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748 DH Sample Changer

Instructions for Use

8.748.1003

99.01 mst, ti

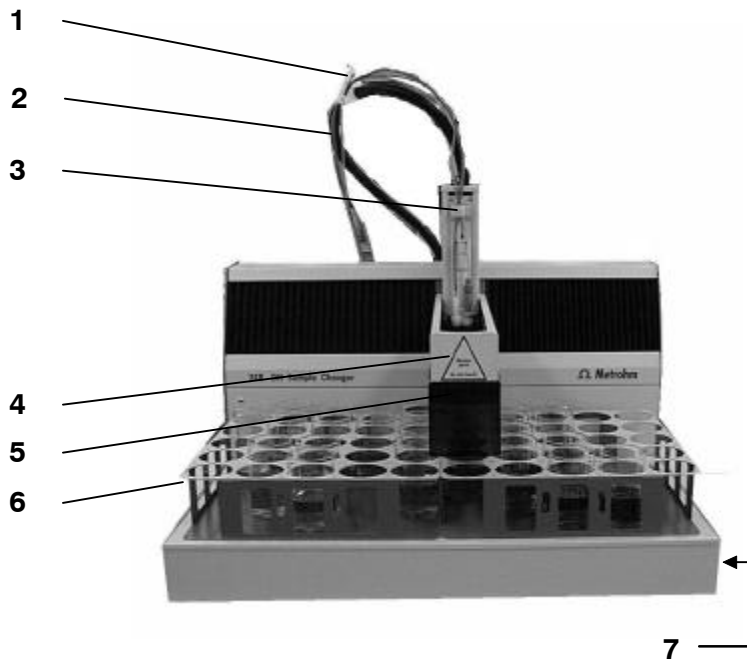
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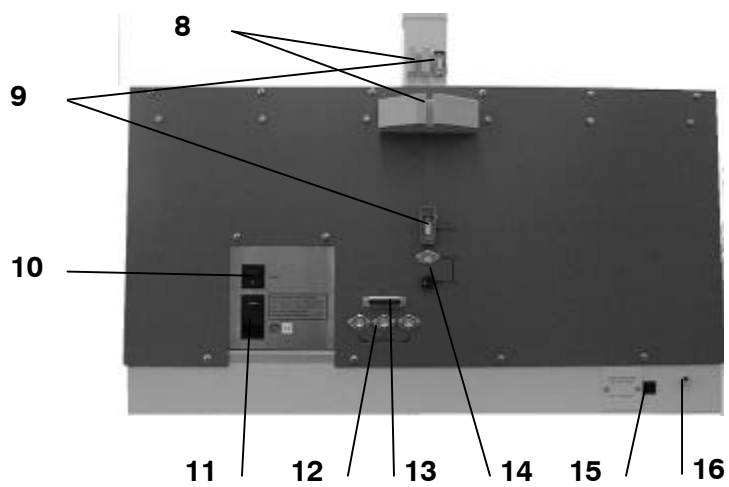
1 Introduction

1.1 Overview

Instrument front panel:



Instrument rear panel:



Instrument front panel:

- 1** **6.2053.010 cable/tubing clamps**
- 2** **Control cable**
assembly see page 6.
- 3** **Cable/tubing holder**
- 4** **Sample arm**
- 5** **Splash protection**
- 6** **Sample rack**
for 48 x 250 mL beakers
or
for 136 x 75 mL beakers
- 7** **Connection for waste tubing**

