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# **GANIMEDE P and GANIMEDE N laboratory machine**

User manual

12/2021, Edition 2



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# Section 1 Technical data

Subject to change.

Ganimede P analysis unit	
Type	Ganimede P for the automatic serial analysis of orthophosphate and total phosphate in the analytical laboratory, consisting of analysis unit, sample changer and control unit
Photometric method	By means of ammonium molybdate in accordance with DIN EN 1189 of December 1996
Total P digestion	Rapid digestion at 150 °C and 6 bar
Sample pH	pH 2 – 11
Measurement range	0.01 – 3.8 mg/L PO <sub>4</sub> -P
Measurement accuracy	±0.03 mg/L at 1 mg/L
Measurement wavelength	880 nm
Calibration	2-point calibration and 10-point calibration
Processing time per sample	4 minutes for single determination
Ganimede N analysis unit	
Type	Ganimede N for the automatic serial analysis of inorganically and organically bound nitrogen in the analytical laboratory, consisting of analysis unit, sample changer and open-loop control unit
Photometric method	By means of UV self-absorption at 210 nm and 228 nm in accordance with DIN EN ISO 11 905-1
Digestion	Alkaline digestion at 150 °C and 8 bar
Measurement range	Low measurement range 0.5 – 30 mg/L TN <sub>B</sub> High measurement range 30 – 150 mg/L TN <sub>B</sub>
Reproducibility of the measurement results	< 2 % at 15 mg/L
Carryover	< 1 % within a measurement range
Measurement wavelengths	210 nm and 228 nm
Calibration	2-point calibration and multiple-point calibration (2–11 measurement points)
Processing time per sample	7 minutes for single determination
Sample changer	
Sample tray	Sample tray for 36 × 25 mL or Sample tray for 53 × 15 mL Tray diameter 240 mm
Environmental conditions	
Temperature range	15 – 35 °C
Relative humidity	< 75 %, non-condensing
Air pressure	75 – 106 kPa
Environmental conditions	Indoor use
Pollution degree	2
Altitude	2000 m

## Technical data

Equipment properties		
Particle mobility	Analysis unit	According to DIN 38402; the prerequisites of EN 1484 TOC of > 100 µm are significantly exceeded
	Sample changer	According to DIN 38402; the prerequisites of EN 1484 TOC of > 100 µm are significantly exceeded with 1 mm (sample needle)
Tube material	Analysis unit	Ismaprene, thermoplastic elastomer on polypropylene basis, almost opaque beige, suitable for the food and medical sectors.
Display	Open-loop control unit	5.7-inch color display
Power connector	Analysis unit	230 V +5%/-15%, 50 Hz
	Sample changer	100–240 V, +5%/-15%, 50/60 Hz
	Open-loop control unit	External power supply: Input: 100–240 VAC ±10%; 50/60 Hz Output: 15 VDC, 2 A Or rechargeable battery operation: Rechargeable battery pack: 15 V, 6 rechargeable batteries, type HHR-200A
Protection class	Analysis unit	Class I
	Sample changer	Class I
Housing protection rating	Analysis unit	IP 20
	Sample changer	IP 20
	Open-loop control unit	IP 20
Overvoltage category	Analysis unit	II
	Sample changer	II
Power consumption	Analysis unit	150 VA
	Sample changer	48 VA
	Open-loop control unit	20 VA
Solution class	Sample changer	1
Dimensions (W×H×D)	Analysis unit	370 × 710 × 360 mm (14.57 × 27.95 × 14.17 inches)
	Sample changer	280 × 210 × 390 mm (11.02 × 8.27 × 15.35 inches)
	Open-loop control unit	65 × 245 × 190 mm (2.56 × 9.65 × 7.48 in.)
Weight	Analysis unit	40 kg
	Sample changer	5 kg (packed)
	Open-loop control unit	2.7 kg (packed)

Other		
Interface	Analysis unit	2 x IR interfaces to the open-loop control unit on the front side 1 x RS 232 (9-pole Sub-D socket) for sample changer 2 x RS 232 C for PC/LIMS 1 x Centronics for printer
	Sample changer	RS 232 (9-pole Sub-D connector) for analysis unit
	Open-loop control unit	Wireless connection to LIMS or printer for the transfer of the results with IR interfaces Serial RS 232 interface for PC or CCD scanner 8-pole round socket for PS/2 compact keyboard
Certification		CE compliant



### **⚠ WARNING**

It is forbidden to remove, bypass or override safety devices, safety functions and monitoring devices.

### **⚠ WARNING**

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and totally excludes such damages as permitted under applicable laws.

The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

## 2.1 Safety information

Read this entire manual carefully before unpacking, setting up or operating the device. Pay attention to all hazard and warning notes. Failure to do so could result in serious injury to the operator or damage to the device.

To prevent damage to or impairment of the device's protection equipment, the device may only be used or installed as described in this manual.

### 2.1.1 Hazard notes in this manual

#### **⚠ DANGER**

Indicates a potentially or imminently hazardous situation that, if not avoided, can result in death or serious injury.

#### **⚠ WARNING**

Indicates a potentially or imminently dangerous situation that, if it is not avoided, can lead to death or to serious injuries.

#### **⚠ CAUTION**

Indicates a possible dangerous situation that can have minor or moderate injuries as the result.

#### **NOTICE**

Indicates a situation that, if it is not avoided, can lead to damage to the device. Information that requires special emphasis.

*Note: Information that supplements points in the main text.*

### 2.1.2 Warning labels

Read all labels and tags attached to the device. Failure to do so could result in personal injury or damage to the device.



This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.

## General information

	This symbol may be found on an enclosure or barrier within the product and indicates a risk of electric shock and/or death by electrocution.
	If shown on the device, this symbol indicates the location of a fuse or current limiter.
	If shown on the device, this symbol indicates a component that can be hot and must not be touched without precautionary measures.
	This symbol indicates that a UV lamp is used in the device.
	If shown on the device, this symbol indicates dangerous chemical substances. The handling of chemicals and the execution of maintenance on chemical feed equipment of the device may only be carried out by qualified personnel who are trained to work with chemicals.
	If shown on the device, this symbol indicates dangerous places on the device that can result in crushing or surface damage. Only operate the device with closed safety covers.
	Electrical equipment marked with this symbol may no longer be disposed of in unsorted European domestic or public disposal systems after 12 August 2005. In conformity with the applicable provisions, consumers in the EU must return old electrical equipment to the manufacturer for disposal from this date. This is at no charge to the user. <b>Note:</b> Contact the manufacturer or supplier for instructions on how to return end-of-life devices, manufacturer-supplied electrical accessories and all auxiliary items for proper disposal.
	When carrying or transporting the instrument components or instrument and if the total weight is more than 18 kg, make sure that suitable lifting equipment is used and/or that the instrument components or instrument are/is carried by two people.

### 2.1.3 Chemical and biological safety

## ⚠ DANGER

Potential danger with contact with chemical/biological substances.

Working with chemical samples, standards and reagents can be dangerous. Make yourself familiar with the necessary safety procedures and the correct handling of the chemicals before the work and read and follow all relevant safety data sheets.

Normal operation of this instrument may involve the use of hazardous chemicals or biologically harmful samples.

- Before handling these substances observe all danger notes and safety information printed on the containers of the original solutions and in the safety data sheet.
- Dispose of all consumed solutions in accordance with the national regulations and laws.
- Select the type of protective equipment accordingly

### 2.1.4 Safety around source lamps

The source lamps are operated at high temperatures.

To avoid the risk of electrocution, make sure the instrument is disconnected from the power source before changing the lamps.

**⚠ CAUTION**

Health hazard caused by ozone.  
Hazardous levels of ozone can be generated when the UV lamp is not cooled.

**⚠ WARNING**

Health risk due to UV light.  
UV light can cause irritation to the eyes and skin. Protect eyes and skin from direct exposure to UV light.  
Do not look directly at an energized lamp without UV safety glasses.

**⚠ CAUTION**

Burn hazard. Allow the lamp(s) to cool for at least 30 minutes before maintaining/replacing them.

## 2.2 Product overview

**⚠ WARNING**

The instrument may not be used in dangerous environments.  
The manufacturer and its suppliers reject any express or indirect guarantee for use with high-risk activities.

**NOTICE**

Any use other than use in accordance with requirements defined in the user manual leads to the loss of the warranty claims and can lead to personal injury and property damage, for which the manufacturer assumes no liability.

### 2.2.1 Product overview of the Ganimede P

In combination with the ready-to-use GaniChem P GCA 100 reagent kit, the Ganimede P enables a rapid and automated serial analysis of  $\text{PO}_4$  and  $\text{PO}_4\text{-P}$  as total phosphate or orthophosphate in accordance with DIN EN 1189 of December 1996.

The digestion of the total phosphate takes place as high-temperature digestion.

The phosphate content is determined as phosphorus molybdenum blue at 880 nm.

### 2.2.2 Product overview of the Ganimede N

In combination with the ready-to-use GaniChem N GCA 200 reagent kit, the Ganimede N enables a quick and automated serial analysis of inorganically and organically bound nitrogen in aqueous samples in accordance with DIN EN ISO 11 905-1.

Inorganically and organically bound nitrogen is oxidized to nitrate with peroxodisulfate by means of alkaline digestion at 150 °C and 8 bar.

The nitrate content is photometrically measured by means of UV self-absorption in a differential measurement at 210 nm and 228 nm.

### 2.3 Scope of delivery

Please check that the order is complete. If anything is missing or damaged, please contact the manufacturer or retailer.

- Sample changer
- Open-loop control unit
- Analysis unit P or analysis unit N

### 2.4 Front and rear view

#### 2.4.1 Sample changer

Figure 1 Front view of sample changer



1	Sample changer arm	5	Reset button
2	Sample needle	6	Sample tray (here, 36 positions for 30-mL sample containers; a sample tray with 53 positions for 18-mL sample containers is optionally available)
3	Rinsing vessel for sample needle		
4	Sample containers	7	Light-emitting diode

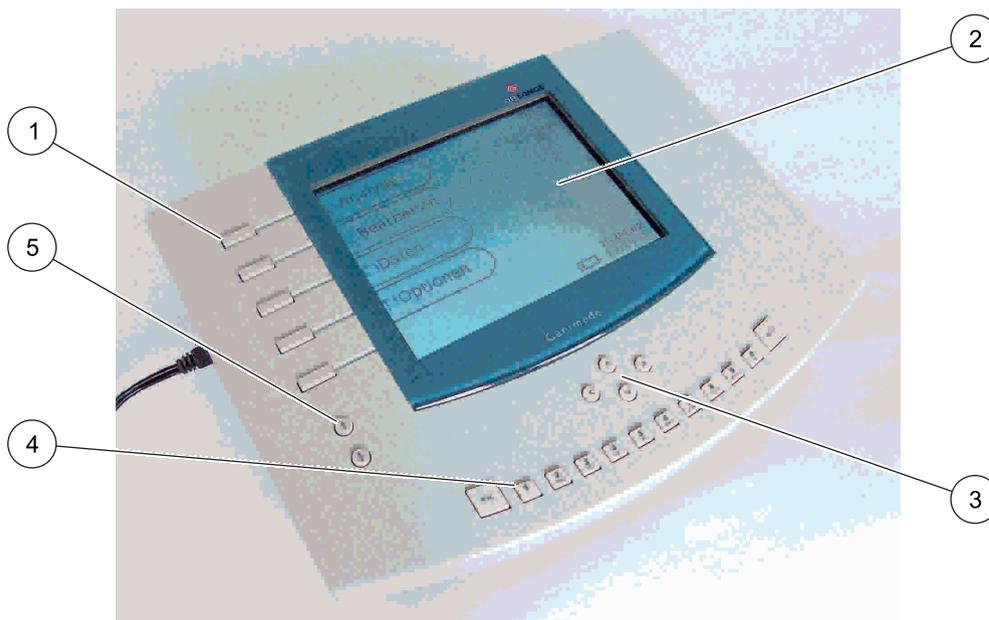
Figure 2 Rear view of sample changer



1 Sample needle	6 Suction tube for rinse water
2 Fuse (2× T 1 A L, 250 VAC)	7 Drain hose
3 Power switch	8 Type plate
4 Power connector	9 Rinsing vessel for sample needle
5 Interface for the analysis unit connection cable	

