 1: pH and temperature measurement*



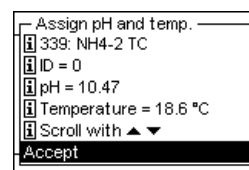
Measuring mode, *pH & ORP*:  
Measure pH value and temperature immediately after sampling.



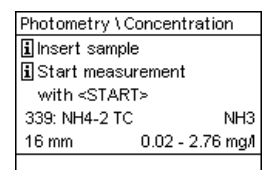
Store measured values with **<STO>**. If necessary, assign an ID for easier retrieving.



Switch to the *Photometry* measuring mode and select program no. 339.



When the prompt *Assign pH and temp.* appears, select and accept the stored values from the pH and temperature measurement.



The meter is ready for the photometric measurement (step 2). The measuring range is shown on the display.

*Step 2: photometric measurement*



Check the pH value of the sample.  
Desired value: approx. pH 7.  
Correct with diluted sodium hydroxide solution or hydrochloric acid as necessary.



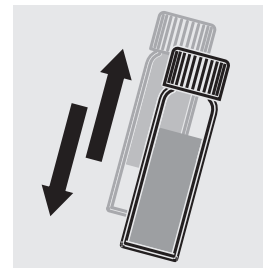
Pipette 2.0 ml of sample into a reaction cell.



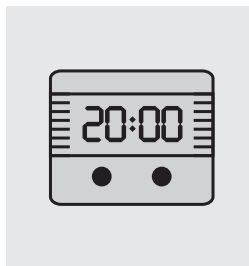
Add the contents of a **VARIO AMMONIA Salicylate F5** powder pack.



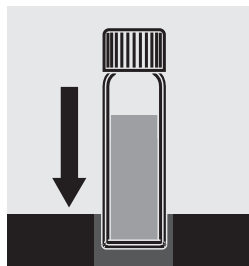
Add the contents of a **VARIO AMMONIA Cyanurate F5** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 20 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**Notes:**

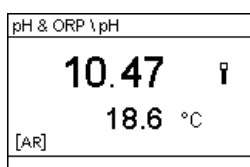
- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If NH<sub>4</sub>-N is present in the sample, the solution becomes green after VARIO AMMONIA Cyanurate F5 was added.
- If chlorine is present, sodium thiosulfate has to be added to the sample immediately after sampling. Add 1 drop of a 0.1 mol/l sodium thiosulfate solution per 0.3 mg/l chlorine to 1 liter sample.
- Iron disturbs the measurement and can be eliminated as follows: Determine the total iron concentration and prepare an iron standard solution with the determined concentration. Use this solution instead of distilled water to determine the reagent blank value for ammonium measurement.



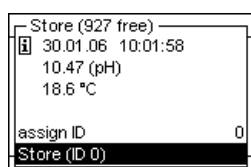
<b>YSI model no.:</b>	NH4-3 TC (HR)
<b>Category:</b>	KT (reaction cell test)
<b>Cell:</b>	16 mm
<b>Measuring range:</b>	Corresponding to 0.5 - 64.4 mg/l NH <sub>4</sub> or 0.4 - 50.0 mg/l NH <sub>4</sub> -N
	Measuring ranges for NH <sub>3</sub> or NH <sub>3</sub> -N depending on pH value and temperature, Example: 0.07 - 9.37 mg/l NH <sub>3</sub> at pH 8.5 and 25 °C.

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value. To determine the reagent blank value it is not necessary to measure the pH and temperature.

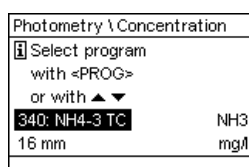
*Step 1: pH and temperature measurement*



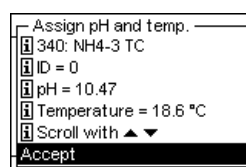
Measuring mode, *pH & ORP*:  
Measure pH value and temperature immediately after sampling.



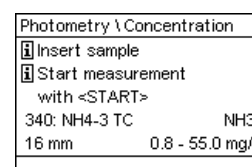
Store measured values with **<STO>**. If necessary, assign an ID for easier retrieving.



Switch to the *Photometry* measuring mode and select program no. 340.



When the prompt *Assign pH and temp.* appears, select and accept the stored values from the pH and temperature measurement.



The meter is ready for the photometric measurement (step 2). The measuring range is shown on the display.

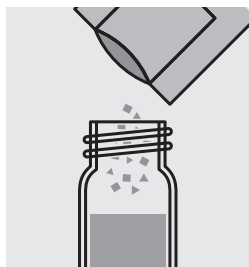
*Step 2: photometric measurement*



Check the pH value of the sample.  
Desired value: approx. pH 7.  
Correct with diluted sodium hydroxide solution or hydrochloric acid as necessary.



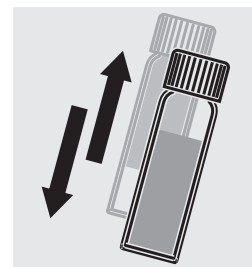
Pipette 0.1 ml of sample into a reaction cell.



Add the contents of a **VARIO AMMONIA Salicylate F5** powder pack.



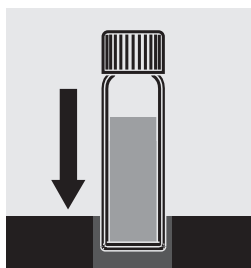
Add the contents of a **VARIO AMMONIA Cyanurate F5** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 20 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**Notes:**

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If NH<sub>4</sub>-N is present in the sample, the solution becomes green after VARIO AMMONIA Cyanurate F5 was added.
- If chlorine is present, sodium thiosulfate has to be added to the sample immediately after sampling. Add 1 drop of a 0.1 mol/l sodium thiosulfate solution per 0.3 mg/l chlorine to 1 liter sample.
- Iron disturbs the measurement and can be eliminated as follows: Determine the total iron concentration and prepare an iron standard solution with the determined concentration. Use this solution instead of distilled water to determine the reagent blank value for ammonium measurement.

# Ammonium vario

Program no.

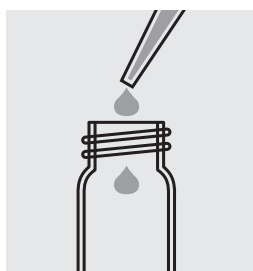
**324**



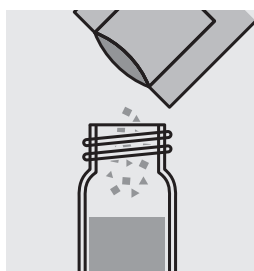
a xylem brand

YSI model no.:	NH4-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.01 - 0.50 mg/l NH <sub>4</sub> -N
	0.01 - 0.64 mg/l NH <sub>4</sub>
	Display in mmol/l possible

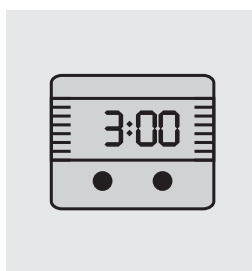
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



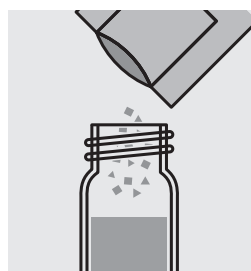
Pipette 10.0 ml of sample into the empty cell.



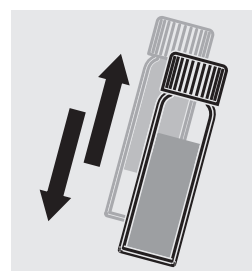
Add the contents of a **VARIO AMMONIA Salicylate F10** powder pack and close the cell with the screw cap.



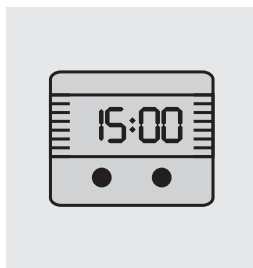
Allow to react for 3 minutes (reaction time).



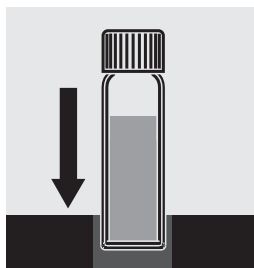
Add the contents of a **VARIO AMMONIA Cyanurate F10** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 15 minutes (reaction time).



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If NH<sub>4</sub>-N is present in the sample, the solution becomes green after VARIO AMMONIA Cyanurate F10 was added.
- If chlorine is present, sodium thiosulfate has to be added to the sample immediately after sampling. Add 1 drop of a 0.1 mol/l sodium thiosulfate solution per 0.3 mg/l chlorine to 1 liter sample.

# Ammonium vario HR

Program no.

**313**



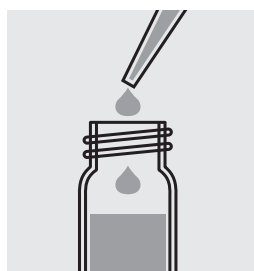
a xylem brand

YSI model no.:	NH4-3 TC (HR)
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.4 - 50.0 mg/l NH <sub>4</sub> -N
	0.5 - 64.4 mg/l NH <sub>4</sub>
	Display in mmol/l possible

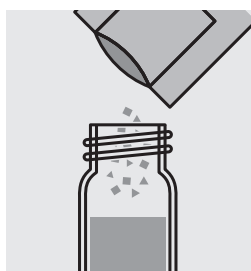
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Check the pH value of the sample.  
Desired value: approx. pH 7.  
Correct with diluted sodium hydroxide solution or hydrochloric acid as necessary.



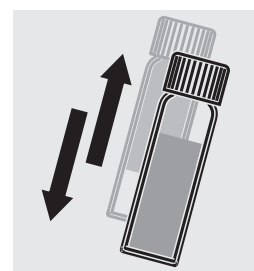
Pipette 0.1 ml of sample into a reaction cell.



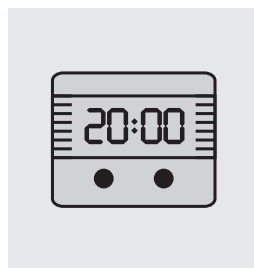
Add the contents of a **VARIO AMMONIA Salicylate F5** powder pack.



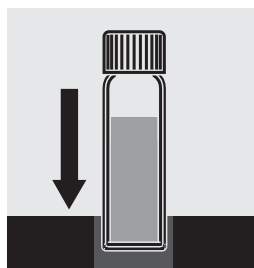
Add the contents of a **VARIO AMMONIA Cyanurate F5** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 20 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If NH<sub>4</sub>-N is present in the sample, the solution becomes green after VARIO AMMONIA Cyanurate F5 was added.
- If chlorine is present, sodium thiosulfate has to be added to the sample immediately after sampling. Add 1 drop of a 0.1 mol/l sodium thiosulfate solution per 0.3 mg/l chlorine to 1 liter sample.
- Iron disturbs the measurement and can be eliminated as follows: Determine the total iron concentration and prepare an iron standard solution with the determined concentration. Use this solution instead of distilled water to determine the reagent blank value for ammonium measurement.

# Ammonium vario LR

Program no.

**312**



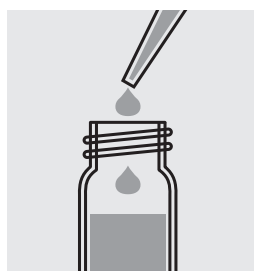
a xylem brand

YSI model no.:	NH4-2 TC (LR)
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.02 - 2.50 mg/l NH <sub>4</sub> -N
	0.03 - 3.20 mg/l NH <sub>4</sub>
	Display in mmol/l possible

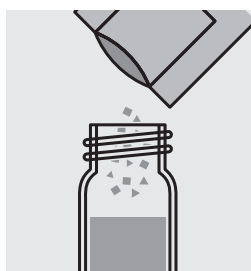
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Check the pH value of the sample.  
Desired value: approx. pH 7.  
Correct with diluted sodium hydroxide solution or hydrochloric acid as necessary.



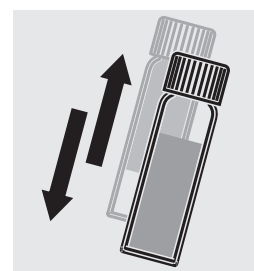
Pipette 2.0 ml of sample into a reaction cell.



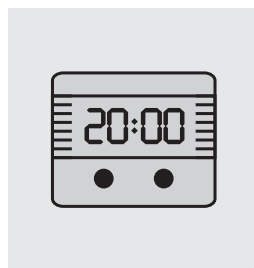
Add the contents of a **VARIO AMMONIA Salicylate F5** powder pack.