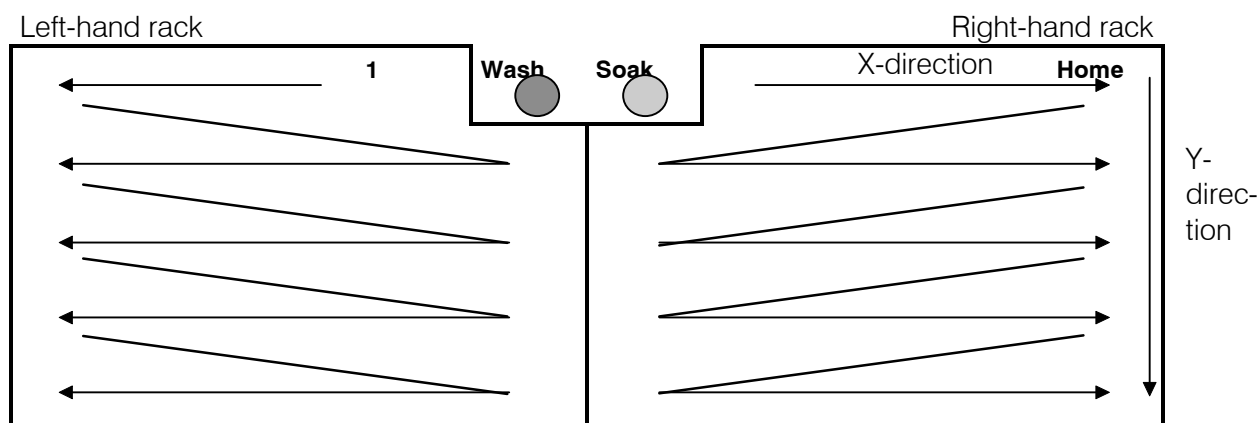
Instrument rear panel:

- 8** **Holder for control cable**
- 9** **Sockets for control cable**
- 10** **Mains switch**
- 11** **Connection for mains cable**
Mains voltage adjustment: see page 5.
In networks where the mains voltage is subject to strong HF-interference the Sample Changer should be operated with an additional mains filter, e.g. Metrohm 615 mains filter.
- 12** **Remote sockets for I/O lines**
The beaker detector is plugged into remote socket 1.
Remote sockets 2 and 3 can be used for connecting external instruments. The lines can be activated from TiNet (see TiNet Instructions for Use).
- 13** **RS232 interface**
for connecting a computer
- 14** **Stirrer connection and setting the stirrer speed**
Rod stirrer 722
Supply voltage: 10 VDC ($I \leq 200$ mA)
- 15** **Voltage adjustment for pump**
see page 5
- 16** **Connection for rinsing tubing**
with 6.1808.050 tubing nozzle

1.2 Sample arm positions

The sample arm is moved in both the XY-direction (rack positions) as well as in the Z-direction.

1.2.1 Positions in the XY-direction



The sample arm is moved so that it only moves above samples which have already been titrated (i.e. positions which have already been visited).

1.2.2 Positions in the Z-direction

The positions in the Z-direction are set in the TiNet configuration. They are given in mm: measurements are made from the tower; the zero point is 15 mm below the upper edge.

The positions in the Z-direction depend on both the type of rack used and on the sample head fittings.

Working position

Position during titration/measurement.

The beaker detector should stand on the beaker rim.

Take care that electrodes, stirrer and buret tips are sufficiently immersed.

Rotation position, movement position

Position during the movement of the sample arm in the XY-direction.

Take care that electrodes, stirrer and buret tips are raised higher than the beaker rims.

Rinsing position

Position during rinsing in the wash beaker.

Take care that electrodes, stirrer and buret tips are well located in the rinsing spray of the wash beaker.

2 Sample changer start-up

2.1 Mains voltage, mains connection

Check that the voltage set on the instrument corresponds to your mains voltage. If this is not the case then the mains voltage must be altered:

1. Remove the mains cable.
2. Carefully open the compartment above the mains cable with a screwdriver.
3. Remove the voltage selection drum.
4. If necessary change the fuse: remove the parts marked with "⇒" and insert the fuses for the corresponding voltage which are given on the rear panel of the instrument.
5. Rotate the voltage selection drum so that the correct voltage appears at the front (when the compartment is closed this voltage will appear in the window).
6. Close the compartment again.

Set mains voltage for pump

1. Screw off the cover for the pump voltage setting (fold-out page, position 15).
2. Adjust the tumbler switch so that your approximate mains voltage appears:
220...240 V: switch display 230 V
100...120 V: switch display 115 V
3. Change the fuse if necessary.
4. Screw on the cover again so that the marking with the set voltage is on the outside.

The mains cable supplied with the instrument is a 3-core cable fitted with a plug with an earthing pin. If a different plug must be used then the yellow/green lead must be connected to the protective earth. Any break in the earthing inside or outside the instrument can turn it into a hazard.

When the instrument is opened or if parts of it are removed then certain components may be live if the instrument is still connected to the mains. This means that the mains cable must always be unplugged when certain adjustments are made or when parts are replaced.

The cable should only be plugged in and unplugged when the instrument is switched off.