### 2.4.2 Open-loop control unit

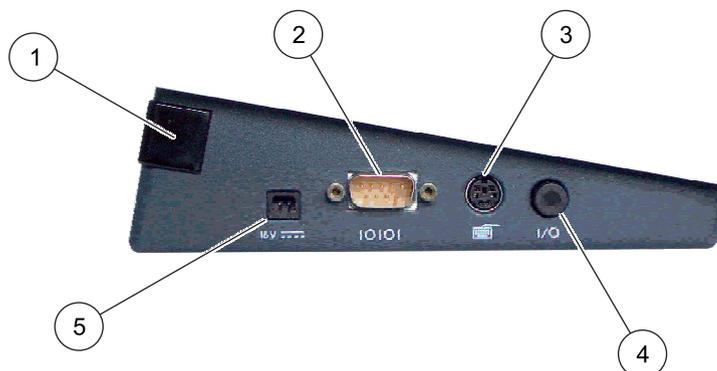
Figure 3 Front view of the open-loop control unit



1 Shortcut keys	4 Alphanumeric keys
2 Graphical display	5 Menu keys
3 Cursor keys	

## General information

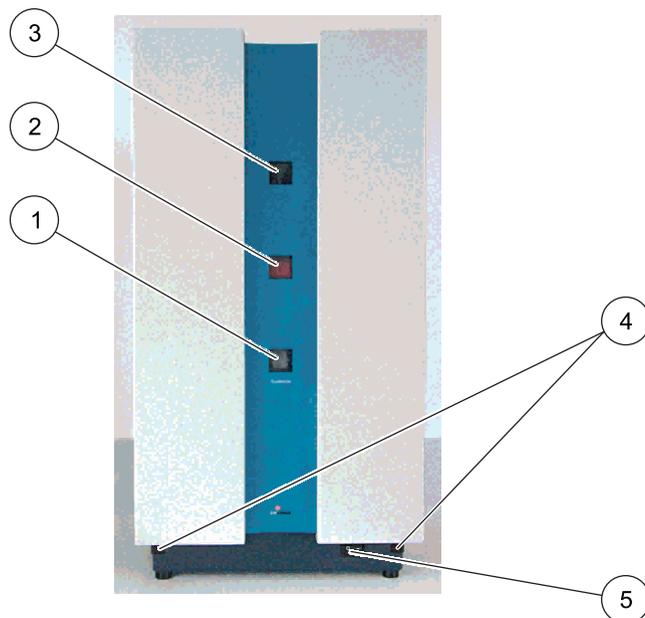
**Figure 4 Detailed view of the open-loop control unit**



1 IR interface	4 Power switch
2 RS 232 interface for PC and hand-held scanner	5 Power connector
3 Interface for compact keyboard	

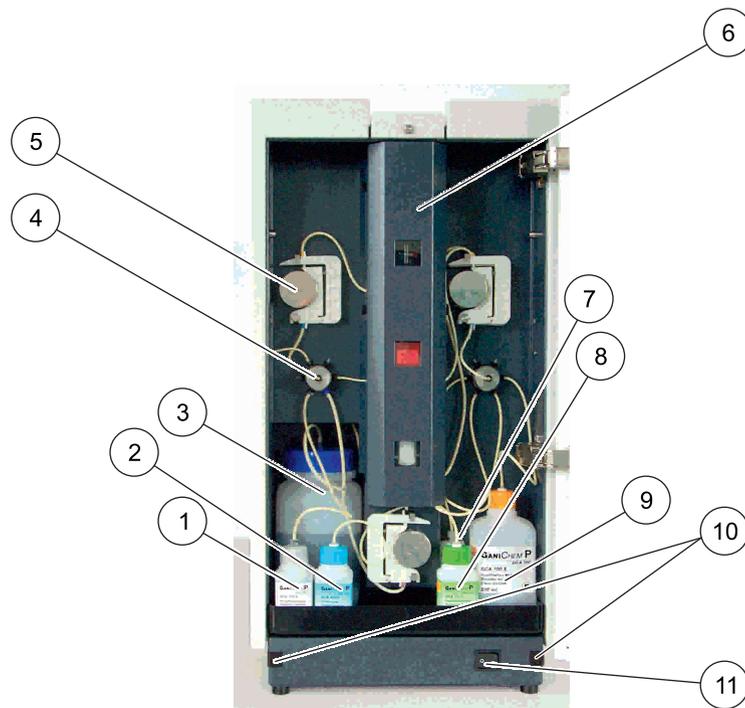
### 2.4.3 Analysis unit

**Figure 5 Front view of analysis unit**



1 Analysis cuvette monitoring window	4 IR interfaces
2 LCD display of the current sample	5 Power switch
3 Digestion cuvette monitoring window	

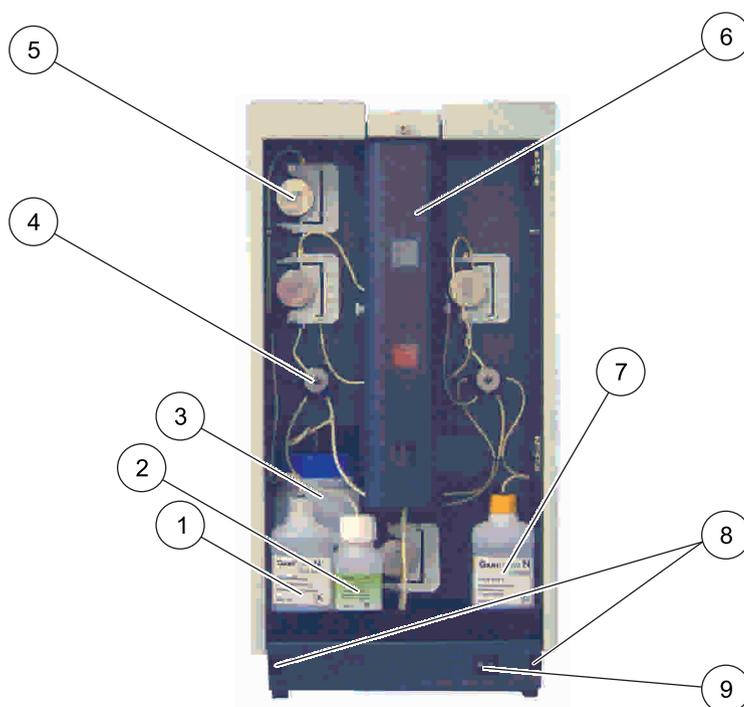
Figure 6 Interior view of analysis unit P



1	Digestion solution A	7	Acid solution D
2	Color solution B	8	Reduction solution C
3	Waste bottle	9	Distilled water
4	Valve	10	IR interfaces
5	Pump	11	Power switch
6	Safety cover		

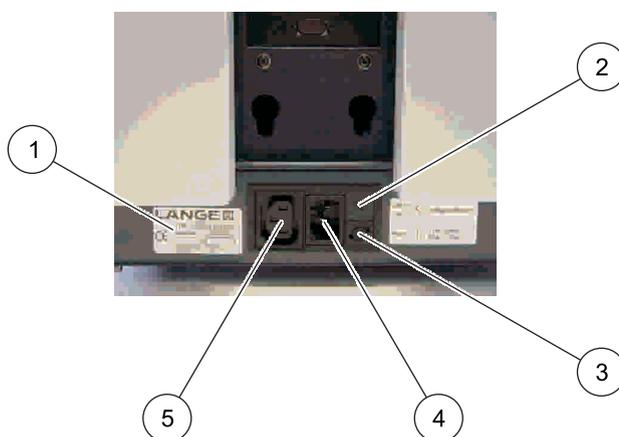
## General information

**Figure 7** Interior view of analysis unit N



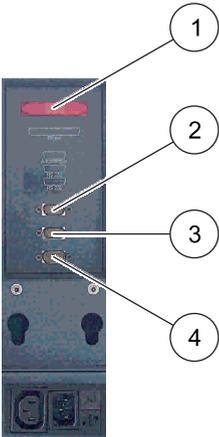
1	Acid solution A	6	Safety cover
2	Digestion solution B	7	Distilled water
3	Waste bottle	8	IR interfaces
4	Valve	9	Power switch
5	Pump		

**Figure 8** Analysis unit power connector



1	Type plate	4	Power connector
2	230 V/115 V voltage selector switch	5	Sample changer power connector
3	T3A L fuse, 250 V		

Figure 9 Analysis unit interfaces



1	Printer interface	3	RS 232 socket
2	Sample changer interface	4	RS 232 connector



## Section 3 Installation

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### 3.1 Installation of the components

#### **⚠ WARNING**

The instrument may not be used in dangerous environments.  
The manufacturer and its suppliers reject any express or indirect guarantee for use with high-risk activities.

#### **NOTICE**

Any use other than use in accordance with requirements defined in the user manual leads to the loss of the warranty claims and can lead to personal injury and property damage, for which the manufacturer assumes no liability.

Unpack all supplied parts carefully, as they are highly sensitive in part to shock and impact. Read the user manual prior to installation and proceed exactly as described.

#### 3.1.1 Operating environment

Observe the following points to allow the instrument to function normally and give a long operating life.

- Position the instrument securely on a flat surface taking care to remove any objects from under the device.
- The ambient temperature must be 15 °C to 35 °C (60 °F to 95 °F).
- The relative humidity must be lower than 75% (no condensate formation).
- A minimum clearance of 15 cm (5.9inches) must be ensured above and on all sides of the device; this allows the air to circulate and prevents overheating of the electric components. The dosage arm of the sample changer must be able to move freely.
- Do not operate or store the instrument in extremely dusty, humid or wet locations.
- Make sure that no liquids enter the instrument and immediately wipe away any liquids that contact the instrument.
- Protect the instrument against vibrations, direct sunlight, corrosive gases as well as strong magnetic and/or electric fields.
- Only use genuine replacement parts and accessories.
- The instrument must be serviced by the manufacturer's service department at the prescribed intervals.