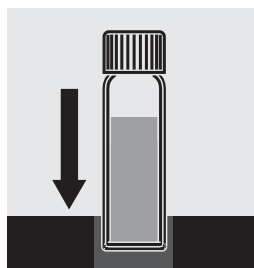
Add the contents of a **VARIO AMMONIA Cyanurate F5** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 20 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If NH<sub>4</sub>-N is present in the sample, the solution becomes green after VARIO AMMONIA Cyanurate F5 was added.
- If chlorine is present, sodium thiosulfate has to be added to the sample immediately after sampling. Add 1 drop of a 0.1 mol/l sodium thiosulfate solution per 0.3 mg/l chlorine to 1 liter sample.
- Iron disturbs the measurement and can be eliminated as follows: Determine the total iron concentration and prepare an iron standard solution with the determined concentration. Use this solution instead of distilled water to determine the reagent blank value for ammonium measurement.

# Chlorine (free) vario

Program no.

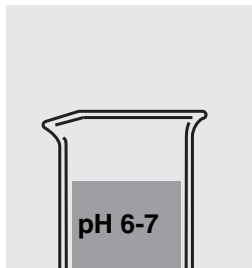
**325**



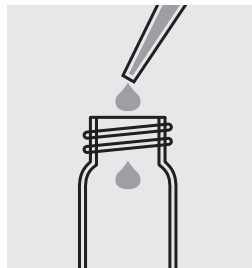
a xylem brand

YSI model no.:	Cl2-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.02 - 2.00 mg/l Cl <sub>2</sub>
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



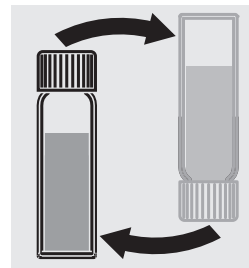
Check the pH value of the sample.  
Desired range: pH 6-7.  
Correct with diluted sodium hydroxide solution or sulfuric acid as necessary.



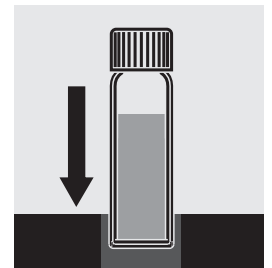
Pipette 10.0 ml of sample into the empty cell.



Add the contents of a **VARIO Chlorine FREE-DPD/F10** powder pack and close the cell with the screw cap.



Mix the contents by swaying (for 20 seconds).



Insert the cell in the photometer cell shaft within one minute and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The test sample should be pink. Very high chlorine concentrations in the sample cause yellow solutions and too low measured values. Dilute the sample in this case.

# Chlorine (free) vario

Program no.

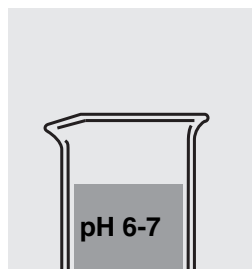
**326**



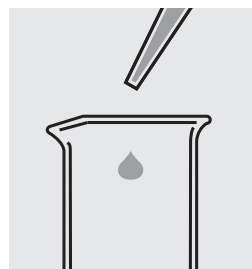
a xylem brand

YSI model no.:	Cl2-2 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.5 - 5.0 mg/l Cl <sub>2</sub>
	Display in mmol/l possible

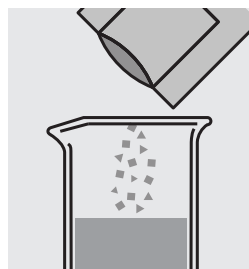
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Check the pH value of the sample.  
Desired range: pH 6-7.  
Correct with diluted sodium hydroxide solution or sulfuric acid as necessary.



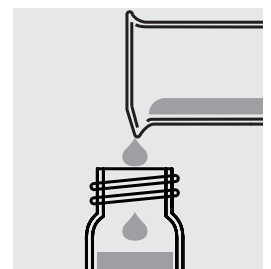
Pipette 10.0 ml of sample into an empty beaker.



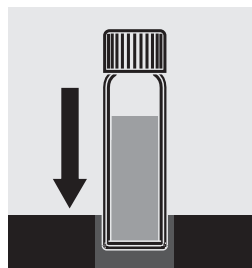
Add the contents of a **VARIO Chlorine FREE-DPD F25** powder pack and dissolve them by stirring.



Add 15.0 ml deionized water with a pipette and mix.



Fill an empty cell with the prepared sample and close it with the screw cap.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The test sample should be pink. Very high chlorine concentrations in the sample cause yellow solutions and too low measured values. Dilute the sample in this case.



# Chlorine (total) vario

Program no.

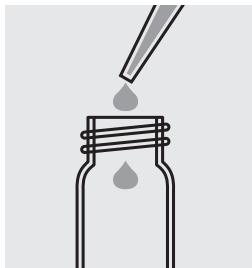
**327**



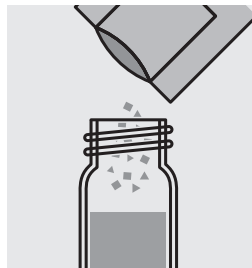
a xylem brand

YSI model no.:	Cl2-3 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.02 - 2.00 mg/l Cl <sub>2</sub>
	Display in mmol/l possible

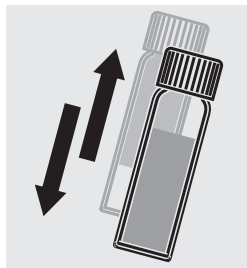
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



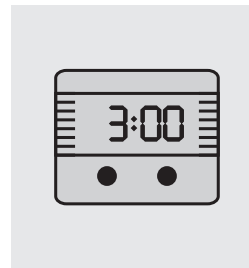
Pipette 10.0 ml of sample into the empty cell.



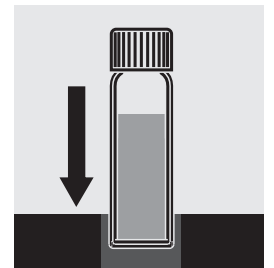
Add the contents of one **VARIO Chlorine Total DPD PP** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids. A small amount of solids may remain undissolved.



Allow to react for 3 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The test sample should be pink. Very high chlorine concentrations in the sample cause yellow solutions and too low measured values. Dilute the sample in this case.

# Chlorine (total) vario

Program no.

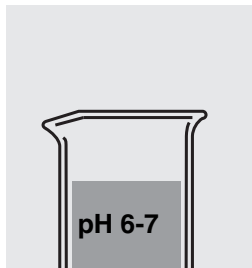
**328**



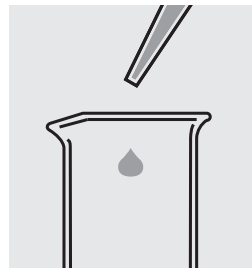
a xylem brand

YSI model no.:	Cl2-4 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.5 - 5.0 mg/l Cl <sub>2</sub>
	Display in mmol/l possible

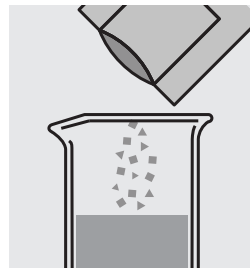
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



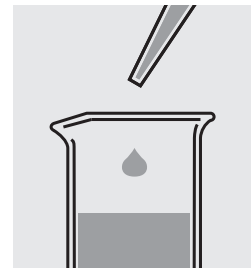
Check the pH value of the sample.  
Required range: pH 6-7.  
Correct with diluted sodium hydroxide solution or sulfuric acid as necessary.



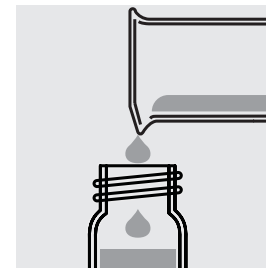
Pipette 10.0 ml of sample into an empty beaker.



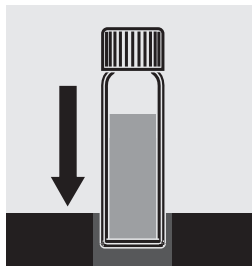
Add the contents of a **VARIO Chlorine Total-DPD F25 ml** powder pack and dissolve them by stirring.



Add 15.0 ml deionized water with a pipette and mix.



Fill an empty cell with the prepared sample and close it with the screw cap.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The test sample should be pink. Very high chlorine concentrations in the sample cause yellow solutions and too low measured values. Dilute the sample in this case.
- Each time after determining total chlorine, rinse the cell with sulfuric acid 25 % and then several times with distilled water.

# COD HR

Program no.

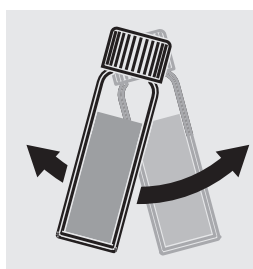
**311**



a xylem brand

<b>YSI model no.:</b>	COD3 TC (HR)
<b>Category:</b>	KT (reaction cell test)
<b>Cell:</b>	16 mm
<b>Measuring range:</b>	200 - 15000 mg/l COD

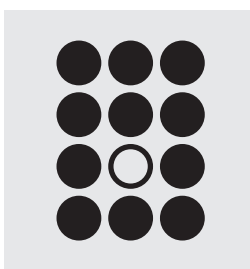
**Note: Before using the test with your photometer for the first time, determine the reagent blank value.**



Shake the reaction cell so that sediment is suspended.



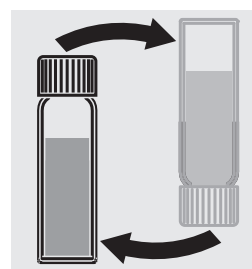
**Carefully** pipette 0.2 ml of sample into the cell, close with screw cap and mix vigorously.  
**Caution, cell becomes very hot!**



Heat the cell in the thermoreactor for two hours at 148 °C.



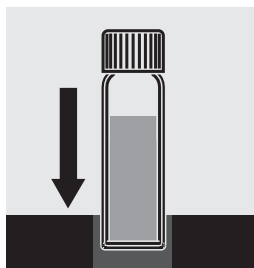
Remove the cell from the thermoreactor and let it cool down in a cell rack.



After approx. 10 min cooling time sway the cell.



Place the cell in the cell rack again and let it cool down **to room temperature**.



**Carefully** insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The chloride content of the sample must not exceed 10,000 mg/l.
- Homogenize samples containing suspended matter with a disperser.
- Before being inserted in the thermoreactor and for photometric measurements the outside of the cell must be free of any contamination (e.g. fingerprints or drops of water). Wipe the cell with a dry cloth as necessary.
- Let the cell cool down long enough (at least 45 min) before inserting it in the photometer cell shaft. The cells remain stable for a long time after reaction and can also be left overnight and then measured.
- After cooling do not rock the cell until the measurement takes place in order not to suspend the solids that formed during the reaction. Suspended matter disturbs the photometric measurement.

# COD LR

Program no.

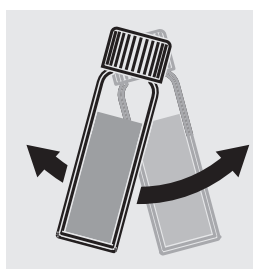
**309**



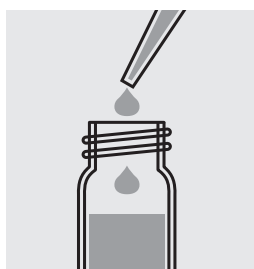
a xylem brand

YSI model no.:	COD1 TC (LR)
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	3 - 150 mg/l COD

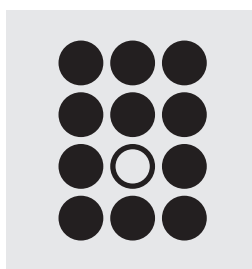
**Note: Before using the test with your photometer for the first time, determine the reagent blank value.**



Shake the reaction cell so that sediment is suspended.



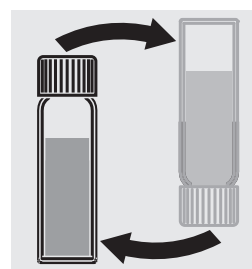
**Carefully** pipette 2.0 ml of sample into the cell, close with screw cap and mix vigorously.  
**Caution, cell becomes very hot!**



Heat the cell in the thermoreactor for two hours at 148 °C.