2.2 Sample Changer setup

2.2.1 Setting up the basic instrument

Attaching the control cable:



Fastening the titration head, sample arm from below:



Important:

Do not lift the sample changer by the sample arm. Check the delivery immediately on receipt for completeness and transport damage.

Setup

1. Attach control cable to sample arm: insert the white sleeve with the washer in the cable holder and screw the holding ring tight (with 1.5 mm Allen key). Insert cable and secure with clip.
2. Attach and insert the control cable on the rear panel of the sample changer in the same way.
3. Clip 6.2053.010 cable clamps onto the control cable.
4. Remove splash protection: screw off the 2 side-mounted Phillips screws and carefully pull off plastic panel.
5. Screw the titration head into the titration head holder of the sample arm from below (3 mm Allen key)
6. Lead the beaker detector cable through the cable holder and through the cable clamps to the rear panel of the sample changer.
7. Connect the beaker detector cable to remote socket "Auxiliary 1".
8. Reattach splash protection: set place plastic part in position and screw on again.

2.2.2 Installation of rinsing accessories

1. Screw 6.1808.050 tubing nozzle for the rinsing tubing onto the rear panel of the Sample Changer (fold-out page, Position 16).
2. Attach the rinsing tubing (thin 6.1801.120 PVC tubing) to the tubing nozzle. Use tubing clamps to attach tubing firmly.
3. Pull the nut of the small opening of the canister over the rinsing tubing.
4. Push the other end of the rinsing tubing onto 6.1828.000 connection nipple and screw it tight.
5. Push 6.1812.010 PTFE tubing onto the other end of the connection nipple (heat up tubing end, hold tubing firmly with abrasive paper) and screw it tight.
6. Screw rinsing tubing onto the rinsing canister and fill the rinsing canister with rinsing solution (water).

7. Push 6.1801.130 PVC tubing onto the right-hand side of the Sample Changer (fold-out page, Position 7).
8. Attach other end of tubing to 6.1828.010 tubing nozzle.
9. Screw tubing nozzle onto the waste canister.

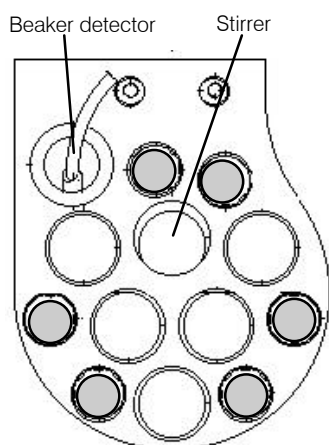
Important

- The waste tubing must not sag.
- Do not seal the canister hermetically (pressure compensation, backwater in the wash beaker!).
- Regularly check the filling levels of the rinsing and waste canisters!
- The rinsing device is only suitable for use with aqueous solutions.

If you have to rinse with organic solvents then you can clean the inserts by "immersion in a rinsing beaker".

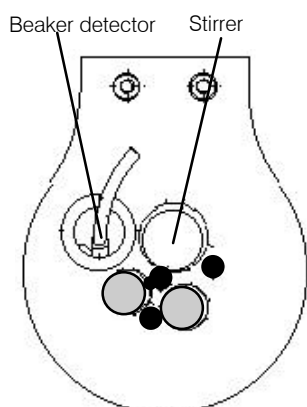
2.3 Equipping the titration head

6.1463.000 Macro titration head:



● M10 screw threads for buret tips

6.1463.010 Micro titration head:



● Built-in buret tips
● M10 screw threads for electrodes or further buret tips

2.722.0020 Rod stirrer

1. Insert stirrer in titration head.
2. Lead stirrer cable through cable holder and through the cable clamps to the rear panel of the Sample Changer.
3. Connect cable to stirrer socket "Mixer".
4. Push 6.1909.020 stirrer propeller onto the stirrer from below.
5. The stirrer speed can be set with the rotary switch on the rear panel of the Sample Changer.

Electrodes (see also page 27)

- 6.1463.000 macro titration head: electrodes with SGJ 14/15
6.1463.010 micro titration head: micro electrodes, 6 mm diameter.
1. Insert electrode into titration head.
 2. Screw electrode cable (at least 2 m long) onto electrode plug head and lead it through the cable holder and the cable clamps to the rear panel of the Sample Changer.
 3. Plug electrode cable into Titrator.