#### 3.1.2 Installation of the devices

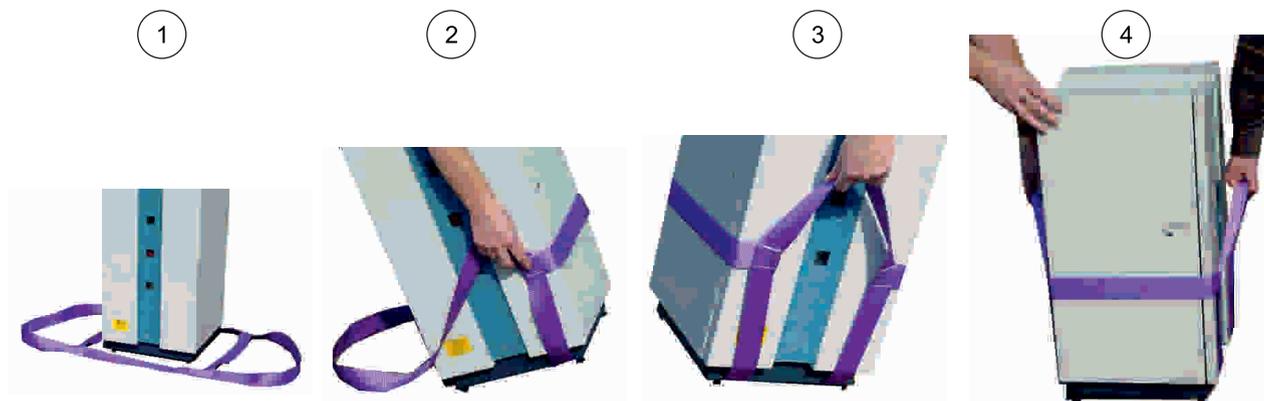
#### **⚠ WARNING**

When carrying or transporting the instrument components or instrument and if the total weight is more than 18 kg, make sure that suitable lifting equipment is used and/or that the instrument components or instrument are/is carried by two people.

The carrying strap provided must be used to be able to carry the analysis unit safely over short distances.

## Installation

Figure 10 Use of the carrying strap



<b>1</b> Slip the carrying strap over the analysis unit as shown in the illustration.	<b>3</b> Tightly pull the carrying belt upwards at the front and back sides.
<b>2</b> Carefully tip the analysis unit to the side and guide the outer parts of the carrying strap behind the feet of the unit. Proceed in the same way on the opposite side.	<b>4</b> The analysis unit must now be transported safely over a short distance by two people.

1. Place the analysis unit on a stable and level tabletop. Level out any unevenness with the rear adjustable feet.
2. Remove the transport locking screws on the bottom of the sample changer. To do so, tip the sample changer to the side and remove the screws above the corresponding sign.
3. Position the sample changer to the left of the analysis unit on a stable and level tabletop.
4. Place the open-loop control unit near (approx. 0.5 m 1.64 ft) to the analysis unit.

**Note:** Communication between the analysis unit and the open-loop control unit takes place via IR interfaces.

### 3.1.3 Installation of the cables

#### DANGER

Danger of an electric shock.

Use only the supplied power cable.

If another power cable without a protective earth contact is used or if the sample changer is connected to a mains connection without a ground connection, there is the danger of an electric shock for the operator and of the destruction of the device.

#### WARNING

Electrical and fire hazards.

Use only the supplied power cable.

Only qualified experts may perform the tasks described in this section of the manual, while adhering to all locally valid safety regulations.

#### WARNING

Removable power cables must not be replaced with inadequately dimensioned power cables.

#### NOTICE

Use only an earthed socket for the connection of this device to the power supply.

If you are not sure if the socket is earthed, have this checked by a qualified electrician.

The power plug serves in addition to the power supply to isolate the device quickly from the mains where necessary.

This is recommended when the instrument is not used for a long time, and can prevent potential dangers in the event of a fault.

Therefore, make sure that socket to which the device is connected is easy to reach by each user at all times.

1. Select the appropriate mains voltage (230 V or 115 V) for the region with the voltage selector switch on the rear side of the analysis unit.
2. Connect the analysis unit to an earthed mains socket with the power cable (230 volts +5 %/-15 %/50 Hz).
3. Optionally, connect a printer or PC to the corresponding interface of the analysis unit
4. Connect the SAMPLER interface of the analysis unit to the sample changer interface with the connection cable (XLH917).
5. Connect the sample changer to the "sample changer power connector" on the analysis unit with the power cable.

**Note:** Use only the supplied power cable.

6. Connect the external power supply unit of the open-loop control unit to an earthed mains socket (230 volt +5 %/-15 %/50 Hz).

**Note:** Use only the external LZV563 power supply unit.

**Note:** The open-loop control unit is equipped for rechargeable battery operation. The charge status is indicated permanently on the display. A red battery symbol indicates a weak rechargeable battery. The battery symbol is shown in black when the rechargeable battery is being charged. The fully charged rechargeable battery enables an operating time of approximately 2.5 hours.

7. Optionally, connect a hand-held scanner or a keyboard to the corresponding interface of the open-loop control unit.

### 3.1.4 Installation of the tubes

#### **DANGER**

Potential danger with contact with chemical/biological substances.

Working with chemical samples, standards and reagents can be dangerous. Make yourself familiar with the necessary safety procedures and the correct handling of the chemicals before the work and read and follow all relevant safety data sheets.

#### **WARNING**

Risk of injury to the eyes, skin and respiratory tract

During work with chemicals and/or solvents, it is absolutely necessary to pay attention to the relevant accident prevention regulations and to wear suitable personal protective equipment for the eyes, face, hands and body, and/or respiratory protection.

Make sure that the system is only unpacked, assembled, connected and operated by qualified and trained personnel.

Make sure that the waste container and the drain hose are always positioned lower than the sample changer. The rinsing fluid must be able to flow unimpeded.

Make sure that the tubes are not kinked or jammed.

Check the capacity of the waste bottles constantly.

#### 3.1.4.1 Installation of the tubes for the Ganimede P

1. Install all tubes of the analysis unit in accordance with [Figure 11 Tube plan for analysis unit P, page 24](#).
2. Screw the large blue lid onto the empty waste bottle (1500 mL).  
*Note: The waste bottle can take the reagent and sample waste from 100 individual determinations.*
3. Connect reagents GCA 100 with the corresponding lids of the same color.
4. Install sample tube A.  
To do so, lead the free end of sample tube A out through the left-hand side of the analysis unit housing.  
Connect the upper end of the sample needle with sample tube A.
5. Insert the sample needle into the guide of the sample changer arm.  
*Note: The sample needle must not reach the bottom of the sample container when magnetic rods are used.*
6. Install the suction tube for the rinse water of the sample needle.  
To do so, connect the end with a screw thread to the permanently mounted tube on the rear side of the sample changer.  
Insert the free end of the suction tube into a bottle of distilled water.  
*Note: It is essential that the needle rinser is connected in order to make sure that a sample batch drains faultlessly. Sufficient rinse water (distilled water) must be available at all times.*

7. Install the drain hose.

Attach one end of the suction tube to the white tube connection on the rear side of the sample changer.

Insert the free end of the drain hose into a suitable waste container.

**Note:** *The waste container and the drain hose must always be positioned lower than the sample changer. The rinsing fluid must be able to drain unimpeded; the drain hose must not be kinked! Check the capacity of the waste bottle.*



Table 1 Tube overview for analysis unit P

Identification	Color in tube plan	Length	Dia-meter	Colored adapter	Connected:
A: (included in the scope of delivery of the sample changer)	Black	400 mm	2.67 mm	-	Sample changer sample needle -> Left-hand side of the analysis unit housing -> Valve 1 connection f
B	Red	140 mm	2.67 mm	-	Valve 1 connection b -> Left-hand analysis cuvette
C	Pink	380 mm	3.04 mm	Yellow/blue	Valve 1 connection g -> Pump 1 -> Digestion cuvette
D	Gray	300 mm	3.04 mm	-	Digestion solution A -> Valve 1 connection d
E	Green	530 mm	3.2 mm	Yellow/blue	Right-hand analysis cuvette -> Pump 2 -> Valve 2 connection g
F	Blue	450 mm	3.2 mm	-	Color solution B -> Valve 2 connection e
G	Green	300 mm	3.04 mm	-	Reduction solution C -> Valve 2 connection c
H	Orange	180 mm	3.04 mm	-	Distilled water -> Valve 2 connection b
J	Black	550 mm	3.53 mm	Gray/green/green	Analysis cuvette -> Pump 3
K	Purple	500 mm	4.17 mm	Gray/black/purple	Lower analysis cuvette -> Pump 4 -> T-piece -> Valve 1 connection c and -> Waste bottle
L	Black	300 mm	3.04 mm	-	Acid solution D -> Valve 2 connection d

### 3.1.4.2 Installation of the tubes for the Ganimede N

1. Install all tubes of the analysis unit in accordance with [Figure 12 Tube plan for analysis unit N, page 27](#).
2. Screw the large blue lid onto the empty waste bottle (1500 mL).  
*Note: The waste bottle can take the reagent and sample waste from 100 individual determinations.*
3. Connect the GCA 200 reagents with the corresponding lids of the same color.
4. Install sample tube A.  
To do so, lead the free end of sample tube A out through the left-hand side of the analysis unit housing.  
Connect the upper end of the sample needle with sample tube A.
5. Insert the sample needle into the guide of the sample changer arm.  
*Note: The sample needle must not reach the bottom of the sample container when magnetic rods are used.*

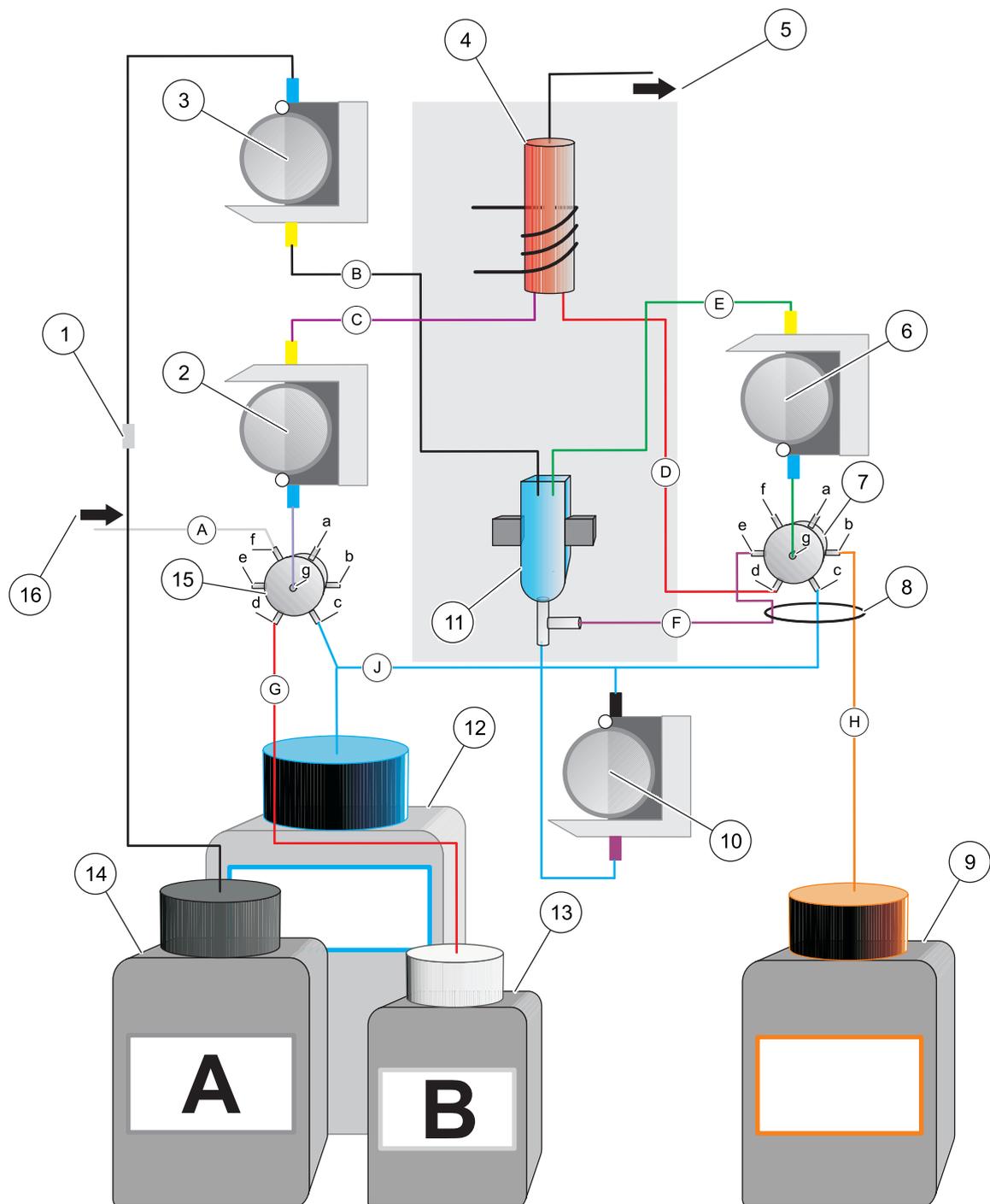
6. Install the suction tube for the rinse water of the sample needle.  
To do so, connect the end with a screw thread to the permanently mounted tube on the rear side of the sample changer.  
Insert the free end of the suction tube into a bottle of distilled water.