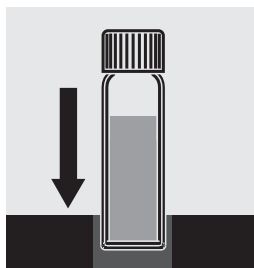
Remove the cell from the thermoreactor and let it cool down in a cell rack.



After approx. 10 min cooling time sway the cell.



Place the cell in the cell rack again and let it cool down **to room temperature**.



**Carefully** insert the cell in the photometer cell shaft and start measurement.

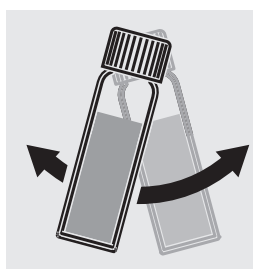
### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The chloride content of the sample must not exceed 1000 mg/l.
- Homogenize samples containing suspended matter with a disperser.
- Before being inserted in the thermoreactor and for photometric measurements the outside of the cell must be free of any contamination (e.g. fingerprints or drops of water). Wipe the cell with a dry cloth as necessary.
- Let the cell cool down long enough (at least 45 min) before inserting it in the photometer cell shaft. The cells remain stable for a long time after reaction and can also be left overnight and then measured.
- After cooling do not rock the cell until the measurement takes place in order not to suspend the solids that formed during the reaction. Suspended matter disturbs the photometric measurement.

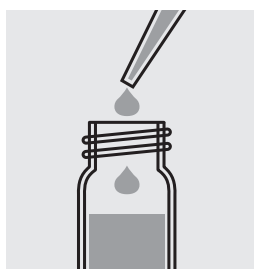


<b>YSI model no.:</b>	COD2 TC (MR)
<b>Category:</b>	KT (reaction cell test)
<b>Cell:</b>	16 mm
<b>Measuring range:</b>	20 - 1500 mg/l COD

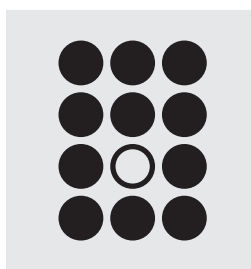
**Note: Before using the test with your photometer for the first time, determine the reagent blank value.**



Shake the reaction cell so that sediment is suspended.



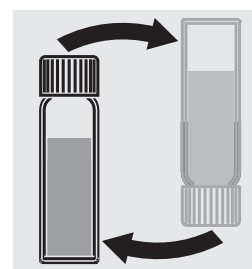
**Carefully** pipette 2.0 ml of sample into the cell, close with screw cap and mix vigorously.  
**Caution, cell becomes very hot!**



Heat the cell in the thermoreactor for two hours at 148 °C.



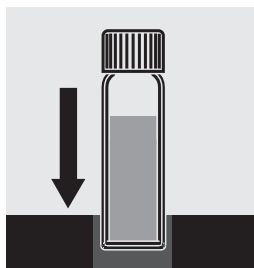
Remove the cell from the thermoreactor and let it cool down in a cell rack.



After approx. 10 min cooling time sway the cell.



Place the cell in the cell rack again and let it cool down **to room temperature**.



**Carefully** insert the cell in the photometer cell shaft and start measurement.

**Notes:**

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The chloride content of the sample must not exceed 1000 mg/l.
- Homogenize samples containing suspended matter with a disperser.
- Before being inserted in the thermoreactor and for photometric measurements the outside of the cell must be free of any contamination (e.g. fingerprints or drops of water). Wipe the cell with a dry cloth as necessary.
- Let the cell cool down long enough (at least 45 min) before inserting it in the photometer cell shaft. The cells remain stable for a long time after reaction and can also be left overnight and then measured.
- After cooling do not rock the cell until the measurement takes place in order not to suspend the solids that formed during the reaction. Suspended matter disturbs the photometric measurement.

## Coloration at 435 nm (FB436)

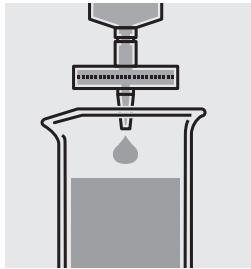
Program no.

**43**

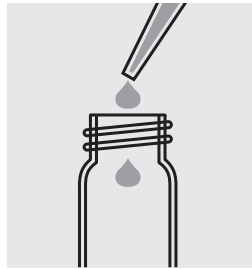


a xylem brand

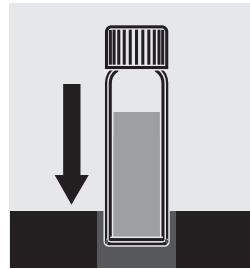
<b>YSI model no.:</b>	FB436
<b>Category:</b>	Reagent free test
<b>Cell:</b>	28 mm
<b>Measuring range:</b>	0.5 - 50.0 m <sup>-1</sup>



Filter the sample as necessary.



Pipette 10.0 ml of sample into the empty cell.



Insert the cell in the photometer cell shaft and start measurement.

Note:

Filtered samples develop the real coloration, unfiltered samples the apparent coloration.

# Coloration at 517 nm (FB517)

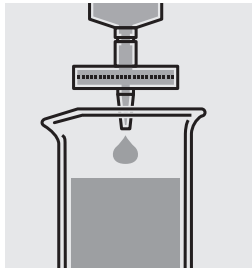
Program no.

**44**

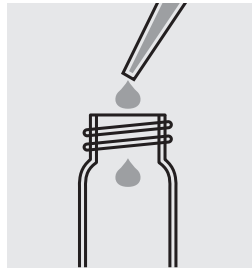


a xylem brand

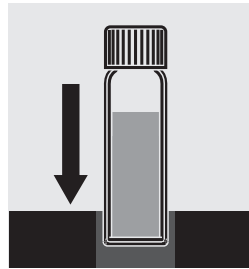
YSI model no.:	FB517
Category:	Reagent free test
Cell:	28 mm
Measuring range:	0.5 - 50.0 m <sup>-1</sup>



Filter the sample as necessary.



Pipette 10.0 ml of sample into the empty cell.



Insert the cell in the photometer cell shaft and start measurement.

Note:

Filtered samples develop the real coloration, unfiltered samples the apparent coloration.

# Coloration at 610 nm (FB610)

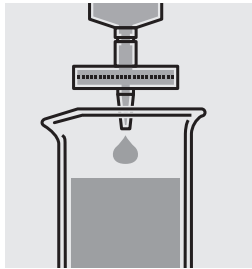
Program no.

45

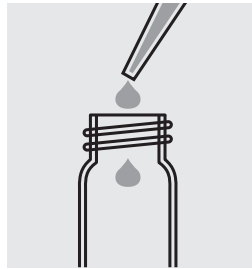


a xylem brand

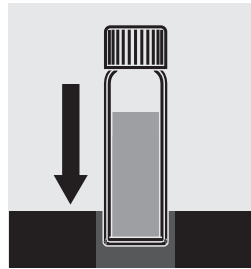
YSI model no.:	FB610
Category:	Reagent free test
Cell:	28 mm
Measuring range:	0.5 - 50.0 m <sup>-1</sup>



Filter the sample as necessary.



Pipette 10.0 ml of sample into the empty cell.



Insert the cell in the photometer cell shaft and start measurement.

Note:

Filtered samples develop the real coloration, unfiltered samples the apparent coloration.



# Copper vario

Program no.

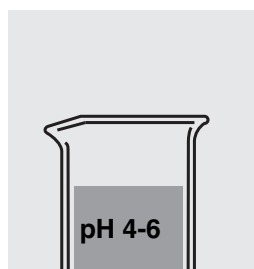
**302**



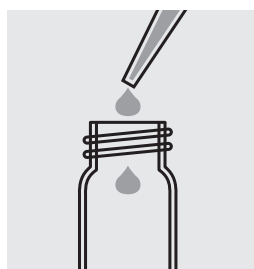
a xylem brand

YSI model no.:	Cu-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.04 - 5.00 mg/l Cu
	Display in mmol/l possible

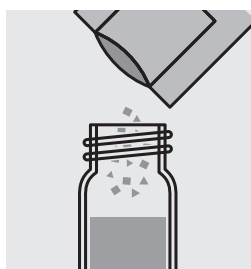
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



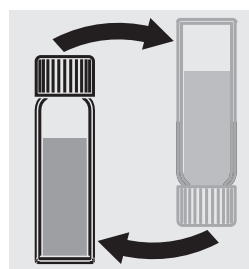
Check the pH value of the sample.  
Desired range: pH 4-6.  
Correct with diluted sodium hydroxide solution or caustic potash solution as necessary.



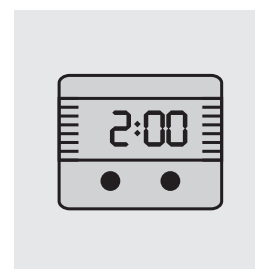
Pipette 10.0 ml of sample into the empty cell.



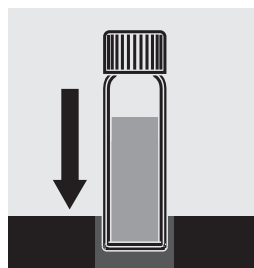
Add the contents of a **VARIO Cu1 F10** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x).  
Undissolved powder has no adverse effect on measurement.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# DEHA vario

Program no.

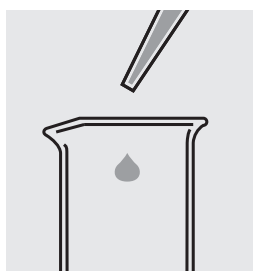
**335**



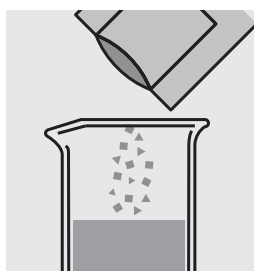
a xylem brand

YSI model no.:	DEHA-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.004 - 0.450 mg/l DEHA
	Display in mmol/l possible

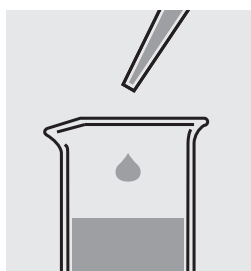
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



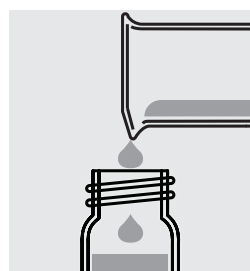
Pipette 25.0 ml of sample into an empty beaker.



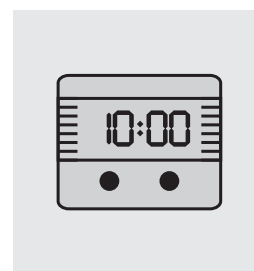
Add the contents of a **Vario Oxyscav 1 RGT** powder packet and dissolve it by stirring.



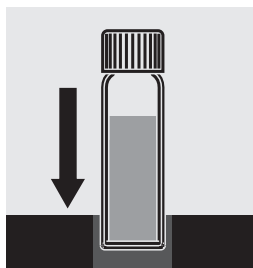
Add 0.5 ml **Vario DEHA 2 RGT** with a pipette and mix.



Fill an empty cell with the prepared sample, close it with the screw cap **and put it in a dark place.**



Allow the sample to react for ten minutes **in a dark place. Then measure immediately.**



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Clean all laboratory glassware with hydrochloric acid (approx. 20 %), then thoroughly rinse with deionized water.
- Avoid excessive movements and exposure to sun light during sampling. Store the samples hermetically sealed.
- The temperature of the samples must be  $25 \pm 3$  °C.

# Hydrazine vario

Program no.

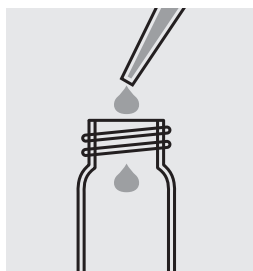
**329**



a xylem brand

YSI model no.:	N2H4-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.004 - 0.600 mg/l N <sub>2</sub> H <sub>4</sub>
	Display in mmol/l possible

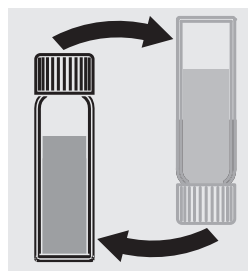
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



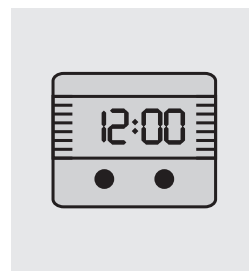
Pipette 10.0 ml of sample into the empty cell.