Buret tips

1. Insert buret tips into titration head and screw tight with M10 screw threads.
2. Screw 6.1805.XXX tubing connection onto the buret tips.
3. Lead tubing through the tubing holder and the tubing clamps to the rear panel of the Sample Changer.
4. Connect the other end of the tubing to the dosing unit outlet. Use 6.1808.000 connection piece for connecting to the dosing tubing if necessary.

Important

The cable and tubing should be led between the cable/tubing holder and the cable/tubing clamps in a curve so that they are not subjected to stress when the titration head is lowered!

Check length of cables and tubings as follows:

- Open Sample Changer window in the titration part of Ti-Net.
- Press button <Ctrl>.
- Move to "Home" position and lower the sample arm to working position.

2.4 Sample racks

Place sample racks in position.
Place 6.1432.320 sample beaker in the soak position (see page 4).
Use 6.2060.000 holders to carry the racks.

2.5 Sample Changer start up

Connect the RS232 interface of the Sample Changer with a COM of the computer:

Cables:

25-pole / 9-pole, 3 m.....	6.2125.110
25-pole / 25-pole, 3 m.....	6.2125.060
Extension cable 25-pole / 25-pole, 3 m.....	6.2125.020
Extension cable 9-pole / 9-pole, 3 m.....	6.2134.110

Start TiNet on the computer and configure the Sample Changer; see TiNet Instructions for Use.

2.6 Adjusting Sample Changer

The offset settings for new instruments are determined by Metrohm. Each Sample Changer is supplied with a document containing these data.

Entering the offset data in TiNet

1. Start the program "Iniedit.exe" from the TiNet bin directory.
2. Under "Various" you will find "Offset 748".
3. Enter the values for X and Y.
4. Press <Apply>.
5. Close the program "Iniedit.exe" and start TiNet (again).

3 Operation via RS232 Interface

3.1 General rules

The DH Sample Changer has a remote control facility that allows its control via TiNet. The parameters of the Sample Changer may be easily set by the method editor of TiNet.

The following description offers special possibilities of low level control via the transfer command of the calculation block of the TiNet method editor.

3.1.1 Tree of commands

The commands are hierarchically ordered with the following rules:

Rules	Example
The root of the tree is designated by &.	
The branches (levels) of a tree are marked with a dot (.) when calling up an object.	
Upper- or lowercase letters may be used.	&STIRER.ON or &Stirer.On
An object can be assigned a value. Values are marked at the beginning and end by quotes ("). They may contain ASCII characters or numerical values.	&Stirer.On"True" &Init.SpeedXY"3"
The current object remains valid until a new object is called.	
New objects can be addressed relative to the old object: A preceding dot leads forwards to the next level in the tree.	
More than one preceding dot leads one (or several) level(s) backwards in the tree. n node backwards require n+1 preceding dots.	&Stirer.On"True";..\$G Leads back from nod &Stirer.On to nod &Stirer
If you want to jump back to the root, enter a preceding &.	

3.1.2 Triggers

\$G Go Commands are executed with \$G.

Example:

&Stirer.On"True" Sets command.

..\$G Starts stirrer.

3.2 Remote control commands

3.2.1 Overview

Object	Description	Input range	Reference
& Root			
Stirer	Stirrer control	\$G	3.2.2.1.
├ .On	Switching stirrer	True, False	ditto
GoTo	Go to position	\$G	3.2.2.2.
├ .Vessel	Designation of vessel	special	ditto
GoAbove	Go to position	\$G	3.2.2.3.
├ .Vessel	Designation of vessel	special	ditto
GoIn	Go into vessel	\$G	3.2.2.4.
├ .Vessel	Designation of vessel	special	ditto
GoToHome	Goes to home position	\$G	3.2.2.5.
WashElectrodes	Wash electrodes	\$G	3.2.2.6.
├ .Times	Number of wash cycles	1...9999	ditto
SetCtrlLine	Setting I/O line	\$G	3.2.2.7.
├ .On	Setting line	True, False	ditto
├ .Line	Selection of line	1...3	ditto
WaitForInput	Waiting for input on I/O line	\$G	3.2.2.8.
├ .On	Line state	True, False	ditto
├ .Line	Selection of line	1...3	ditto
Init	Setup of Sample Changer	\$G	3.2.2.9.
├ .SpeedXY	Speed in XY direction	0...5...7	ditto
├ .SpeedXYFast	Speed in XY direction	0...2...7	ditto
├ .SpeedZ	Speed in Z direction	0...3...7	ditto
├ .SpeedZFast	Speed in Z direction	0...7	ditto
├ .SpeedZSlow	Speed in Z direction	0...7	ditto
StopAll	Emergency stop	\$G	3.2.2.10.
Assembly	Basic assembly functions		
├ .GoToXYZ	Go to position	\$G	3.2.2.11.
├ .X	X coordinate	0...630	ditto
├ .Y	Y coordinate	0...272	ditto
├ .Z	Z coordinate	0...120	ditto
├ .SpeedXY	Speed in XY direction	0...3...7	ditto
├ .SpeedZ	Speed in Z direction	0...3...7	ditto
├ .PumpOn	Switching on/off pump	True, False, \$G	3.2.2.12.