**Note:** *It is essential that the needle rinser is connected in order to make sure that a sample batch drains faultlessly. Sufficient rinse water (distilled water) must be available at all times.*

7. Install the drain hose.  
Attach one end of the suction tube to the white tube connection on the rear side of the sample changer.  
Place the free end of the drain hose in a suitable waste container.

**Note:** *The waste container and the drain hose must always be positioned lower than the sample changer. The rinsing fluid must be able to drain unimpeded; the drain hose must not be kinked! Check the capacity of the waste bottle.*

Figure 12 Tube plan for analysis unit N



1	Tube routing	9	Distilled water
2	Pump 1	10	Pump 4
3	Pump 3	11	Analysis cuvette
4	Digestion cuvette	12	Waste bottle
5	Overpressure discharge	13	Digestion solution B
6	Pump 3	14	Acid solution A
7	Valve 2	15	Valve 1
8	O-ring for tube routing	16	Sample tube 1 sample feed coming from the sample changer

**Table 2 Tube overview for analysis unit N**

Identification	Color in tube plan	Length	Dia-meter	Colored adapter	Connected:
A: (included in the scope of delivery of the sample changer)	Gray	400 mm	2.67 mm	-	Sample changer sample needle -> Left-hand side of the analysis unit housing -> Valve 1 connection f
B	Black	950 mm	3.2 mm	Yellow/blue	Acid solution A -> Pump 3 -> Left-hand analysis cuvette
C	Purple	380 mm	3.2 mm	Blue/yellow	Valve 1 connection g -> Pump 1 -> Digestion cuvette
D	Red	215 mm	2.7 mm	Blue/yellow	Digestion cuvette -> Valve 2 connection d
E	Green	550 mm	3.2 mm	Gray	Valve 2 connection g -> Pump 2 -> Right-hand analysis cuvette
F	Purple	230 mm	3.5 mm	-	Valve 2 connection e -> Lower right-hand analysis cuvette (air)
G	Red	220 mm	3.0 mm	-	Digestion solution B -> Valve 1 connection d
H	Orange	220 mm	3.0 mm	-	Distilled water -> Valve 2 connection b
J	Blue	250 mm	3.0 mm	Black/purple/gray	Valve 2 connection c -> T-piece -> Pump 4 -> Lower analysis cuvette -> T-piece -> Waste bottle -> Valve 1 connection c

### 3.1.5 Installation of the sample tray

#### **⚠ WARNING**

Possible risk of injury due to the sample needle.  
Make sure that the system is only installed by qualified and trained personnel.

The position designations for the sample containers are printed next to the sampling openings.

1. Make sure that the sample changer is switched off.
2. Load the sample containers with at least 15 mL of homogenized samples and zero or standard solution. Add magnetic rods if necessary.
3. Place the filled sample containers on the sample tray without interruption, starting with position 1.
4. Place the sample tray on the spindle of the sample changer from above.
5. Turn the sample tray until it locks.
6. Switch on the sample changer.

- The sample tray is subsequently turned automatically to the correct position and the sample needle dips into the rinsing solution.

**Note:** A sample stray for 53 samples of 15 mL each is available for special applications.

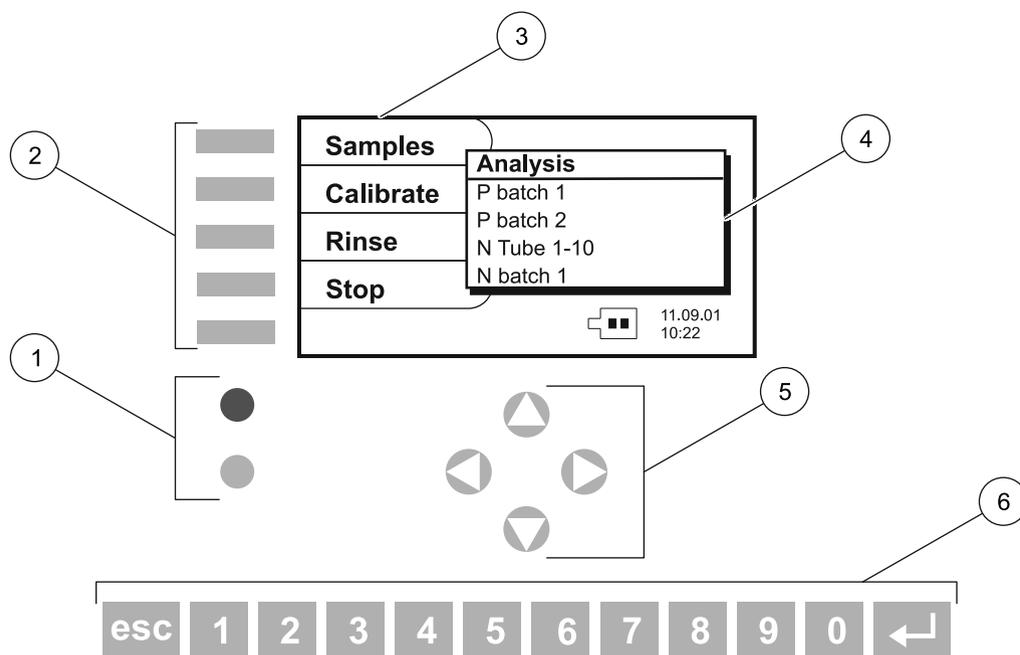
The reset button on the front left-hand side of the housing is used for initialization of the sample changer. The reset button must not be actuated during a sample series.

The green light-emitting diode on the front left-hand side of the housing indicates that the sample changer is in operation.

## 3.2 Open-loop control unit

### 3.2.1 Overview of the display and keys of the open-loop control unit

Figure 13 Overview of the display and keys



1	Menu keys	4	Display and input area
2	Shortcut keys	5	Cursor keys
3	Menu selection	6	Alphanumeric keys

#### Error messages

Error messages are shown in red on the display. Press the top menu key in order to be able to continue to work.

#### Exit the menu

Press the top menu key.

#### Edit selection lists

Selection with the cursor keys. Press the enter key to confirm the selection.

#### Alphanumeric keys

Numbers, letters and special characters can be entered with the alphanumeric keys.

**Table 3 Assignment of the alphanumeric keys**

Key	▼ abc	▲ ABC
1	_ 1 . : , ( ) % 1 ?	_ 1 . : , ( ) % 1 ?
2 ABC	a b c 2 ä à á â ã ä æ ç	A B C 2 Ä À Á Â Ã Ä Æ Ç
3 DEF	d e f 3 è é ê	D E F È É
4 GHI	g h i 4	G H I 4
5 JKL	j k l 5	J K L 5
6 MNO	m n o 6 ö ó ô õ ø œ ñ	m n o 6 Ö Ó Ô Õ Ø Ñ
7 PQRS	p q r s 7 ß	P Q R S 7
8 TUV	t u v 8 ü ú ú ú	T U V 8 Ü Ú Ú Ú
9 WXYZ	w x y z 9	W X Y Z 9
0 +	+ - 0 / \ *	+ - 0 / \ *

## 3.2.2 Switch-on of the open-loop control unit

The open-loop control unit is switched on with the power switch on the left-hand side of the housing.

The open-loop control unit is ready for operation after the manufacture's logo is shown. The charge status of the battery, as well as the date and time, are shown on the display next to the main menu.

Upon delivery, the open-loop control unit is set to the correct national language, date and time. If these values are not entirely correct, they can be changed in the menu option OPTIONS, DATE/TIME and OPTIONS, LANGUAGE.

The main menu options are accessed with the adjacent shortcut keys.

## 3.3 Reagents

### 3.3.1 Reagents for Ganimede P

The GCA 100 reagents for the automated orthophosphate and total phosphate determination are designed for 100 determinations. The principle of the reaction complies with DIN EN 1189 of December 1996.

Phosphate ions react in acid solution with molybdate and antimony ions to form an antimony–phosphomolybdate complex that is reduced to phosphorus molybdenum blue by means of ascorbic acid.

The opened solutions can be kept for seven days at room temperature.

Prepare the reagents according to the work instructions enclosed in the reagent packaging.

### NOTICE

The Ganimede P and the ready-to-use GaniChem-P GCA 100 reagent kit are optimally adapted for each other. The use of third-party chemicals can result in the impairment of the results and the whole system.

The guarantee claim only remains valid with the use of GaniChem-P GCA 100.

### 3.3.2 Reagents for Ganimede N

The GCA 200 reagents for the automated sum determination of inorganically and organically bound nitrogen are each designed for 100 determinations.

Inorganically and organically bound nitrogen is oxidized to nitrate with peroxodisulfate by means of an alkaline digestion. The nitrate content is photometrically measured by means of UV self-absorption in a differential measurement at 210 nm and 228 nm.

The opened solutions can be kept for seven days at room temperature.

Prepare the reagents according to the work instructions enclosed in the reagent packaging.

#### NOTICE

The analysis unit N and the ready-to-use GaniChem-N GCA 200 reagent kit are adapted optimally for each another. The use of third-party chemicals can result in the impairment of the results and the whole system.

The guarantee claim only remains valid with the use of GaniChem-N GCA 200.

### 3.3.3 Storage

The original substances are stored at room temperature. The fully prepared solutions are stored in the refrigerator for brief storage (e.g. over a weekend).

The reagents remain in the analysis unit when the Ganimede is used daily.

### 3.3.4 Reagents reserve

A package of GCA 100 for Ganimede P or GCA 200 for Ganimede N is designed for 100 single analyses, and appropriate pre-rinsing amounts for 4–5 analysis series are included per package. The maximum number of determinations can be reduced from 100 in the event of a higher number of analysis series per package.

A waste bottle can hold the reagent waste and sample waste of one package (i.e. 100 single determinations).

The exact reagent reserves of the chemicals can be shown by means of the menu items OPTIONS, REAGENT STATUS.

## 3.4 Ganimede P sample preparation

- Samples must lie within the pH range 2–10.
- Samples that contain substances that react aggressively with Viton, e.g. solvents, must be diluted.
- Samples containing particulates must be homogenized with a disintegrator for 30 seconds.
- Homogenized samples in positions 1 to 27 can be stirred with magnetic rods with the sample tray for 36 sample containers.
- The sample containers are suitable for one-time use only. Residues of cleaning agents can lead to increased phosphate findings.

### 3.4.1 Load the sample tray

Each sample tray is a sample batch.

If multi-point calibration is to be used, a standard curve with 2–11 measurement points must be recorded before the measurement series. The device refers to this recorded curve during measurement operation.