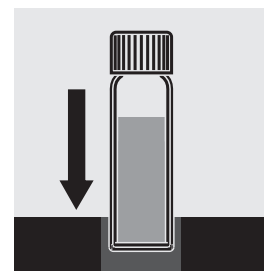
With a pipette add 0.5 ml **Vario Hydra2 Reagent Solution** and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



Allow to react for 12 minutes.



Insert the cell in the photometer cell shaft and start measurement.

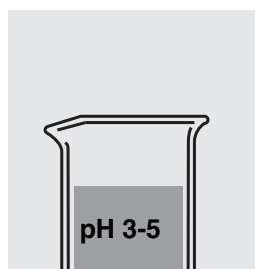
## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If any hydrazine is present, the solution develops a yellow color after the reagent is added.
- The temperature of the samples must be 21±4 °C.
- Avoid moving the sample or too long exposure to air.

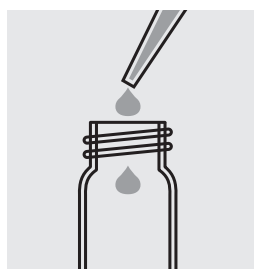


YSI model no.:	Fe-2 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.02 - 3.00 mg/l Fe
	Display in mmol/l possible

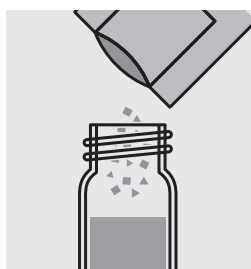
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



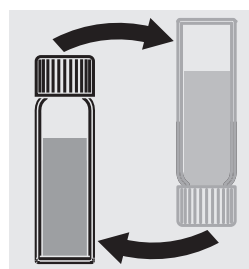
Check the pH value of the sample.  
Desired range: pH 3-5.  
Correct with diluted sodium hydroxide solution or hydrochloric acid as necessary.



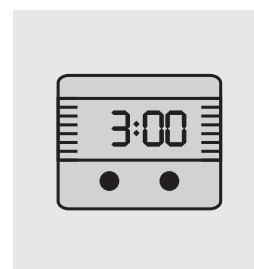
Pipette 10.0 ml of sample into the empty cell.



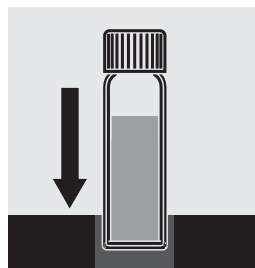
Add the contents of a **VARIO Ferro F10** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x).  
Undissolved powder has no adverse effect on measurement.



Allow to react for 3 minutes (reaction time).



Insert the cell in the photometer cell shaft and start measurement.

**Notes:**

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- This method covers all forms of dissolved iron and most forms of undissolved iron.
- In the case of samples with visible rust the reaction time should be extended to at least 5 minutes.

# Iron vario TPTZ

Program no.

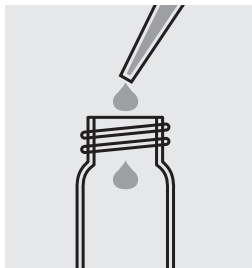
**300**



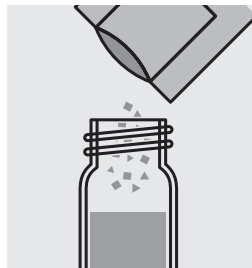
a xylem brand

YSI model no.:	Fe-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.012 - 1.800 mg/l Fe
	Display in mmol/l possible

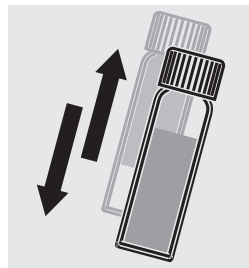
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



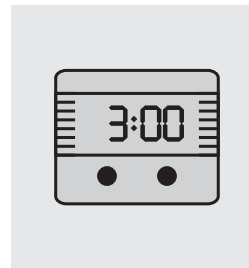
Pipette 10.0 ml of sample into the empty cell.



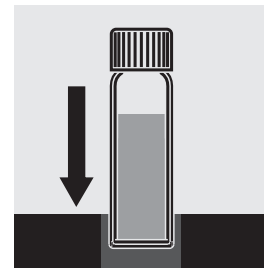
Add the contents of a **VARIO Iron TPTZ F10** powder pack and close the cell with the screw cap.



To dissolve solids, shake the cell vigorously for approx. 30 seconds.



Allow to react for 3 minutes (reaction time).



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Manganese vario

Program no.

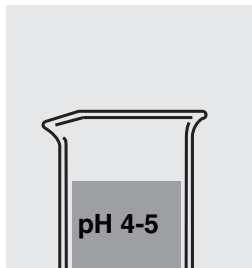
**303**



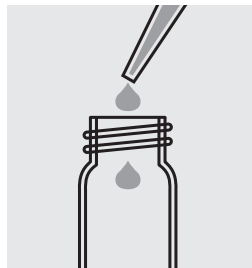
a xylem brand

YSI model no.:	Mn-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.2 - 20.0 mg/l Mn
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



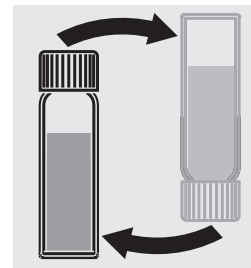
Check the pH value of the sample.  
Desired range: pH 4-5.  
Correct with diluted nitric acid or sodium hydroxide solution as necessary.



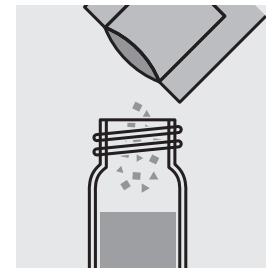
Pipette 10.0 ml of sample into the empty cell.



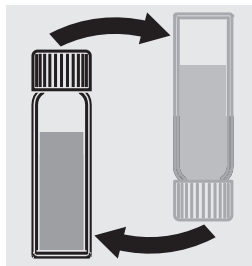
Add the contents of a **VARIO MANGANESE Citrate Buffer F10** powder pack and close the cell with the screw cap.



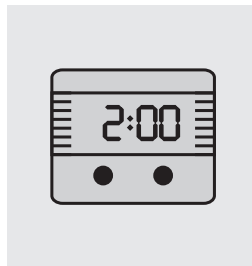
Mix the contents by carefully swaying the cell (10 x).



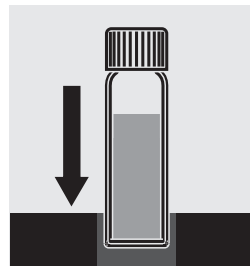
Add the contents of a **VARIO Sodium Periodate F10** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x).



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Manganese vario

Program no.

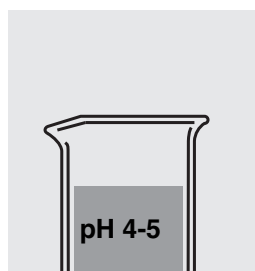
**330**



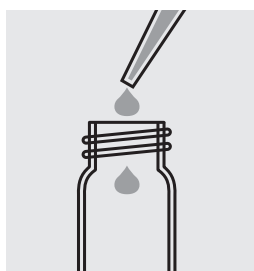
a xylem brand

YSI model no.:	Mn-2 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.007 - 0.700 mg/l Mn
	Display in mmol/l possible

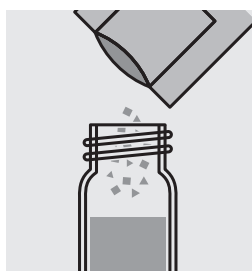
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



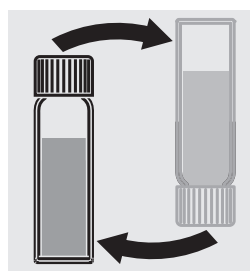
Check the pH value of the sample.  
Required range: pH 4-5.  
Correct with diluted nitric acid or sodium hydroxide solution as necessary.



Pipette 10.0 ml of sample into the empty cell.



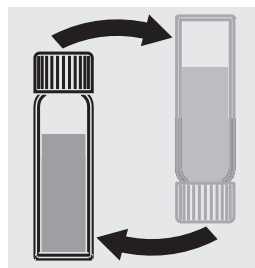
Add the contents of a **Vario Ascorbic Acid** powder packet and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



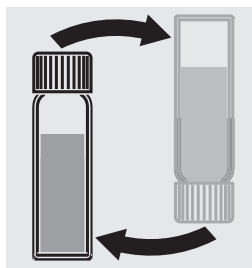
Add 15 drops of **Vario Alkaline-Cyanide Reagent Solution** and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



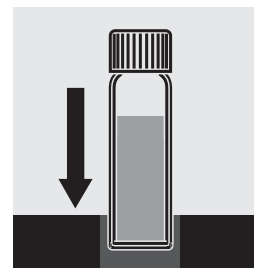
Add 21 drops of **Vario PAN Indicator Solution 0.1%** and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Clean all laboratory glassware with nitric acid, then thoroughly rinse with deionized water.

# Molybdate vario

Program no.

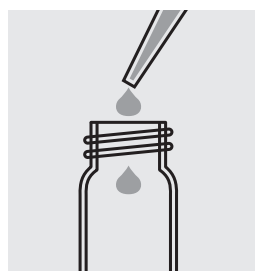
**304**



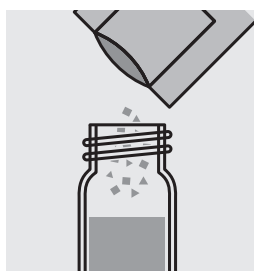
a xylem brand

YSI model no.:	Mo-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.3 - 35.0 mg/l Mn
	Display in mmol/l possible

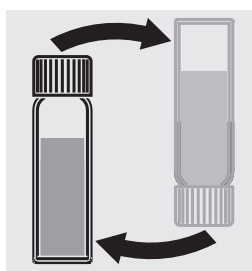
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



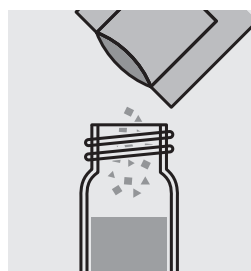
Pipette 10.0 ml of sample into the empty cell.



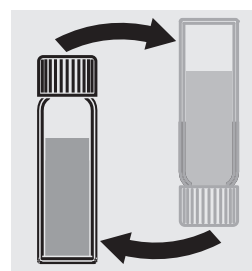
Add the contents of a **MolyVer 1 Reagent** powder pack and close the cell with the screw cap.



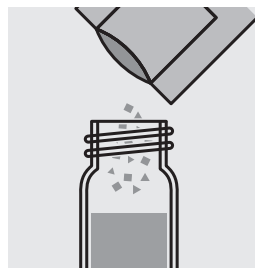
Mix the contents by carefully swaying the cell (10 x).



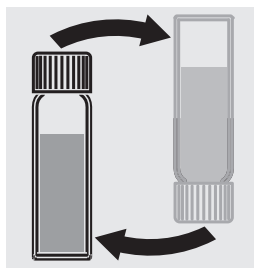
Add the contents of a **MolyVer 2 Reagent** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x).



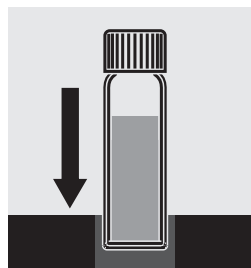
Add the contents of a **MolyVer 3 Reagent** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x). Undissolved powder has no adverse effect on measurement.



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.



# Molybdenum vario

Program no.

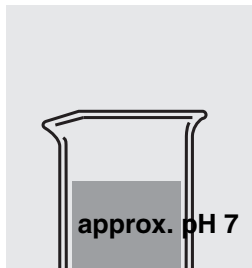
**331**



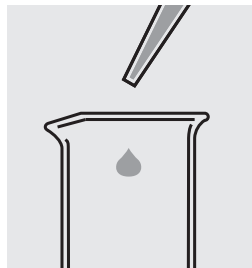
a xylem brand

YSI model no.:	Mo-2 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.3 - 40.0 mg/l Mo
	Display in mmol/l possible

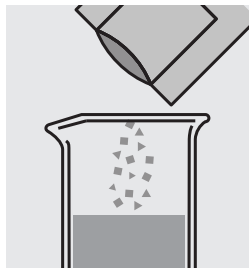
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



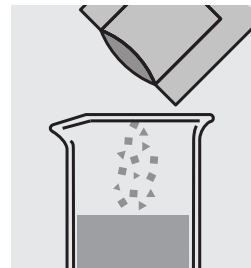
Check the pH value of the sample.  
Nominal value: approx. pH 7.  
Correct with diluted sodium hydroxide solution or nitric acid as necessary.