3.2.2.11	Assembly.GoToXYZ	\$G
	Assembly.GoToXYZ.X	0...630
	Assembly.GoToXYZ.Y	0...272
	Assembly.GoToXYZ.Z	0...120
	Assembly.GoToXYZ.SpeedXY	0...3...7
	Assembly.GoToXYZ.SpeedZ	0...3...7

Moves to the predefined position. The above speeds are only valid for Assembly commands.

The extreme positions which are still in the moving range of the Sample Changer are given in the corresponding rack definition file

(..\bin\PW74xDef\748*r.def of your TiNet program).

You may enter higher values for X, Y, and Z but the Sample Changer has to be reinitialized after being moved to a position out of its moving range.

3.2.2.12	Assembly.PumpOn	True, False, \$G
	&Assembly.Pump"True";\$G	Switching the pump on.
	&Assembly.Pump"False";\$G	Switching the pump off.

3.3 Properties of the RS 232 Interface

The DH Sample Changer is configured as DTE (Data Terminal Equipment).

The RS 232 interface has the following technical specifications:

- Data interface according to the RS 232C standard
- RS232 parameters: 9600 baud
8 data bit
1 stop bit
no parity
SW handshake
- Control characters: C_R (ASCII DEC 13)
L_F (ASCII DEC 10)
XON (ASCII DEC 17)
XOFF (ASCII DEC 19)
- Cables 6.2125.060 25/25 pol
6.2125.110 25/9 pol
length: max. approx. 15 m

4 Troubleshooting, remedying faults

4.1 Troubleshooting

Problem	Possible causes and remedies
Beaker detector does not respond although no beaker is present.	<ul style="list-style-type: none"> • Activate beaker detector in program part "Configuration" of TiNet. • Is the beaker detector correctly plugged into the "Auxiliary 1" socket?
Rack does not fit on Sample Changer.	Loosen wash beaker from below the Sample Changer, set rack onto Sample Changer and screw wash beaker back in position.
Rinsing solution does not enter the wash beaker.	<ul style="list-style-type: none"> • The rinsing canister must be open. • Is the aspiration tubing sufficiently immersed in the rinsing canister? • Are all tubing connections tight?
Rinsing solution is not discharged.	<ul style="list-style-type: none"> • Waste tubing must not sag! • The waste canister must be open.
Sample arm contacts left or right side.	Readjust Sample Changer, see page 19.
Stirrer does not rotate.	<ul style="list-style-type: none"> • Increase stirrer speed. Turn counterclockwise until maximum stirrer speed is reached. • Try switching on the stirrer in the Sample Changer window of TiNet, program part "Titration". If the stirrer rotates then it is possible that your method does not contain the command to switch the stirrer on. • Is the stirrer connected correctly to the "Mixer" socket?

4.2 TiNet error messages

Problem	Possible causes and remedies
Invalid head position selected.	A rack position has been selected which is not contained in the rack definition file. <ul style="list-style-type: none"> • Check the selected position. • Have you selected the correct rack in the TiNet configuration?
Selected command can't be executed.	General communication problem. Exchange the cable.
There is no beaker. (Position: X)	In the TiNet configuration the beaker test is set to "Display" and no beaker is present in the given position. Set the beaker test to "Move" if you want to move to the next beaker automatically or to "OFF" if you want to switch off the beaker test.
There is no reply from the Sample Changer.	Communication interrupted? <ul style="list-style-type: none"> • Try to initialize the Sample Changer with the menu item "Commands, Initialize instruments" in the titration part of TiNet. • Reboot computer. • Switch Sample Changer off/on, make sure cable is well plugged in and try to initialize again. • Does the green lamp light up? If not, check whether the mains cable is plugged in correctly. If everything seems to be OK, change the power supply fuses, see page 5. • If the green lamp lights up and everything appears to be OK then change the pump fuse, see page 5. • Exchange cable.
Transfer error: the target device cannot receive data.	Errors if transfer commands from the calculation block in the method editor are used: <ul style="list-style-type: none"> • Wrong path, value and/or trigger. • Communication interrupted.