Alternatively, it is possible to work with a two-point calibration. In addition, a zero standard solution, or alternatively two standard solutions, is/are positioned in positions 35 and 36.

To do so, load the sample tray as follows:

- According to the sample batch, the sample tray is loaded with the samples from position 1.
- For a two-point calibration, the standards are positioned with the measurement series on a sample tray for 36 sample containers as follows:

Position 35: GCZ 100 zero solution

Position 36: standard, e.g. 0.2 mg/L PO<sub>4</sub>-P GCS 050

Alternatively:

Position 35: 1st standard, e.g. 0.2 mg/L PO<sub>4</sub>-P GCS 050

Position 36: 2nd standard, e.g. 2 mg/L PO<sub>4</sub>-P GCS 100

Single and double determinations can be carried out. For double determinations, the sample is drawn from a container twice. The settings refer to the whole sample tray.

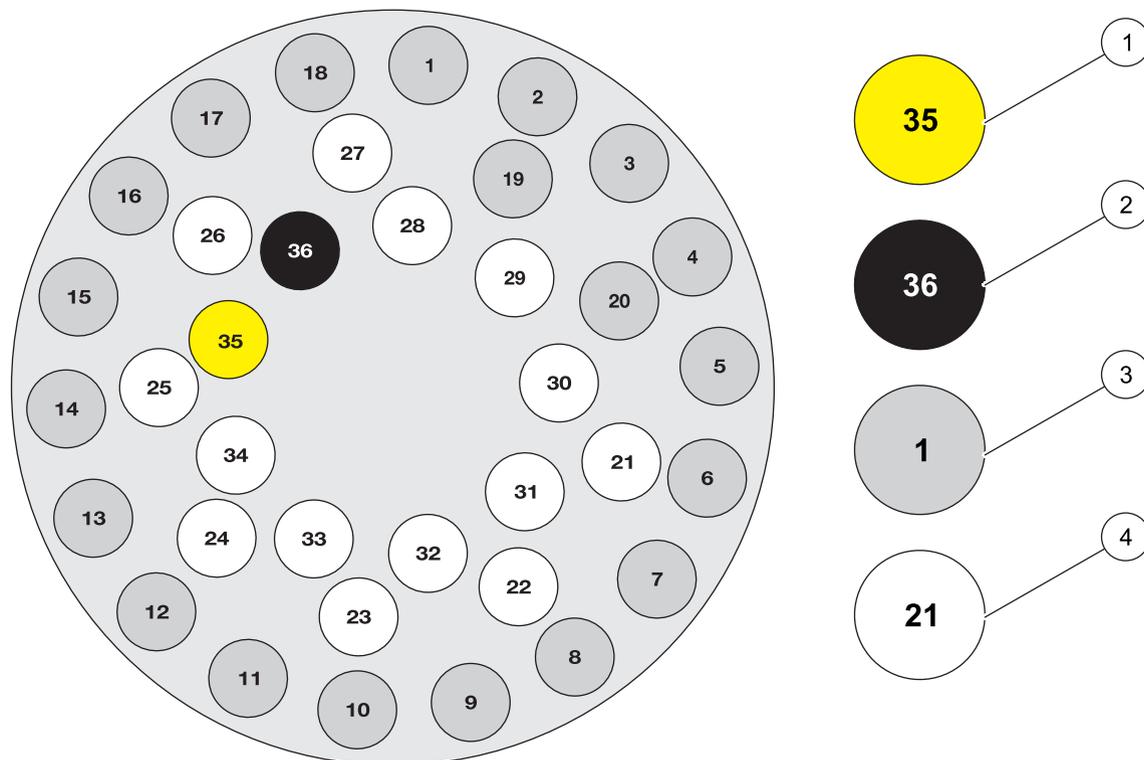
Two sample containers must be filled with the sample if the orthophosphate and total phosphate content is to be determined from a sample. The allocation of the determination method (orthophosphate or total P) to the position numbers of the sample containers is performed during definition of the sample batch with the open-loop control unit. If necessary, the use of the sample tray for 53 sample containers is recommended.

The following table and illustration show an example of a sample tray load for a two-point calibration:

**Table 4 Sample tray load for 36 sample containers, Ganimed P**

Position	Load
35	GCZ 100 zero solution
36	GCS 050 standard solution
1	Sample 1 orthophosphate
2	Sample 1 total phosphate
3	Sample 2 orthophosphate
4	Sample 2 total phosphate
5	Sample 3 orthophosphate
6	Sample 3 total phosphate
7	Sample 4 orthophosphate
8 etc.	Sample 4 total phosphate, etc.

Figure 14 Example of a sample tray load, Ganimede P



1	Zero solution	3	Samples
2	Standard solution	4	Empty positions

### 3.5 Ganimede N sample preparation

- Samples that contain substances that react aggressively with Viton, e.g. solvents, must be diluted.
- Samples containing particulates must be homogenized with a disintegrator for 30 seconds.
- Homogenized samples in positions 1 to 27 can be stirred with magnetic rods with the sample tray for 36 sample containers.
- The sample containers are suitable for one-time use only.

#### 3.5.1 Load the sample tray

Each sample tray is a sample batch.

If multi-point calibration is to be used, a standard curve with 2–11 measurement points must be recorded before the measurement series. The device refers to this recorded curve during measurement operation.

Alternatively, it is possible to work with a two-point calibration. To do so, two standard solutions are each positioned in positions 33 and 36 for the low and high measurement range.

For this, load the sample tray as follows:

- According to the sample batch, the sample tray is loaded with the samples from position 1.

- For a two-point calibration, the standards are positioned with the measurement series on a sample tray for 36 sample containers as follows:

Position 33: 1st low standard, e.g. 0.5 mg/L TN<sub>B</sub> GCZ 100

Position 34: 2nd low standard, e.g. 30 mg/L TN<sub>B</sub> GCS 050

Position 35: 1st high standard, e.g. 30 mg/L TN<sub>B</sub> GCS 050

Position 36: 2nd high standard, e.g. 100 mg/L TN<sub>B</sub> GCS 100

The low standards can be selected freely in the range 0.5–30 mg/L TN<sub>B</sub>; the high standards can be selected freely in the range 30–150 mg/L TN<sub>B</sub>.

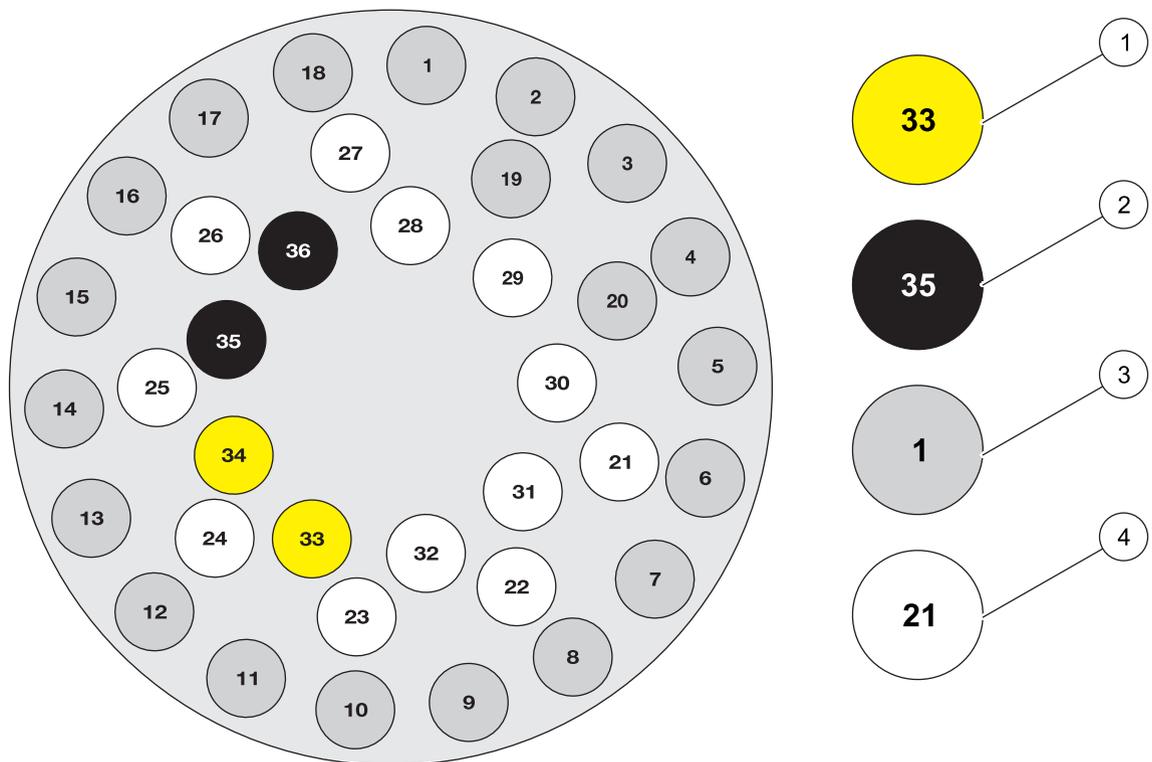
Single and double determinations can be carried out. For double determinations, the sample is drawn from a container twice. The settings refer to the whole sample tray.

The following table and illustration show an example of a sample tray load for a two-point calibration:

**Table 5 Sample tray load for 36 sample containers, Ganimede N**

Position	Load
33	1st low standard, e.g. 0.5 mg/L TN <sub>B</sub> GCZ 100
34	2nd low standard, e.g. 30 mg/L TN <sub>B</sub> GCS 050
35	1st high standard, e.g. 30 mg/L TN <sub>B</sub> GCS 050
36	2nd high standard, e.g. 100 mg/L TN <sub>B</sub> GCS 100
1	Sample 1
2	Sample 2
3	Sample 3
4	Sample 4
5	Sample 5
6 etc.	Sample 6 etc.

Figure 15 Example of a sample tray load, Ganimede P



1	Low-range standard solution	3	Samples
2	High-range standard solution	4	Empty positions



### 4.1 Operation of the open-loop control unit

The sample batch is defined with the open-loop control unit according to:

- Parameter (phosphate with Ganimede P or nitrogen with Ganimede N)
- Number of samples
- Single or double determination
- Orthophosphate or total phosphate determination with Ganimede P or low or high measurement range with Ganimede N
- Analysis as  $\text{PO}_4$ ,  $\text{PO}_4\text{-P}$  or  $\text{P}_2\text{O}_5$  with Ganimede P
- Dilution factor
- User etc.

Defined sample batches can be saved and retrieved again, modified or copied at any time. Thus, a new definition of repeated sample batches is omitted.

A two-point calibration, or alternatively a multi-point calibration, can be used in measurement operation.

For a multi-point calibration, a standard curve must be recorded before the measurement series. At least five standards are prescribed according to DIN. Optionally, an individual standard curve is also possible with 2–11 measurement points. The device refers to this recorded curve during measurement operation if desired.

Alternatively, a two-point calibration can be used during a measurement series with Ganimede P. To do so, a zero solution (GCZ 100) and a standard are positioned in positions 35 and 36, or alternatively two different standard solutions.

With Ganimede N, a two-point calibration is used by positioning two standard solutions for the low and high measurement ranges in each position from 33 to 36.

The operation of the open-loop control unit is carried out via an external keypad or via the alphanumeric keys of the open-loop control unit. The color graphical display shows the operation of the different menu levels. Error messages, erroneous entries and abnormal measurements are presented in color.