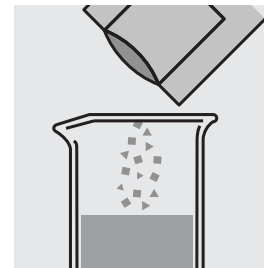
Pipette 25.0 ml of sample into an empty beaker.



Add the contents of a **Vario Molybdenum HR 1 F25 ml** powder pack and dissolve them by stirring.



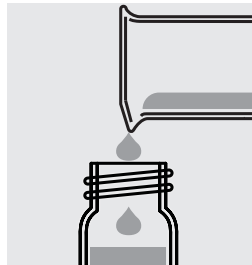
Add the contents of a **Vario Molybdenum HR 2 F25 ml** powder pack and dissolve them by stirring.



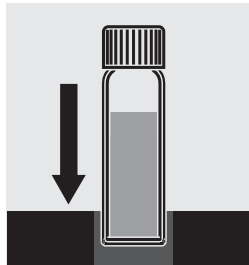
Add the contents of a **Vario Molybdenum HR 3 F25 ml** powder pack and dissolve them by stirring.



Allow to react for 5 minutes.



Fill an empty cell with the prepared sample and close it with the screw cap.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If any molybdenum is present, the solution develops a yellow color after all reagents have been added.

# Monochloramine (MCA)

Program no.

**345**



a xylem brand

<b>YSI model no.:</b>	MCA-1 TP
<b>Category:</b>	RT (reagent test)
<b>Cell:</b>	28 mm
<b>Measuring range:</b>	0.04 - 3.00 mg/l Cl <sub>2</sub> (MCA)
	0.03 - 2.17 mg/l NH <sub>2</sub> Cl
	Display in mmol/l possible

**CAL / ZERO 2**

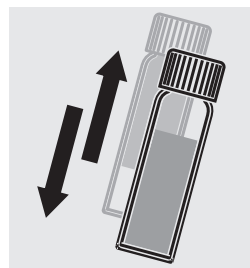


Perform a zero adjustment using a **28 mm** cell filled with **sample**.

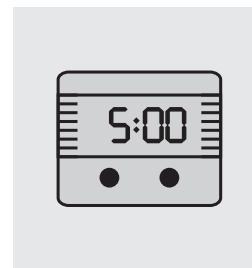
Pipette 10.0 ml sample into an empty **28 mm** cell.



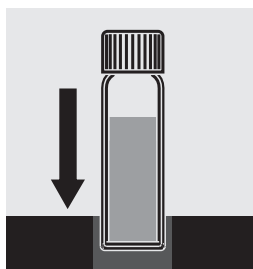
Add the contents of a **Vario Monochlor F RGT** powder pack and close the cell with the screw cap.



Shake the cell vigorously for about 20 seconds to dissolve solids.



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**CAL / ZERO 2**

When switching to another program restore the zero adjustment by performing a new zero adjustment using a **28 mm** cell filled with **deionized water**.

**Note: Failing to restore the zero adjustment will result in all future measurements being erroneous!**

## Notes:

- Collect samples in clean glass bottles and analyze as soon as possible.
- The 5 minutes reaction times refer to a sample temperature of 18-20 °C (64-68 °F). For other sample temperatures adjust the reaction time according to the following table:

Sample temperature		Reaction time (minutes)
°C	°F	
5	41	10
10	50	8
16	61	6

Sample temperature		Reaction time (minutes)
°C	°F	
20	68	5
23	73	2.5
25	77	2

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Monochloramine (MCA)

Program no.

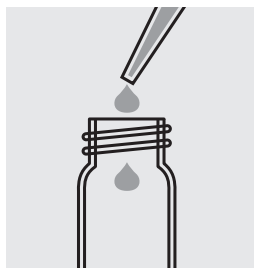
**344**



a xylem brand

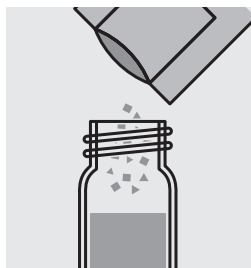
YSI model no.:	MCA-1 TP
Category:	RT (reagent test)
Cell:	16 mm
Measuring range:	0.04 - 4.50 mg/l Cl <sub>2</sub> (MCA)
	0.03 - 3.26 mg/l NH <sub>2</sub> Cl
	Display in mmol/l possible

**CAL / ZERO 2**

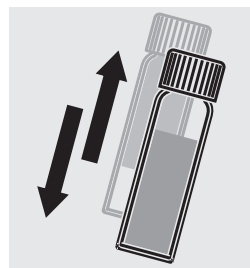


Perform a zero adjustment using a **16 mm** cell filled with **sample**.

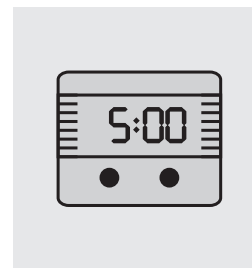
Pipette 10.0 ml sample into an empty **28 mm** cell.



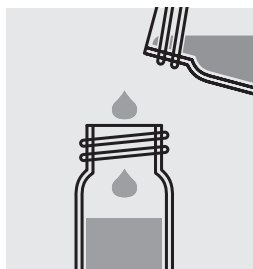
Add the contents of a **Vario Monochlor F RGT** powder pack and close the cell with the screw cap.



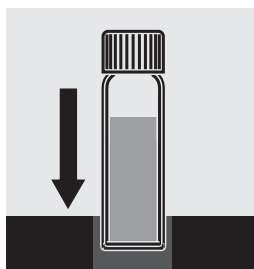
Shake the cell vigorously for about 20 seconds to dissolve solids.



Allow to react for 5 minutes.



Transfer the prepared sample to an empty **16 mm** cell and close it with the screw cap.



Insert the **16 mm** cell in the photometer cell shaft and start measurement.

**CAL / ZERO 2**

When switching to another program restore the zero adjustment by performing a new zero adjustment using a **16 mm** cell filled with **deionized water**.

**Note: Failing to restore the zero adjustment will result in all future measurements being erroneous!**

## Notes:

- Collect samples in clean glass bottles and analyze as soon as possible.
- The 5 minutes reaction times refer to a sample temperature of 18-20 °C (64-68 °F). For other sample temperatures adjust the reaction time according to the following table:

Sample temperature		Reaction time (minutes)
°C	°F	
5	41	10
10	50	8
16	61	6

Sample temperature		Reaction time (minutes)
°C	°F	
20	68	5
23	73	2.5
25	77	2

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Nitrate

Program no.

**314**



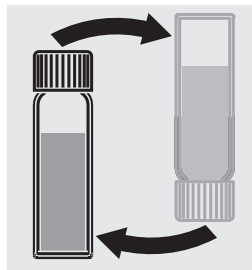
a xylem brand

YSI model no.:	NO3-1 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.2 - 30.0 mg/l NO <sub>3</sub> -N
	1.0 - 133.0 mg/l NO <sub>3</sub>
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



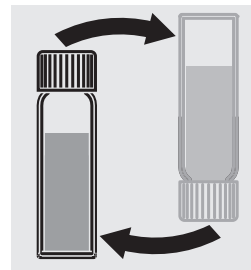
Pipette 1.0 ml of sample into a reaction cell and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x).



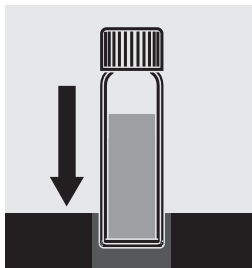
Add the contents of a **VARIO Nitrate Chromotropic** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x). A small amount of solids may remain undissolved.



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

**Nitrite HR**  
Program no.

**317**



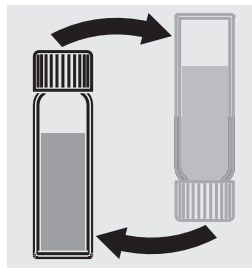
a xylem brand

YSI model no.:	NO2-2 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.30 - 3.00 mg/l NO <sub>2</sub> -N
	0.99 - 9.85 mg/l NO <sub>2</sub>
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



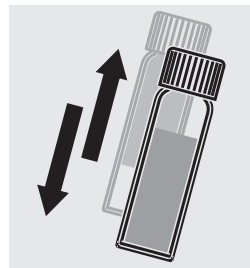
Pipette 0.5 ml of sample into a reaction cell.



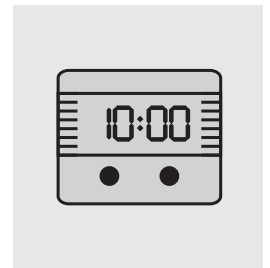
Mix the contents by carefully swaying the cell.



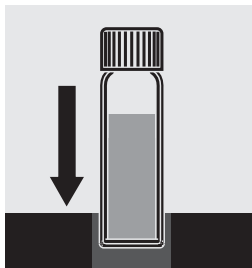
Add 1 level black measuring spoon no. 8 of **Nitrit-101** and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 10 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**Notes:**

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Store the closed reagents at a temperature of +4 to +8 °C.

**Nitrite LR**  
Program no.

**318**



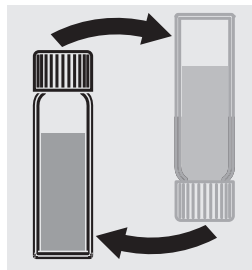
a xylem brand

YSI model no.:	NO2-2 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.03 - 0.60 mg/l NO <sub>2</sub> -N
	0.10 - 1.97 mg/l NO <sub>2</sub>
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



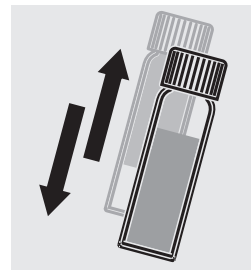
Pipette 2.0 ml of sample into a reaction cell.



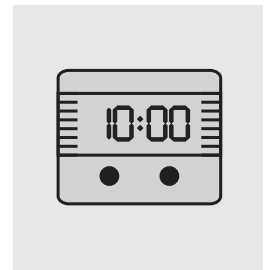
Mix the contents by carefully swaying the cell.



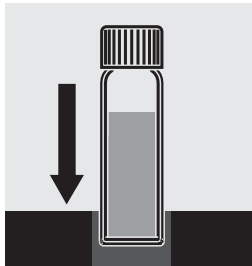
Add 1 level black measuring spoon no. 8 of **Nitrit-101** and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



Allow to react for 10 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**Notes:**

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Store the closed reagents at a temperature of +4 to +8 °C.

# Nitrite vario

Program no.

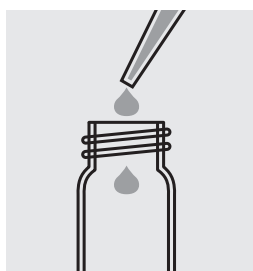
**305**



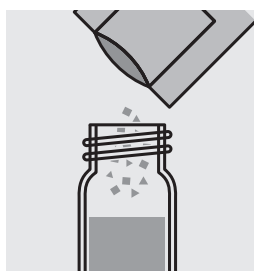
a xylem brand

YSI model no.:	NO2-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.002 - 0.300 mg/l NO <sub>2</sub> -N
	0.007 - 0.985 mg/l NO <sub>2</sub>
	Display in mmol/l possible

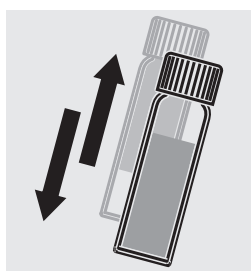
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



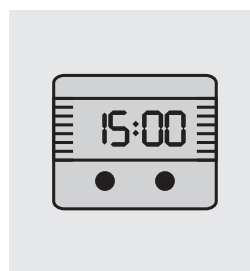
Pipette 10.0 ml of sample into the empty cell.



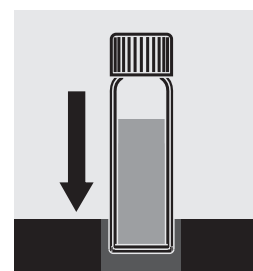
Add the contents of a **VARIO Nitri 3 F10** powder pack and close the cell with the screw cap.



Shake the cell. Undissolved powder has no adverse effect on measurement.



Allow to react for 15 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Nitrite vario

Program no.