4.3 Readjust Sample Changer

Sample arm from below
with position guide:



Centering ring over rack
bolt:



1. Load the test software from the Internet:
<http://www.metrohm.ch>
2. Remove the sample racks from the Sample Changer.
3. Install 6.2625.000 position guide on the sample arm instead of the titration head.
4. Place the centering ring over the right-hand side rack bolt.
5. Start the test software which you have loaded from the Internet and follow the instructions which you will also find there.

5 Appendix

5.1 Technical specifications

Lift

Max. lift way	146 mm
Max. load	500 g

Sample position precision \pm 2 mm

Sample racks 48 beaker, 250 mL
136 beaker, 75 mL
Material Light metal, powder coated

Pump

Capacity	0.33 L/min
Fuse	for 100...120 V: T1.25A for 220...240 V: T630mA L

Housing Al (antichromed) and stainless steel, powder coated

RS232 interface for PC connection

Input/output lines for beaker sensor and any other devices

Ambient temperature

Nom. operation range	0 ... 45 °C
Storage, transport	- 25 ... 60 °C

Safety specifications

Designed and tested in accordance to IEC publication 1010-1, safety class I. This manual contains information and warnings which have to be followed by the user to ensure safe operation and to retain the apparatus in safe condition.

Mains connection

Voltage	100, 120, 220, 240 V \pm 10 % (switchable)
Frequency	50 ... 60 Hz
Power consumption	max. 190 VA
Fuses (2)	for 100...120 V: T2A/120V for 220...240 V: T1A/250V

Dimensions

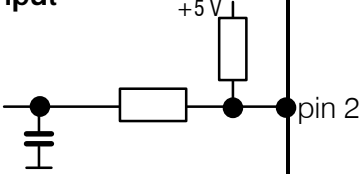
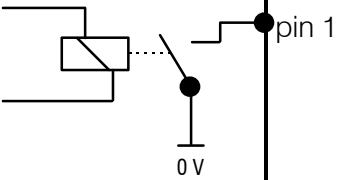
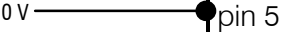
Width	750 mm
Height	750 mm
Depth	600 mm

Weight, incl. accessories ca. 35.5kg

5.2 Sample Changer methods

Methods for TiNet and working with the 748 DH Sample Changer are available at <http://www.metrohm.ch>

5.3 Pin assignment of I/O sockets "Auxiliary"

	external	Function
Input 		
Output 		1 A 50 V non-inductive
Ground 		

5-pin DIN plug

No liability whatsoever will be accepted for damage caused by improper interconnection of instruments.

5.4 Warranty and certificates

5.4.1 Warranty

The warranty regarding our products is limited to rectification free of charge in our workshops of defects that can be proved to be due to material, design or manufacturing faults which appear within 12 months from the day of delivery. Transport costs are chargeable to the purchaser.

For day and night operation, the warranty is valid for 6 months. Glass breakage in the case of electrodes or other glass parts is not covered by the warranty. Checks which are not a result of material or manufacturing faults are also charged during the warranty period. For parts of outside manufacture insofar as these constitute an appreciable part of our instrument, the warranty stipulations of the manufacturer in question apply.

With regard to the guarantee of accuracy, the technical specifications in the Instructions for Use are authoritative.

Concerning defects in material, construction or design as well as the absence of guaranteed features, the purchaser has no rights or claims except those mentioned above.

If damage of the packaging is evident on receipt of a consignment or if the goods show signs of transport damage after unpacking, the carrier must be informed immediately and a written damage report demanded. Lack of an official damage report releases METROHM from any liability to pay compensation.