The communication of the open-loop control unit and the analysis unit takes place via the IR interface. In order to enable a connection, the open-loop control unit must be brought near (approximately 0.5 meters) to the analysis unit. A connection is established, then the data that defines the sample batch is sent. The measurement procedure is started automatically and the connection is disconnected.

The analysis unit saves all raw data during the measurement. This data can be retrieved by the open-loop control unit at any time during or after the measurement. For this, the connection via the IR interface is established again, the measurement results are transmitted and displayed as a table in the open-loop control unit.

If the sample batch is processed completely and all data is sent, the connection is disconnected automatically. The measurement results can be displayed, edited and sent to the PC, printer and LIMS by means of the open-loop control unit.

## 4.2 Menu structure of the open-loop control unit

### 4.2.1 Menu structure

Analysis	
Samples	
Analysis X batch Y	Display of a list of all saved sample batches (maximum 30) for the various parameters (phosphate or nitrogen). Selection of the desired batch starts the measuring procedure
Calibrate	Save measured standard curves
Phosphorus	Phosphate parameters for Ganimede P
Standard curve 1	Storage location for standard curve 1 with 2 to 11 measurement points
Add	Add standard
Remove	Remove standard
Graph	Show standard series as a graph
Measure	Measure standard absorbance
User	Input of the username
Standard curve 2	Storage location for standard curve 2 with 2 to 11 measurement points, all submenus the same as standard curve 1
Standard curve 3	Storage location for standard curve 3 with 2 to 11 measurement points, all submenus the same as standard curve 1
Nitrogen	Nitrogen parameters for Ganimede N
Standard curve 1	Storage location for standard curve 1 with 2 to 11 measurement points
low	Storage location for standard curve 1 in the low measurement range with 2 to 11 measurement points
Add	Add standard
Remove	Remove standard
Graph	Show standard series as a graph
Measure	Measure standard absorbance
Users	Input of the username
high	Storage location for standard curve 1 in the high measurement range with 2 to 11 measurement points
Add	Add standard
Remove	Remove standard
Graph	Show standard series as a graph
Measure	Measure standard absorbance
Users	Input of the username
Standard curve 2	Storage location for standard curve 2 with 2 to 11 measurement points, all submenus the same as standard curve 1
Standard curve 3	Storage location for standard curve 3 with 2 to 11 measurement points, all submenus the same as standard curve 1
Rinse	A rinse of the system must be run for longer downtime and after every workday.
Stop	Interrupts the analysis series, e.g. in the event of damage, errors occurring or incorrect load

### 4.2.1 Menu structure

Edit	
Program	Create and save a new sample batch
Phosphorus	Definition of a sample batch for phosphorus
Name	Name, maximum 20 characters long, for the sample batch e.g. Well 1-10
Users	Name of the user. The usernames must be defined beforehand under the menu option EDIT, USER.
Measurements	Single or double determination
Calibration	Two-point calibration with two selectable standard concentrations or Multi-point calibration with access to standard curve 1, 2 or 3 (the standard curve must first be recorded under the menu option ANALYSIS, CALIBRATION)
Sample data	Opens an input window for the description of individual samples.
Position	Automatic numbering (1–36)
Sample	Sample name, maximum 13 characters long
Method	Total phosphate or orthophosphate
Express as	PO <sub>4</sub> , PO <sub>4</sub> -P or P <sub>2</sub> O <sub>5</sub>
Unit	Selection of the unit mg/L, g/L, µg/L, mmol/L, mg/100 g or Ext.
Control standard	A control standard with freely selectable concentration and permissible deviation can also be measured on the sample tray. Control standard selection YES or NO.
Dilution	The selection of a dilution factor against which the result is to be offset
Factor	Freely definable specific sample factor (0.001 – 9999)
Sampling	Date and time of sampling
Note	Note regarding the sample, maximum 30 characters long
Nitrogen	Definition of a sample batch for nitrogen
Name	Name, maximum 20 characters long, for the sample batch e.g. Well 1-10
User	Name of the user. The usernames must be defined beforehand under the menu option EDIT, USER.
Measurements	Single or double determination
Calibration	Two-point calibration with two selectable standard concentrations in the low and high measurement range respectively or Multi-point calibration with access to standard curve 1, 2 or 3 (the standard curve must first be recorded under the menu item ANALYSIS, CALIBRATION)
Sample data	Opens an input window for the description of individual samples.
Position	Automatic numbering (1–36)
Sample	Sample name, maximum 13 characters long
Method	Low measurement range (0.5–30 mg/L TN <sub>B</sub> ) or high (30–150 mg/L TN <sub>B</sub> )
Express as	TN
Unit	Selection of the unit mg/L, g/L, µg/L, mmol/L, mg/100 g or Ext.
Control standard	A control standard with freely selectable concentration and permissible deviation can also be measured on the sample tray. Control standard selection YES or NO.
Dilution	The selection of a dilution factor against which the result is to be offset
Factor	Freely definable specific sample factor (0.001 – 9999)
Sampling	Date and time of sampling
Note	Note regarding the sample, maximum 30 characters long

## Operation

### 4.2.1 Menu structure

Modify	Saved sample batches can be modified.
Modify	Selection list of all saved sample batches. Select the desired sample batch.
Name	Name, maximum 20 characters long, for the sample batch e.g. Well 1-10
User	Name of the user. The usernames must be defined beforehand under the menu option EDIT, USER.
Measurements	Single or double determination
Calibration	Two-point calibration with two selectable standard concentrations or Multi-point calibration with access to standard curve 1, 2 or 3 (the standard curve must be recorded under the menu option ANALYSIS, CALIBRATION)
Sample data	Opens an input window for the description of individual samples.
Position	Automatic numbering (1–36)
Sample	Sample name, maximum 13 characters long
Method	Total phosphate or orthophosphate and/or low measurement range (0.5–30 mg/L TN <sub>B</sub> ) or high (30–150 mg/L TN <sub>B</sub> )
Express as	PO <sub>4</sub> , PO <sub>4</sub> -P or P <sub>2</sub> O <sub>5</sub> or TN
Unit	Unit selection mg/L, g/L, µg/L, mmol/L, mg/100 g or Ext.
Control standard	A control standard with freely selectable concentration and permissible deviation can also be measured on the sample tray. Control standard selection YES or NO.
Dilution	The selection of a dilution factor against which the result is to be offset
Factor	Freely definable specific sample factor (0.001 – 9999)
Sampling	Date and time of sampling
Note	Note regarding the sample, maximum 30 characters long
Erase	The saved sample batch can be erased
Erase	Selection list of all saved sample batches. Select the desired sample batch.
Copy	The saved sample batch can be saved under a new name.
Copy	Selection list of all saved sample batches. Select the desired sample batch.
Users	Up to 19 usernames with maximum 10 characters.
New	Definition of a new username
Erase	Deletion of a username
Dilution	Display of nine predefined dilution stages that can be changed individually. A further 11 dilution stages can be saved.
New	Definition of a new dilution stage
Erase	Deletion of a dilution stage

## 4.2.1 Menu structure

Data	
Current	<p>After a connection to the analysis unit has been established, a list of current measurement results is shown.</p> <p>In addition to the mean value, both single results and single absorbances are displayed for a double determination. Measurement results that are beyond the selected measurement range are shown in red.</p> <p><b>Note:</b> A new measurement can be started only if the results of the previous measurement are transferred completely to the open-loop control unit and the indicator display of the analysis unit is no longer flashing.</p>
Express as	The sample name can be changed.
Unit	The unit mg/L, g/L, µg/L, mmol/L, mg/100 g or Ext. can be changed.
Dilution	If the dilution factor is changed, the result is calculated again automatically.
Factor	If the sample-specific factor is changed, the result is calculated again automatically.
Sampling	The date and time of the sampling can be changed
Note	The comment on the sample, a maximum of 30 characters long, can be changed
Display	Display of all saved measurement results for the individual sample batches.
Data/display	Selection list of all saved sample batches. Select the desired sample batch.
Output	Output of the saved measurement results of the different sample batches to the PC, printer or a LIMS system.
PC	Transfer of the measurement results to the PC via the RS 232 interface of the open-loop control unit.
Printers	Transfer of the measurement results to the analysis unit by means of the IR interface and then on to the printer via the RS 232 interface of the analysis unit.
LIMS	Transfer of the measurement results to the analysis unit by means of the IR interface and then on to the LIMS system via the RS 232 interface of the analysis unit.

## Operation

### 4.2.1 Menu structure

Options	
About	Display of the program version, control files and operating hours
Reagent status	Display of the reagent quantity and the range
Reagent status	Display of the number of samples that can be analyzed with the remaining reagent quantity.
Reagent status 100	Reset of the sample counter after the analysis unit has been loaded with a new reagent kit.
Date/time	Input of date and time for the open-loop control unit.
Display contrast	Set the display contrast.
Lighter	
Darker	
Interfaces	Configuration of the interfaces for PC/scanner and LIMS system
PC/scanner	
Scanner	
XON / XOFF	
9600	Baud rate
None	Parity
LIMS	
9600	Baud rate
None	Parity
Printers	Display of the connected printers on the open-loop control unit and analysis unit
Language	Selection list of available languages

### 4.2.2 Start of a measurement series

1. Load the sample tray according to the sample batch with the samples starting from position 1.

**Note:** The data is overwritten if a sample batch is already stored. A copy must be created beforehand if the data is to be retained.

2. If a multi-point calibration is selected for the calibration of the measurement series, the device refers to one of the three saved calibration curves.

**For Ganimede P, the following applies:**

The standards are placed on the sample tray with the measurement series as follows for a two-point calibration:

- Position 35: zero solution, GCZ 100
- Position 36: standard, e.g. 0.2 mg/L PO<sub>4</sub>-P GCS 050

Alternatively:

- Position 35: 1st standard, e.g. 0.2 mg/L PO<sub>4</sub>-P GCS 050
- Position 36: 2nd standard, e.g. 2 mg/L PO<sub>4</sub>-P GCS 100

**For Ganimede N, the following applies:**

The standards are placed on the sample tray with the measurement series as follows for a two-point calibration:

- Position 33: 1st low standard, e.g. 0.5 mg/L TN<sub>B</sub> GCZ 100
- Position 34: 2nd low standard, e.g. 30 mg/L TN<sub>B</sub> GCS 050
- Position 35: 1st high standard, e.g. 30 mg/L TN<sub>B</sub> GCS 050

- Position 36: 2nd high standard, e.g. 100 mg/L TN<sub>B</sub> GCS 100

The low standards can be selected freely in the range 0.5–30 mg/L TN<sub>B</sub>; the high standards can be selected freely in the range 30–150 mg/L TN<sub>B</sub>.

3. Place the sample tray on the sample changer.
4. Switch on the analysis unit and the sample changer.
5. Select the desired sample batch with the cursor keys and the enter key.

A connection to the analysis unit is established automatically via the IR interface (maximum distance 0.5 meters).

6. Select the desired parameter (phosphorus or nitrogen).

The measuring procedure is started.

**Note:** The open-loop control unit must not be moved or removed during the transmission procedure. The whole data transfer is shown on the display.

The open-loop control unit/analysis unit connection is disconnected automatically.

7. Close the window with the upper menu key.

### 4.2.3 Calibration (recording of multi-point calibrations)

#### 4.2.3.1 Ganimede P

In the storage locations for STD. CURVE 1, 2 and 3, standard curves with 2 to 11 measurement points are measured and stored. The device refers to these stored curves if the sample batch is to be processed after the multi-point calibration.

1. Select standard curves 1, 2 or 3.

The selected standard curve is opened; standard curves that have already been stored can be modified individually.