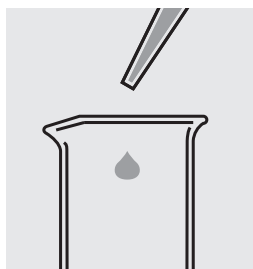
**334**



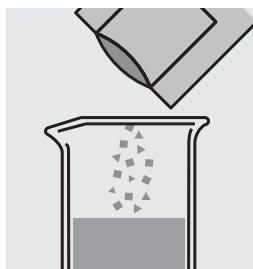
a xylem brand

YSI model no.:	NO2-3 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.002 - 0.300 mg/l NO <sub>2</sub> -N
	0.007 - 0.982 mg/l NO <sub>2</sub>
	Display in mmol/l possible

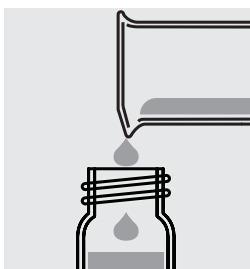
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



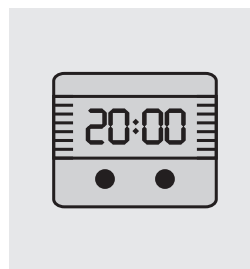
Pipette 25.0 ml of sample into an empty beaker.



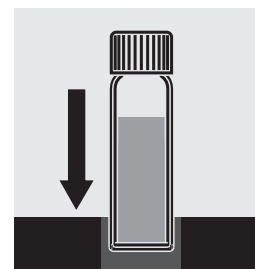
Add the contents of a **Vario Nitri3 F25 ml** powder pack and dissolve them by stirring.



Fill an empty cell with the prepared sample and close it with the screw cap.



Allow to react for 20 minutes.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.



# Nitrogen (total)

Program no.

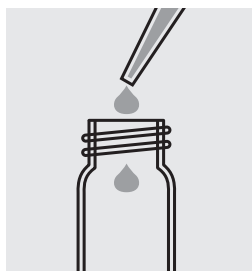
35



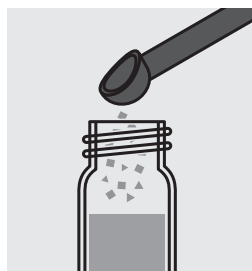
a xylem brand

YSI model no.:	14537
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.50 - 15.00 mg/l N

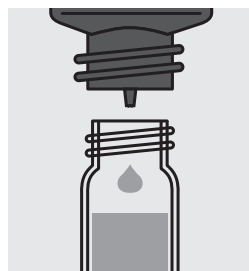
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



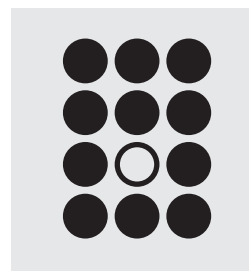
Pipette 10.0 ml of sample into an empty cell.



Add 1 level blue microspoon of **N-1K**.



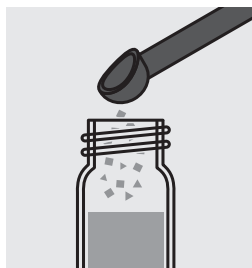
Add 6 drops of **N-2K**, close cell with screw cap and mix.



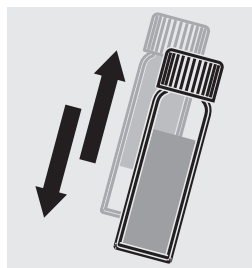
Heat the cell in the thermoreactor for one hour at 120 °C.



Place the cell in the cell rack again and let it cool down to room temperature (=prepared sample).



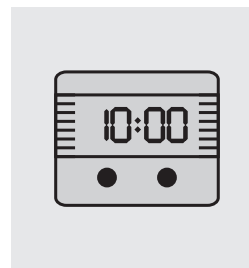
Add 1 level blue microspoon of **N-3K** into a reaction cell and close the cell with the screw cap.



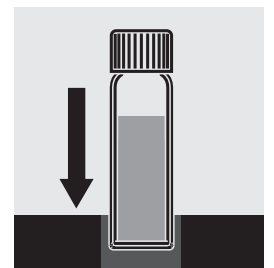
To dissolve solids, shake the cell **vigorously for 1 minute**.



With a pipette add 1.5 ml of prepared sample very slowly, close with screw cap and mix vigorously. **Caution, cell becomes very hot!**



Allow to react for 10 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Sample solution and reagents must have a temperature of 20-25 °C. Temper as necessary.
- For further notes please refer to the package insert of the test.

# Nitrogen, total HR

Program no.

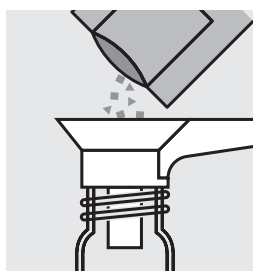
**320**



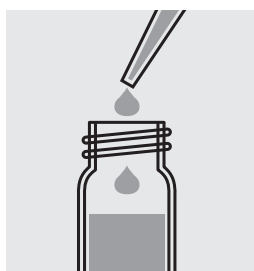
a xylem brand

YSI model no.:	Ntot2 TC (HR)
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	10 - 150 mg/l N

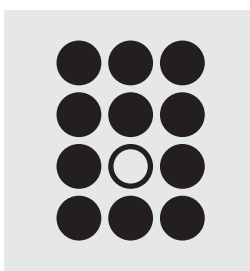
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Add the contents of a **VARIO TN Persulfate Rgt.** powder pack into a **TN Hydroxide HR** digestion cell.



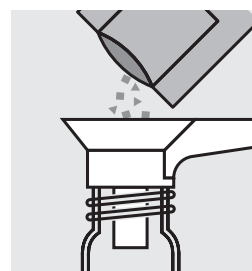
With a pipette add 0.5 ml of sample, close the cell with the screw cap and mix vigorously for at least 30 s. A small amount of solids may remain undissolved.



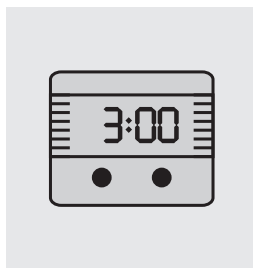
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



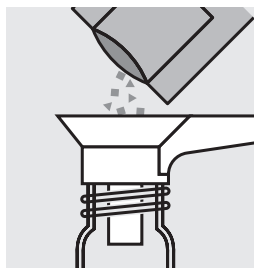
Remove the cell from the thermoreactor and let it cool down in a cell rack.



Add the contents of a **VARIO TN Reagent A** powder pack, close the cell with the screw cap and mix for at least 15 s.



Allow to react for 3 minutes.



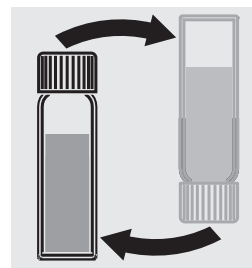
Add the contents of a **VARIO TN Reagent B** powder pack, close the cell with the screw cap and mix for at least 15 s.



Allow to react for 2 minutes.



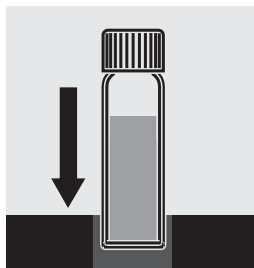
Pipette 2.0 ml of prepared sample into a **TN Acid LR/HR (Reagent C)** reaction cell and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x / for approx. 30 s altogether). **Caution, the cell becomes warm!**



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**Note:**

Always clean the powder funnel prior to adding a reagent!

# Nitrogen, total LR

Program no.

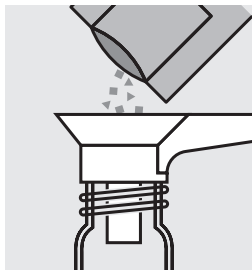
**319**



a xylem brand

YSI model no.:	Ntot1 TC (LR)
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.5 - 25.0 mg/l N

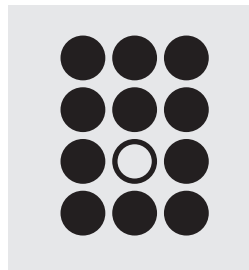
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



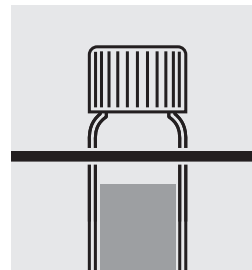
Add the contents of a **VARIO TN Persulfate Rgt.** powder pack into a **TN Hydroxide LR** digestion cell.



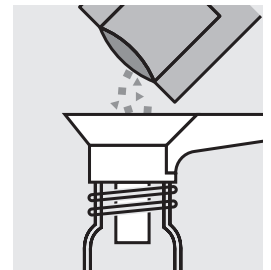
With a pipette add 2.0 ml of sample, close the cell with the screw cap and mix vigorously for at least 30 s. A small amount of solids may remain undissolved.



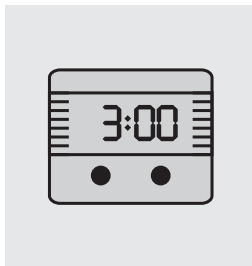
Heat the cell in the thermoreactor at 120 °C for 30 minutes.



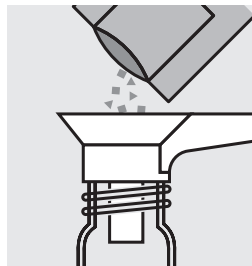
Remove the cell from the thermoreactor and let it cool down in a cell rack.



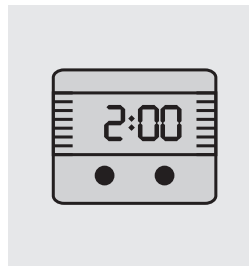
Add the contents of a **VARIO TN Reagent A** powder pack, close the cell with the screw cap and mix for at least 15 s.



Allow to react for 3 minutes.



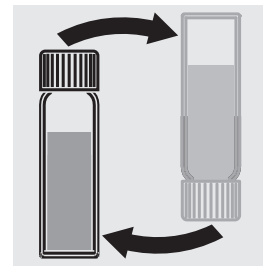
Add the contents of a **VARIO TN Reagent B** powder pack, close the cell with the screw cap and mix for at least 15 s.



Allow to react for 2 minutes.



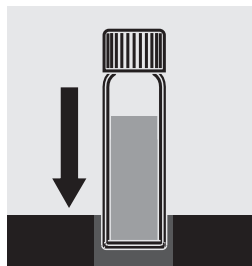
Pipette 2.0 ml of prepared sample into a **TN Acid LR/HR (Reagent C)** reaction cell and close the cell with the screw cap.



Mix the contents by carefully swaying the cell (10 x / for approx. 30 s altogether). **Caution, the cell becomes warm!**



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

**Note:**

Always clean the powder funnel prior to adding a reagent!

# Phosphate vario (ortho)

Program no.

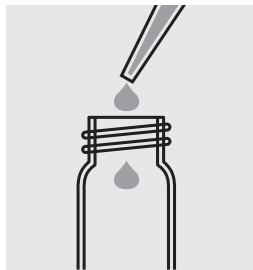
**306**



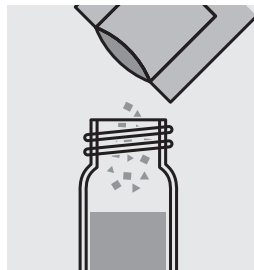
a xylem brand

YSI model no.:	PO4-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.007 - 0.800 mg/l PO <sub>4</sub> -P
	0.02 - 2.45 mg/l PO <sub>4</sub>
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



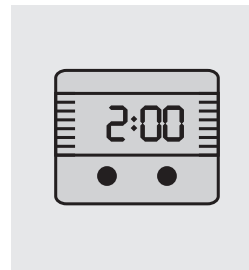
Pipette 10.0 ml of sample into the empty cell.



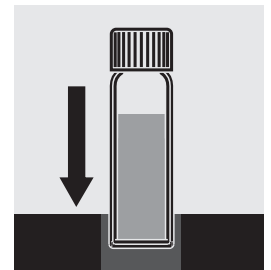
Add the contents of a **VARIO Phos3 F10** powder pack and close the cell with the screw cap.



Shake the cell for 10 to 15 seconds. Undissolved powder has no adverse effect on measurement.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Phosphate, acid hydrolyzable

Program no.