If any instruments and parts have to be returned, the original packaging should be used if at all possible. This applies above all to instruments, electrodes, buret cylinders and PTFE pistons. Before embedding in wood shavings or similar material, the parts must be packed in a dustproof package (for instruments, use of a plastic bag is imperative). If open assemblies are enclosed in the scope of delivery that are sensitive to electromagnetic voltages (e.g. data interfaces etc.) these must be returned in the associated original protective packaging (e.g. conductive protective bag). (Exception: assemblies with built-in voltage source belong in a non-conductive protective packaging). For damage which arises as a result of non-compliance with these instructions, no warranty responsibility whatsoever will be accepted by METROHM.

5.4.2 Certificate of Conformity and System Validation

This is to certify the conformity to the standard specifications for electrical appliances and accessories, as well as to the standard specifications for security and to system validation issued by the manufacturing company.

Name of commodity:	748 DH Sample Changer
System software:	Stored in ROMs
Name of manufacturer:	Metrohm Ltd., Herisau, Switzerland

This Metrohm instrument has been built and has undergone final type testing according to the standards:

Electromagnetic compatibility: Emission

EN50081-1/92, EN55022/class B, EN55011/class B	Generic emission
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Electromagnetic compatibility: Immunity

IEC801-2/91,	Static discharge
IEC801-3, IEC1000-4-3	Radiated rf electromag. field immunity
EN61000-3-2/95	Harmonic current

Security specifications

IEC1010 class1, EN61010 class1, UL3101-1

The technical specifications are documented in the instruction manual.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance.

The features of the system software are documented in the instruction manual.

Metrohm Ltd. is holder of the SQS certificate of the quality system ISO 9001 for quality assurance in design/development, production, installation and servicing.

Herisau, October 14, 1998



Dr. J. Frank
Development Manager

Ch. Buchmann
Production and
Quality Assurance Manager

Ionenanalytik • Analyse des ions • Ion analysis • Análisis iónico

748 DH Sample Changer**EU Declaration of Conformity**

The company Metrohm AG, Herisau, Switzerland, certifies herewith, that the following instrument:

748 DH Sample Changer

meets the CE mark requirements of EU Directives 89/336/EWG and 72/23/EWG.

Source of specifications:

EN 50081-1	Electromagnetic compatibility, basic specification Emitted Interference
EN 50082-1	Electromagnetic compatibility, basic specification Interference Immunity
EN 61010	Safety requirements for electrical laboratory measurement and control equipment

Description of apparatus:

X,Y,Z Sample Changer with built-in rinsing pump, controlled by a PC via the RS232 interface.

Herisau, October 14, 1998



Dr. J. Frank

Ch. Buchmann

Development Manager

Production and
Quality Assurance

5.5 Scope of delivery, accessories

748 DH Sample Changer 2.748.0010

including the following accessories:

1 Sample beaker, glass, 250 mL	6.1432.320
2 PE containers, 10 L	6.1621.000
1 PVC tubing 4/6, 2m	6.1801.120
1 PVC tubing 8/12, 2m	6.1801.130
1 Tubing nozzle/outer M8 thread	6.1808.050
1 PTFE tubing, 4/6, 45 cm	6.1812.010
1 Connecting nipple for container	6.1828.000
1 Tubing nozzle for container	6.1828.010
3 Cable/tubing clamps	6.2053.010
1 Set rack holders (2 items)	6.2060.000
1 Position adjustment tool	6.2625.000
1 Mains cable with cable socket type CEE(22), V Cable plug to customer's specifications	
Type SEV 12 (Switzerland...)	6.2122.020
Type CEE(7), VII (Germany...)	6.2122.040
Type NEMA/ASA (USA...)	6.2122.070
1 Instructions for Use for 748 DH Sample Changer	8.748.1003

Options

Accessories to separate order and on payment of extra charge:

Titration heads, stirrer, buret tips

Macro titration head for 250 mL beakers.....	6.1463.000
Micro titration head for 75 mL beakers.....	6.1463.010
Rod stirrer, PP.....	2.722.0020
Nipple with M10 thread	4.658.0180
O-ring for nipple with M10 thread	E.301.0083
Tubing for buret tips	
80 cm	6.1805.110
150 cm	6.1805.030
200 cm	6.1805.530
Coupling bush for tubing with M6 threads	6.1808.000
Ball stopper for buret tips in SGJ 14/15.....	6.1446.030

Electrodes

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