2. Select the standard concentration to be changed and confirm the input.
3. Enter the standard concentration with the alphanumeric keys or the connected keypad and confirm the input.
4. Add further standard measurement points or remove points with the shortcut keys.
5. Open the standard series graphically with the GRAPH shortcut key.

The standard curve can be printed out with Enter.

6. Measure the standard absorbances with the MEASURE shortcut key.
7. Load the sample changer with the desired standard solutions in ascending order from position 1.

The standard solutions GCS 050 and GCS 100 with 0.2 mg/L and 2 mg/L PO<sub>4</sub>-P and their dilutions are recommended.

8. Make the analysis unit ready for operation.
9. Switch on the analysis unit and the sample changer.
10. Start the measurements of the standard solutions with the MEASURE shortcut key.

A connection to the analysis unit is established automatically via the IR interface.

11. Select the phosphorus parameter.

The measuring process is started.

**Note:** The open-loop control unit must not be moved or removed during the transmission procedure. The whole data transfer is shown on the display.

12. Confirm the input with the top menu key and close the window.

### 4.2.3.2 Ganimede N

In the storage locations for STD. CURVE 1, 2 and 3, standard curves, with 2 to 11 measurement points each in the low and high measurement range, are measured and stored. The device refers to these stored curves if the sample batch is to be processed after the multi-point calibration.

1. Select standard curves 1, 2 or 3 and the low or high measurement range.  
The selected standard curve is opened; standard curves that are already stored can be modified individually.
2. Select the standard concentration to be changed and confirm the input.
3. Enter the standard concentration with the alphanumeric keys or the connected keypad and confirm the input.
4. Add further standard measurement points or remove points with the shortcut keys.
5. Open the standard series graphically with the GRAPH shortcut key.  
The standard curve can be printed out with Enter.
6. Measure the standard absorbances with the MEASURE shortcut key.
7. Load the sample changer with the desired standard solutions in ascending order from position 1.  
The standard solutions GCZ 100, GCS 050 and GCS 100 with 0.5 mg/L, 30 mg/L and 100 mg/L TN<sub>B</sub> and their dilutions are recommended.
8. Make the analysis unit ready for operation.
9. Switch on the analysis unit and the sample changer.
10. Start the measurements of the standard solutions with the MEASURE shortcut key.  
A connection to the analysis unit is established automatically via the IR interface.
11. Select the nitrogen parameter.  
The measuring process is started.

**Note:** The open-loop control unit must not be moved or removed during the transmission procedure. The whole data transfer is shown on the display.

12. Confirm the input with the top menu key and close the window.

**Note:** If only one measurement range (high or low) is stored under the standard curve 1, 2 or 3, only samples of the corresponding measurement range can be measured with this standard curve. Combinations of different standard curves (e.g. standard curve 1 low and standard curve 2 high) are **not possible**.

### 4.2.4 Rinse

A rinse of the system with cleaning solution (GCR 100 for Ganimede P and GCR 200 for Ganimede N) is necessary every working day.

1. Remove the reagent bottles and close the bottles tightly with the corresponding color-marked lids.
2. Store reagents in the refrigerator.

**Note:** The reagents can be kept for a maximum of seven days after opening.

3. Connect the bottles with cleaning solutions to the corresponding lid under consideration of the color markings.

4. Check the capacity of the waste bottle.
5. Start the rinse procedure with the RINSE shortcut key.
6. Switch on the prepared analysis unit.
7. Confirm the safety prompt.

A connection to the analysis unit is established automatically via the IR interface.

8. Select the desired parameter.

The rinse process is started. The rinsing of the analysis unit is finished after two minutes and the system can be switched off.

#### 4.2.5 Stop

In the event of damage, an error or an incorrect load, the analysis series can be interrupted immediately with the STOP shortcut key. A connection to the analysis unit is established automatically via the IR interface.

1. Select and confirm the desired parameter.

The measurement series is interrupted.

2. Close the window with the upper menu key.

If the error or damage cannot be fixed without switching off the analysis unit, proceed as follows:

3. Replace the reagent bottles with the cleaning solutions and activate RINSE.
4. Connect the reagent bottles with the analysis unit again for further analyses.
5. Load the sample tray.
6. Define the sample batch.
7. Start with ANALYZE.

#### 4.2.6 Data/current

After the connection has been established, a list of the latest current measurement results is shown with the Data/CURRENT menu option. In addition to the mean value, both single results and single absorbances are displayed for a double determination. Measurement results that are beyond the selected measurement range are shown in red.

1. Select DATA and CURRENT.

A connection to the analysis unit is established.

2. Select the desired parameter.

The list of current results opens.

3. Select the result to be edited with the cursor keys and confirm with the enter key.

The measurement results can now be edited.

The sample name, the unit, the indication of the result, e.g. as  $\text{PO}_4$ ,  $\text{PO}_4\text{-P}$  or  $\text{P}_2\text{O}_5$ , the sample collection time and the note can be changed.

If the dilution factor or the sample-specific factor is changed, the result is calculated again automatically.

The position, result, method and measurement time components cannot be changed afterwards.

4. Select CALIBRATION DATA in order to display the calibration that was carried out.

## Operation

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The input is carried out via the alphanumeric keys of the open-loop control unit or via a connected compact keyboard.

**Note:** *A new measurement can be started only if the results of the previous measurement are transferred completely to the open-loop control unit and the indicator display of the analysis unit is no longer flashing.*

## Section 5 Maintenance

---

### 5.1 Sample changer

#### **⚠ DANGER**

The sample changer must be disconnected from the mains during cleaning. The PTFE sealing rings in the housing on the sample arm, on the rinsing vessel and the sealing ring on the tray holder must not be removed!

Further repairs can only be carried out by the manufacturer's service departments.

The sample changer is a maintenance-free device. For safe and accurate operation, it is necessary to keep the device clean. A soft cloth that is moistened with water should be used for (external) cleaning. It must be made sure that no fluid penetrates the device during cleaning!

In the event of an overflow of the rinsing vessel or spillage of small amounts of liquid over the sample changer, the sample changer must be switched off (the power plug must then be disconnected!) and cleaned (in order to dry it). If larger quantities of liquid enter into the device, it must be made sure that the device is dried completely before switching it back on.

### 5.2 Open-loop control unit

The open-loop control unit is cleaned with a soft cloth that is moistened with water.

Further repairs can only be carried out by the manufacturer's service departments.

### 5.3 Analysis unit

#### **⚠ DANGER**

Under no circumstances may the digestion cuvette and its supply and drainage lines be opened or manipulated.

If an over-pressure is intercepted by the dual protection system, the analysis unit must be switched off and the service department must be informed in order to avert damage to the device.

#### **⚠ DANGER**

Burn hazard

Only remove the cover with the power plug pulled out and with a cooling time of a few minutes.

All defects that cannot be repaired by means of a tube change or by means of cleaning the analysis cuvette, may only be repaired by the service personnel authorized by the manufacturer.

For the cleaning of the cuvette and for the tube change, it is necessary to remove the cover in the middle of the device with the lateral knurled screws.

#### 5.3.1 Mount the cover

1. Hook the cover onto the upper housing edge.
2. Guide the tubes into the recesses on the right and left.
3. Press on the cover.
4. Make sure that no tube is jammed.
5. Fasten the cover with the knurled screws.

### 5.3.2 Downtime

In the event of downtime, e.g. overnight or over weekends, a rinse of the system with cleaning solution (GCR 100) must be carried out.

1. In each case, remove a reagent bottle and seal it with the original lid of the same color.

The opened reagents are stored in the refrigerator.

**Note:** The opened reagents can be kept for a maximum of seven days at room temperature.

2. Connect the bottles with cleaning solutions to the corresponding lids.
3. Check the capacity of the waste bottle.
4. Start the rinse process with the open-loop control unit.

The process is finished after four minutes and the system can be switched off.

In the switched-off state, all tubes should be disconnected from the pump-tube clamps to slacken them, in order to guarantee the intended service life.

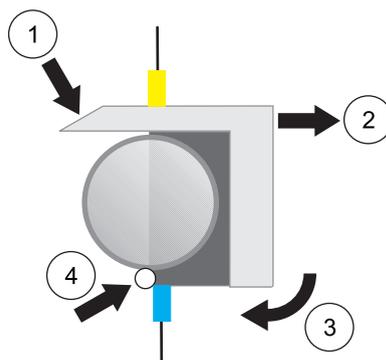
1. Press the nose of the clamp downward (1) and to the right (2).

The clamp swivels downward (3) and is held in the holder (4).  
The tube is now slackened.

For start-up, the tubes must be tensioned in the tube clamps again.

2. Swivel the clamp upward.
3. Press the nose downward and the clamp to the left.

**Figure 16** Slacken a tube in a pump



1	Press the nose downward.	3	Swivel the clamp downward.
2	Press the clamp to the right.	4	The clamp is held in the metal holder.

### 5.3.3 Tube change

A change of the whole tube set is necessary every three months. The tubes become porous due to the thermal and mechanical load.

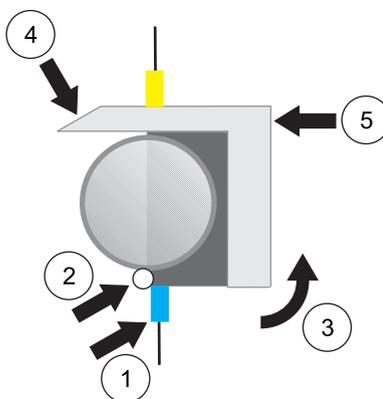
#### 5.3.3.1 Insertion of the tube in a pump

1. Place the tube with the colored tabs in the groove above and below the clamp (1).

2. Mount the clamp in the metal holder (2) from below. In so doing, tilt the clamp forward slightly.
3. Swivel the clamp upward (3).
4. Press the nose downward (4) and the clamp to the left (5).

**Note:** It is recommended to change one tube at a time in order to prevent mix-ups, i.e. each removed tube is immediately replaced with the corresponding new tube.

**Figure 17** Insertion of the tube in a pump



1	Place the tube with the colored tabs in the groove above and below the clamp.	4	Press the nose downward.
2	Mount the clamp in the metal holder from below.	5	Press the clamp to the left.
3	Swivel the clamp upward.		

### 5.3.4 Clean the analysis cuvette

#### ⚠ DANGER

Potential hazards (e.g. cut injuries) due to mechanical damage of the analysis cuvette (breakage of glass).  
Wear protective clothing, protective gloves and safety glasses/face protection that are suitable for the work being performed.

The analysis cuvette is cleaned every three months or as required.

1. Disconnect the power plug and wait a few minutes until the digestion cuvette has cooled down.
2. Remove the protective cover with the knurled screws.
3. Carefully pull the two tubes out of the lower part of the analysis cuvette according to [Figure 18](#) and [Figure 19](#).
4. Remove the tubes from the analysis cuvette.
5. Loosen the plastic screw on the right-hand side of the cuvette slightly with a screwdriver.
6. Loosen the connection pieces for the tubes with two screws and remove them upward from the cuvette.
7. Carefully remove the cuvette forward.

**Note:** Make sure not to damage the photometer unit.

## Maintenance

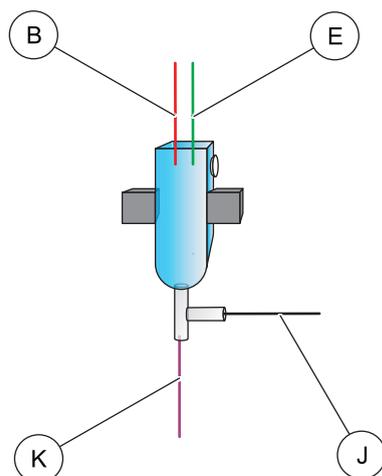
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8. Clean the cuvette with a moist cotton bud from inside.
9. If necessary, use a suitable cleaning solution, e.g. Extran for Ganimede P, alcohol for Ganimede N (ethanol, propanol).