**336**



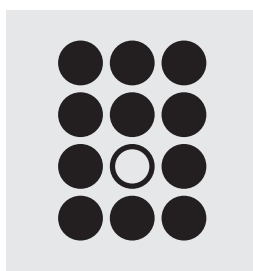
a xylem brand

YSI model no.:	PO4-4 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.06 - 3.50 mg/l PO <sub>4</sub>
	0.020 - 1.141 mg/l PO <sub>4</sub> -P
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Pipette 5 ml of sample into a reaction cell and close the cell with the screw cap.



Heat the cell in the thermoreactor for 30 minutes at 120 °C.



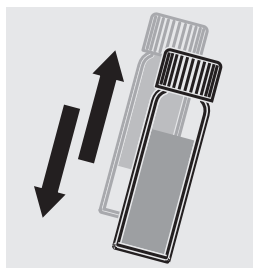
Remove the cell from the thermoreactor and let it cool down in a cell rack.



With a pipette add 2.0 ml **Vario Sodium hydroxide 1.00 N**, close the cell with the screw cap and mix.



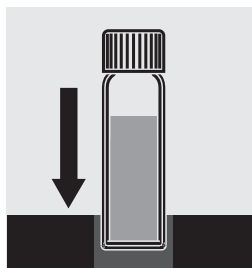
Add the contents of a **Vario Phosphate RGT F10 ml** powder packet and close the cell with the screw cap.



Shake the cell for 10-15 s. A small amount of solid matter remains undissolved.



Allow to react for 2 minutes.



Within 8 minutes after the last reagent was added:  
Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Clean all laboratory glassware with hydrochloric acid (approx. 20 %), then thoroughly rinse with deionized water. Do not use any detergents that contain phosphate!

# Phosphate, ortho

Program no.

**315**



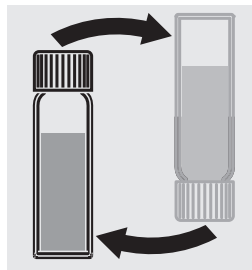
a xylem brand

YSI model no.:	PO4-2 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.06 - 5.00 mg/l PO <sub>4</sub>
	0.02 - 1.63 mg/l PO <sub>4</sub> -P
	Display in mmol/l possible

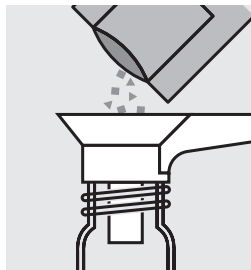
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



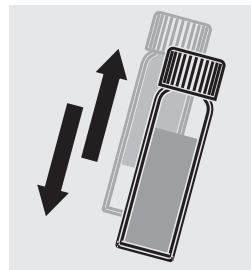
Pipette 5.0 ml of sample into a reaction cell and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



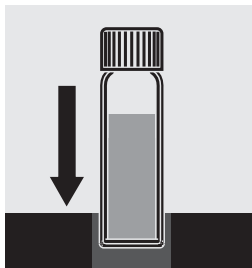
Add the contents of a **VARIO Phos 3 F10** powder pack and close the cell with the screw cap.



To dissolve solids, shake the cell for approx. 10 to 15 seconds. A small amount of solids may remain undissolved.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Phosphate, total

Program no.

**316**



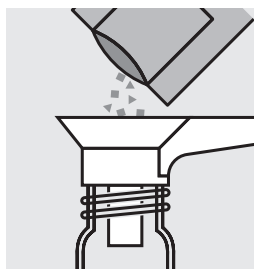
a xylem brand

YSI model no.:	PO4-3 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.06 - 3.50 mg/l PO <sub>4</sub>
	0.020 - 1.141 mg/l PO <sub>4</sub> -P
	Display in mmol/l possible

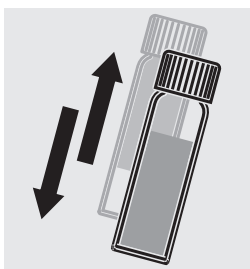
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



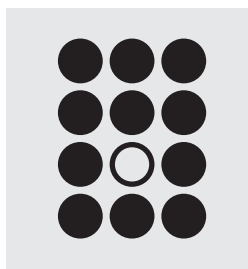
Pipette 5.0 ml of sample into a reaction cell.



Add the contents of a **VARIO Potassium Persulfate F10** powder pack and close the cell with the screw cap.



Shake the cell vigorously to dissolve solids.



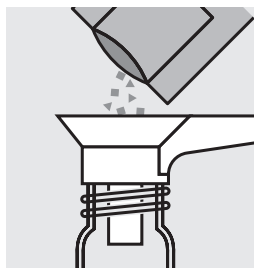
Heat the cell in the thermoreactor for 30 minutes at 120 °C.



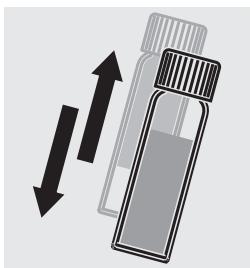
Remove the cell from the thermoreactor and let it cool down in a cell rack.



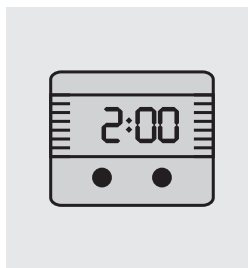
With a pipette add 2.0 ml of 1.54 N sodium hydroxide solution, close the cell with the screw cap and mix the contents by carefully swaying the cell.



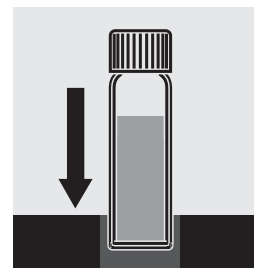
Add the contents of a **VARIO Phos 3 F10** powder pack and close the cell with the screw cap.



To dissolve solids, shake the cell for approx. 10 to 15 seconds. A small amount of solids may remain undissolved.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Phosphate, total

Program no.

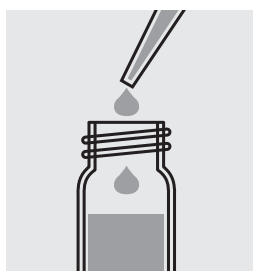
**336**



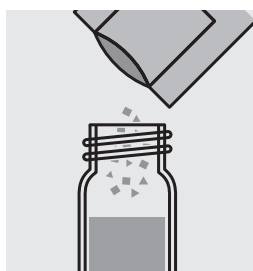
a xylem brand

YSI model no.:	PO4-4 TC
Category:	KT (reaction cell test)
Cell:	16 mm
Measuring range:	0.06 - 3.50 mg/l PO <sub>4</sub>
	0.020 - 1.141 mg/l PO <sub>4</sub> -P
	Display in mmol/l possible

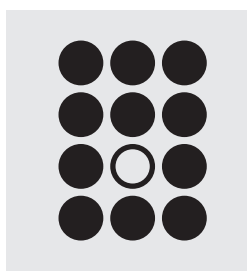
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Pipette 5 ml of sample into a reaction cell and close the cell with the screw cap.



Add the contents of a **Vario Potassium Persulfate F10 ml** powder packet and close the cell with the screw cap.



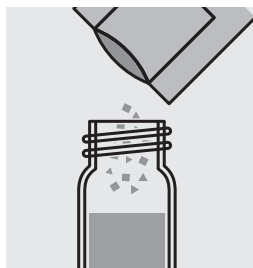
Heat the cell in the thermoreactor for 30 minutes at 120 °C.



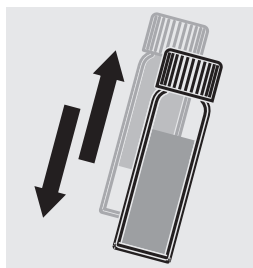
Remove the cell from the thermoreactor and let it cool down in a cell rack.



With a pipette add 2.0 ml **Vario Sodium hydroxide 1.54N**, close the cell with the screw cap and mix.



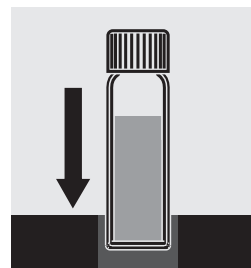
Add the contents of a **Vario Phosphate RGT F10 ml** powder packet and close the cell with the screw cap.



Shake the cell for 10-15 s. A small amount of solid matter remains undissolved.



Allow to react for 2 minutes.



Within 8 minutes after the last reagent was added: Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- Clean all laboratory glassware with hydrochloric acid (approx. 20 %), then thoroughly rinse with deionized water. Do not use any detergents that contain phosphate!



# Silica HR vario

Program no.

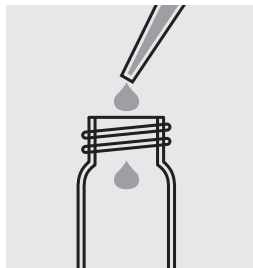
**307**



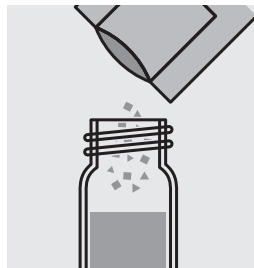
a xylem brand

YSI model no.:	Si-2 TP (HR)
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.7 - 70.0 mg/l SiO <sub>2</sub>
	0.3 - 32.7 mg/l Si
	Display in mmol/l possible

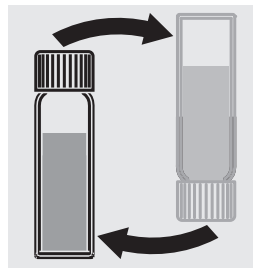
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



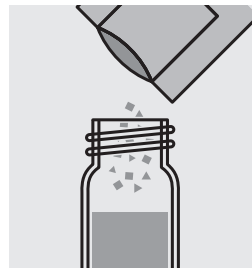
Pipette 10.0 ml of sample into the empty cell.



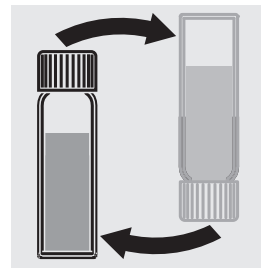
Add the contents of a **VARIO Silica HR Molybdate F10** powder pack and close the cell with the screw cap.



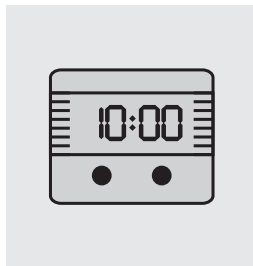
Mix the contents by carefully swaying the cell.



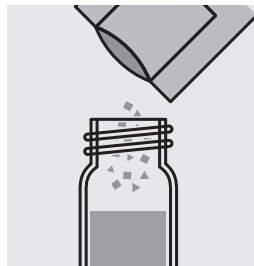
Add the contents of a **VARIO Silica HR Acid Rgt F10** powder pack and close the cell with the screw cap.



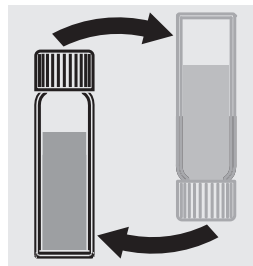
Mix the contents by carefully swaying the cell.



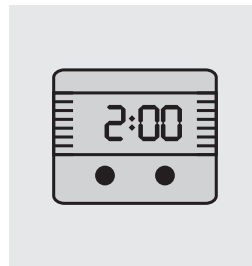
Allow to react for 10 minutes.



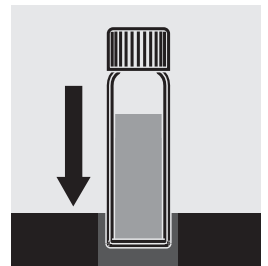
Add the contents of a **VARIO Silica Citric Acid F10** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The sample temperature has to be between 15 and 25 °C.

# Silica HR vario

Program no.

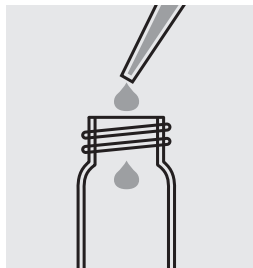
**308**



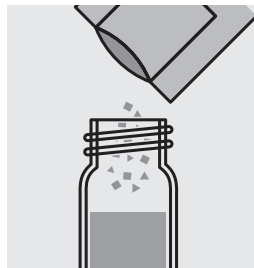
a xylem brand

YSI model no.:	Si-2 TP (HR)
Category:	RT (reagent test)
Cell:	16 mm
Measuring range:	1 - 100 mg/l SiO <sub>2</sub>
	0.5 - 46.7 mg/l Si
	Display in mmol/l possible

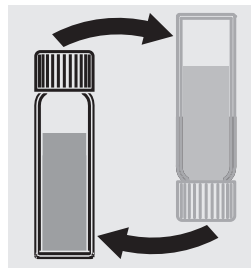
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Pipette 10.0 ml of sample into the empty cell.



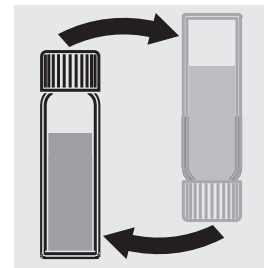
Add the contents of a **VARIO Silica HR Molybdate F10** powder pack and close the cell with the screw cap.



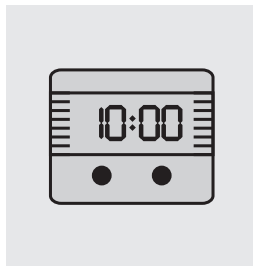
Mix the contents by carefully swaying the cell.



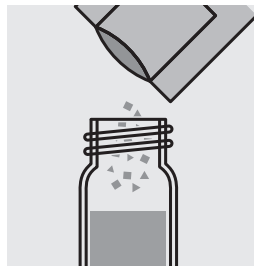
Add the contents of a **VARIO Silica HR Acid Rgt F10** powder pack and close the cell with the screw cap.



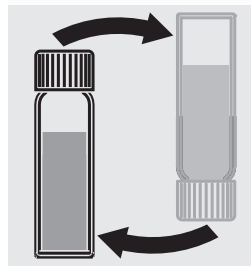
Mix the contents by carefully swaying the cell.



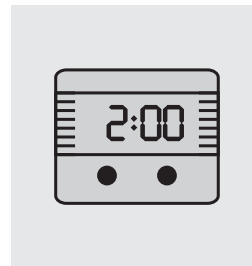
Allow to react for 10 minutes.



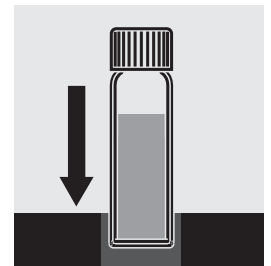
Add the contents of a **VARIO Silica Citric Acid F10** powder pack and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The sample temperature has to be between 15 and 25 °C.

# Silica HR vario

Program no.

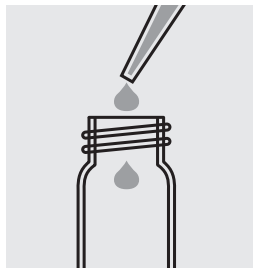
**337**



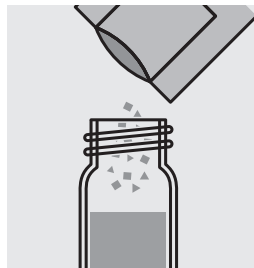
a xylem brand

YSI model no.:	Si-3 TP (HR)
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	1 - 75 mg/l SiO <sub>2</sub>
	0.5 - 35.1 mg/l Si
	Display in mmol/l possible

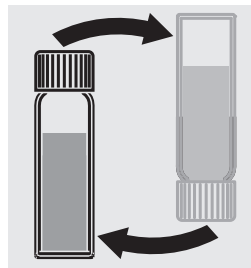
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Pipette 25.0 ml of sample into the empty cell.



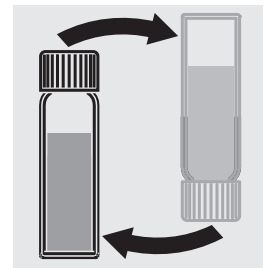
Add the contents of a **VARIO Silica HR Molybdate F25** powder packet and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



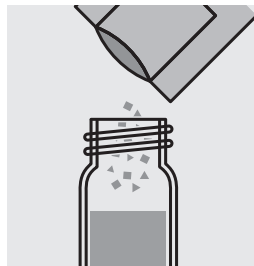
Add the contents of a **VARIO Silica HR Acid Rgt F25** powder packet and close the cell with the screw cap.



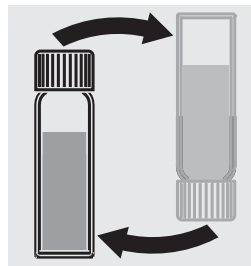
Mix the contents by carefully swaying the cell.



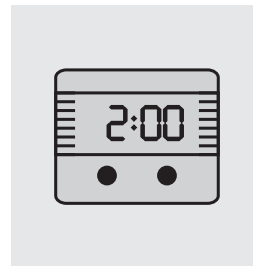
Allow to react for 10 minutes.



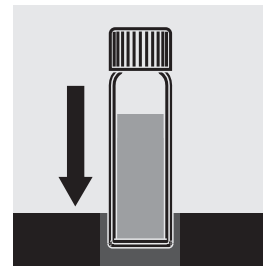
Add the contents of a **VARIO Silica HR Citric Acid F25** powder packet and close the cell with the screw cap.



Mix the contents by carefully swaying the cell.



Allow to react for 2 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The temperature of the samples must be in the range 15 ... 25 °C.

# Silica LR vario

Program no.

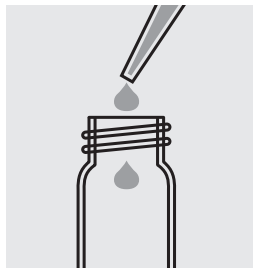
**321**



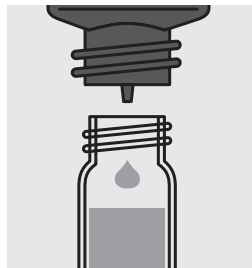
a xylem brand

YSI model no.:	Si-1 TP (LR)
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	0.01 - 1.60 mg/l SiO <sub>2</sub>
	0.005 - 0.748 mg/l Si
	Display in mmol/l possible

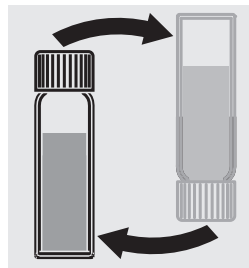
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



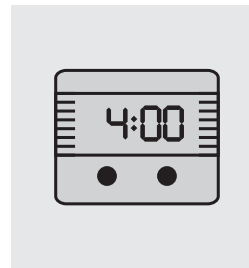
Pipette 10.0 ml of sample into the empty cell.



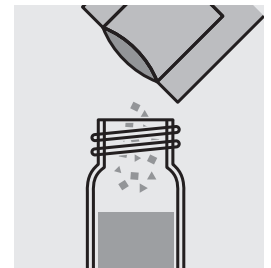
Add 15 drops of **Vario Molybdate 3 Reagent Solution** and close the cell with the screw cap.



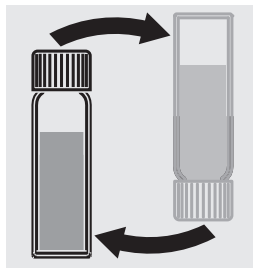
Mix the contents by carefully swaying the cell.



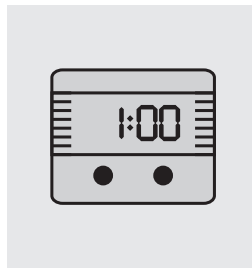
Allow to react for 4 minutes (temperature dependence, see note).



Add the contents of a **VARIO Silica Citric Acid F10** powder pack and close the cell with the screw cap.



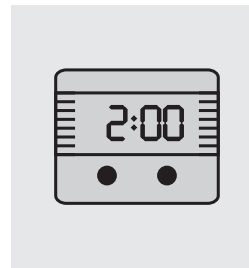
Mix the contents by carefully swaying the cell.



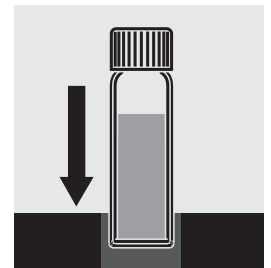
Allow to react for 1 minute (temperature dependence, see note).



Add the contents of a **VARIO LR Silica Amino Acid F F10** powder pack, close the cell with the screw cap and mix.



Allow to react for 2 minutes. If SiO<sub>2</sub> is present in the sample, the solution becomes blue.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- The above mentioned reaction times are valid at room temperature (20 °C). At 10 °C the reaction time has to be doubled, at 30 °C it has to be halved.

# Sulfate vario

Program no.

**322**



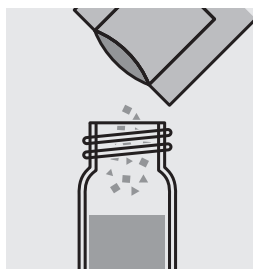
a xylem brand

YSI model no.:	SO4-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	2 - 70 mg/l SO <sub>4</sub>
	Display in mmol/l possible

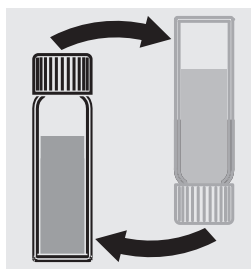
**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



Pipette 10.0 ml of sample into the empty cell.



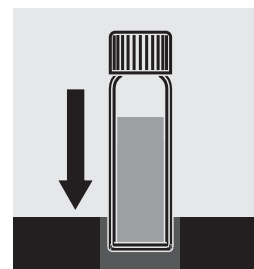
Add the contents of a **VARIO SULPHA 4 F10** powder pack and close the cell with the screw cap.



Mix the contents by swaying. If sulfate is present in the sample, a white turbidity occurs.



Allow to react for 5 minutes.



Insert the cell in the photometer cell shaft and start measurement.

## Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.

# Sulfate vario

Program no.

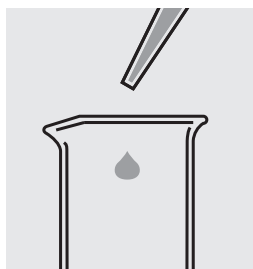
**338**



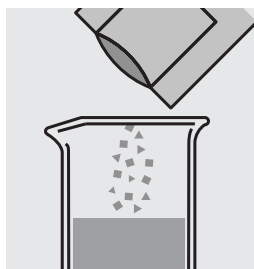
a xylem brand

YSI model no.:	SO4-1 TP
Category:	RT (reagent test)
Cell:	28 mm
Measuring range:	2 - 70 mg/l SO <sub>4</sub>
	Display in mmol/l possible

**Note:** Before using the test with your photometer for the first time, determine the reagent blank value.



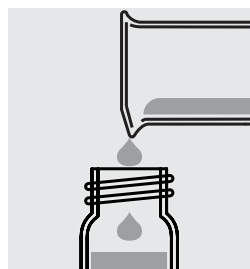
Pipette 25.0 ml of sample into an empty beaker.



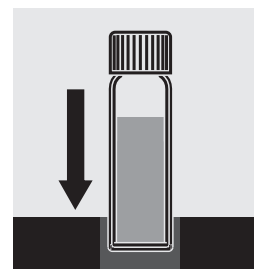
Add the contents of a **VARIO SO4-1 TP Sulfa 4 F25 ml** powder pack and dissolve them by stirring.



Allow to react for 5 minutes.



Fill an empty cell with the prepared sample and close it with the screw cap.



Insert the cell in the photometer cell shaft and start measurement.

### Notes:

- We recommend to determine a new reagent blank value (deionized water instead of sample) for each test package started.
- If any sulfate is present, a white turbidity develops.
- Powder sedimented at the bottom does not affect the measurement result.

### 3 Contact Information

#### 3.1 Ordering & Technical Support

Telephone: (800) 897-4151  
(937) 767-7241  
Monday through Friday, 8:00 AM to 5:00 PM ET

Fax: (937) 767-1058

Email: [environmental@ysi.com](mailto:environmental@ysi.com)

Mail: YSI Incorporated  
1725 Brannum Lane  
Yellow Springs, OH 45387  
USA

Internet: [www.ysi.com](http://www.ysi.com)

When placing an order please have the following information available:

YSI account number (if available)	Name and Phone Number
Model number or brief description	Billing and shipping address
Quantity	Purchase Order or Credit Card

#### 3.2 Service Information

YSI has authorized service centers throughout the United States and Internationally. For the nearest service center information, please visit [www.ysi.com](http://www.ysi.com) and click 'Support' or contact YSI Technical Support directly at 800-897-4151.

When returning a product for service, include the Product Return form with cleaning certification. The form must be completely filled out for an YSI Service Center to accept the instrument for service. The Product Return form may be downloaded at [www.ysi.com](http://www.ysi.com) and clicking on the 'Support' tab.

# Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're 12,500 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

**For more information on how Xylem can help you, go to [www.xylem.com](http://www.xylem.com)**



a **xylem** brand

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