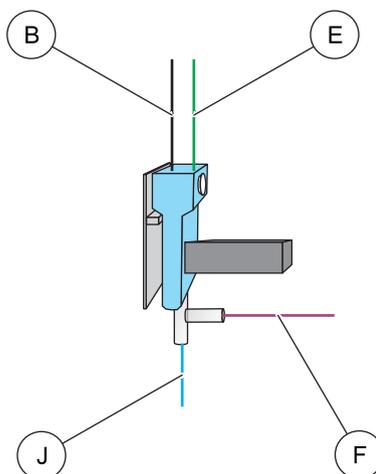
**Note:** Do not use any cleaning agents that could contain detergents on the Ganimede N.

10. Rinse the cuvette with distilled water or allow the cleaning agent to evaporate fully.
11. Ganimede P:  
Insert the cleaned cuvette and pull the cuvette downward completely.  
  
Ganimede N:  
Insert the cleaned cuvette so that the guide rail on the left-hand side of the cuvette is flush with the upper edge of the optical window.
12. Attach the cuvette carefully with the plastic screws.
13. Attach the connection pieces with the screws.
14. Connect all tubes according to [Figure 18](#) or [Figure 19](#).

**Figure 18**      **Cleaning of the Ganimede P analysis cuvette**



Tube B	Tube J
Tube E	Tube K

**Figure 19**      **Cleaning of the Ganimede N analysis cuvette**

Tube B	Tube F
Tube E	Tube J

### 5.3.5 Cleaning of the analysis unit

The housing is cleaned with a soft, possibly damp, cloth. The reagent chamber can be cleaned with a damp cloth. The collecting tray can be removed for cleaning.



## Section 6 Troubleshooting

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### 6.1 Error messages on the open-loop control unit

Error message	Note
Notice: The transferred data XXXXX could not be assigned! XXXXX= sample batch name	The measurement results saved in the analysis unit could not be assigned to a sample batch in the open-loop control unit. The sample batch was probably deleted or the sample batch name was modified in the open-loop control unit.
Sample batch was not accepted	There are still measurement results in the analysis unit that have not yet been retrieved with DATA, CURRENT.
Notice: Reagents are no longer sufficient for the intended measurements. Continue? ENTER: Yes Esc: No	Load the analysis unit with a new set of chemical reagents and set the reagent status to 100.
Establishing connection. Please wait!	Switch on the analysis unit. Move the open-loop control unit near (0.5 m) to the front of the analysis unit.
The connection is interrupted!	The infrared connection has been disconnected. Move the control unit near (0,5 m) to the front of the analysis unit.

### 6.2 Error messages on the analysis unit

Error message	Meaning	Solution
2-4	Internal analysis unit error	Consult service technician
5	No contact to the sample changer	Switch on the sample changer, check the sample changer/analysis unit connection cable (connector)
6	Sample changer mechanical error	Insert the sample tray again, consult a service technician
7	Photo signal faulty	Clean the analysis cuvette, consult a service technician



## Section 7 Replacement parts and accessories

### 7.1 Replacement parts

Description	Cat. No
Sample changer including sample tray for 36 sample containers, 25 mL each	LQV 134
Sample tray for 36 sample containers, 25 mL each	LZQ 031
Sample tray for 53 sample containers, 15 mL	LZQ 032
15-mL polystyrene sample containers, 100 pieces (for aqueous solutions, acids and bases)	LZQ 034
25-mL polystyrene sample containers, 100 pieces (for aqueous solutions, acids and bases)	LZQ 035
Drain hose for sample changer	LZQ 039
Suction tube for sample changer	LZQ 038
Complete tube set for the sample changer, including needle	LZV 263
Open-loop control unit	LPV 135
Complete tube set for Ganimede P analysis unit	LZV 262
Ganimede P analysis cuvette	HBK 057
Complete tube set for Ganimede N analysis unit	LZV 423
Ganimede N analysis cuvette	HBK 059
Sample changer – analysis unit connection cable	XLH 917
Sample changer – analysis unit power cable	XLH 060
External power supply, 15 VDC/2 A	LZV 563
1.5-m cable for the open-loop control unit/PC connection	LZV 087
Analysis unit power cable	YAA 080
Analysis unit – PC connection cable	XLH 917

### 7.2 Accessories

Description	Cat. No
GaniChem P, reagent kit for automatic phosphate analytics, measurement range 0.01 – 3.8 mg/L (PO <sub>4</sub> -P), 100 determinations	GCA 100
Zero solution 250 mL	GCZ 100
Standard solution 250 mL, 2 mg/L PO <sub>4</sub> -P	GCS 100
Standard solution 250 mL, 0.2 mg/L PO <sub>4</sub> -P	GCS 050
Calibration solutions	
Standard 1: 0 mg/L PO <sub>4</sub> -P for GaniChem P, 100 mL	
Standard 2: 0.5 mg/L PO <sub>4</sub> -P for GaniChem P, 100 mL	
Standard 3: 1.0 mg/L PPO <sub>4</sub> -P for GaniChem P, 100 mL	GCS 200
Standard 4: 2.0 mg/L PO <sub>4</sub> -P for GaniChem P, 100 mL	
Standard 5: 3.8 mg/L PO <sub>4</sub> -P for GaniChem P, 100 mL	
Cleaning solution for Ganimede P	GCR 100
GaniChem N, reagent kit for the automatic determination of inorganically and organically bound nitrogen, measurement range 0.5 – 150 mg/L TN <sub>B</sub> , 100 determinations	GCA 200
Standard solution 250 mL, 0.5 mg/L TN <sub>B</sub>	GCS 025
Standard solution 250 mL, 30 mg/L TN <sub>B</sub>	GCZ 100
Standard solution 250 mL, 100 mg/L TN <sub>B</sub>	GCS 100
Calibration solutions 0.5 – 30 mg/L TN <sub>B</sub> ,	
Standard 1: 3 mg/L TN <sub>B</sub> for GaniChem N, 100 mL	
Standard 2: 9 mg/L TN <sub>B</sub> for GaniChem N, 100 mL	
Standard 3: 15 mg/L TN <sub>B</sub> for GaniChem N, 100 mL	
Standard 4: 21 mg/L TN <sub>B</sub> for GaniChem N, 100 mL	GCS 300
Standard 5: 27 mg/L TN <sub>B</sub> for GaniChem N, 100 mL	

## Replacement parts and accessories

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### 7.2 Accessories

Description	Cat. No
Calibration solutions 30 – 150 mg/L TN <sub>B</sub> , Standard 1: 30 mg/L TN <sub>B</sub> for GaniChem N, 100 mL Standard 2: 60 mg/L TN <sub>B</sub> for GaniChem N, 100 mL Standard 3: 90 mg/L TN <sub>B</sub> for GaniChem N, 100 mL Standard 4: 120 mg/L TN <sub>B</sub> for GaniChem N, 100 mL Standard 5: 150 mg/L TN <sub>B</sub> for GaniChem N, 100 mL	GCS 350
Cleaning solution for Ganimede N	GCR 200
Magnetic rods, 10 pieces	LZQ 045
Compact keypad	LZV 260
GaniTrans software including 1.5 m connection cable	LZV 404

## Section 8    **Warranty and liability**

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The manufacturer warrants that the product supplied is free of material and manufacturing defects and undertakes the obligation to repair or replace any defective parts at zero cost.

The warranty period for instruments is 24 months. If a service contract is taken out within 6 months of purchase, the warranty period is extended to 60 months.

With the exclusion of further claims, the supplier is liable for defects including the lack of assured properties as follows: All those parts that, within the warranty period calculated from the day of the transfer of risk, can be demonstrated to have become unusable or that can only be used with significant limitations due to a situation present prior to the transfer of risk, in particular due to incorrect design, poor materials or inadequate finish will be improved or replaced, at the supplier's discretion. At the discretion of the supplier, these deficiencies will be corrected or the instrument replaced. The identification of such defects must be notified to the supplier in writing without delay, however at the latest seven days after the identification of the fault. If the customer fails to notify the supplier, the product is considered approved despite the defect. Further liability for any direct or indirect damages is not accepted.

If equipment-specific maintenance and servicing work defined by the supplier is to be performed within the warranty period by the customer (maintenance) or by the supplier (servicing) and these requirements are not carried out, claims for damages are rendered void due to the failure to comply with the requirements.

Any further claims, in particular claims for consequential damages, cannot be made.

Consumables and damage caused by incorrect handling, unsafe assembly or by incorrect use are excluded from this provision.

The instruments of the manufacturer are of proven reliability in many applications and are therefore often used in automatic control loops to provide the most economical possible operation of the related process.

To avoid or limit consequential damage, it is therefore recommended to design the control loop such that a malfunction in an instrument results in an automatic change over to the backup control system, which is the most secure operating condition for the environment and for the process



# Appendix A Interface protocol

RS 232 interface for the analysis unit and open-loop control unit.

The RS 232 C interface has a 9-pole sub-D socket and a 9-pole sub-D connector. The interface is connected to the serial interface (COM) of the computer (LIMS system) with the PC cable (XLH 917).

**Table 6 RS 232 I/O card connection assignment**

9-pole SUB-D	Socket	9-pole SUB-D	Connector
	PIN		PIN
GND	5	GND	5
RxD	3	RxD	2
TxD	2	TxD	3
RTS	8	RTS	7
CTS	7	CTS	8

**Table 7 RS 232 software description**

ID	Description
ID001	Start of a block
ID101	Parameters
ID102	Name
ID103	Users
ID104	Measurements (single/double)
ID107	Calibration (two-point/e.g. standard curve 1)
ID108	Sample tray measurement data
ID110	Method 0 name (total/low)
ID111	Standard absorbance 2 (two-point calibration)
ID112	Standard concentration 2 (two-point calibration)
ID114	Standard curve linear equation
ID115	Standard curve measurement data
ID116	Standard absorbance 1 (two-point calibration)
ID117	Standard concentration 2 (two-point calibration)
ID118	Standard curve lowest concentration
ID119	Standard curve highest concentration
ID120	Method name 1 (ortho/high)
ID121	Standard absorbance 2 (two-point calibration)
ID122	Standard concentration 2 (two-point calibration)
ID124	Standard curve linear equation
ID125	Standard curve measurement data
ID126	Standard absorbance 1 (two-point calibration)
ID127	Standard concentration 2 (two-point calibration)
ID128	Standard curve lowest concentration
ID129	Standard curve highest concentration
ID130	Start of a sample
ID131	Position
ID132	Sample name

Table 7 RS 232 software description

ID	Description
ID133	Calculated concentration result 1
ID134	Absorbance 1
ID135	Unit
ID136	Express as
ID137	Method
ID138	Dilution
ID139	Factor
ID140	Sampling time
ID141	Sample collection date
ID142	Sample collection time
ID143	Comment
ID144	Calculated concentration result 2
ID145	Absorbance 2
ID146	Calculated concentration mean value
ID149	End of a sample
ID150	Concentration of the control standard
ID151	Permissible deviation (%)
ID152	Measured deviation result 1 (%)
ID153	Measured deviation result 2 (%)
ID154	Measured deviation mean value (%)
ID155	Result table
\qID999	\qEnd of a block



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