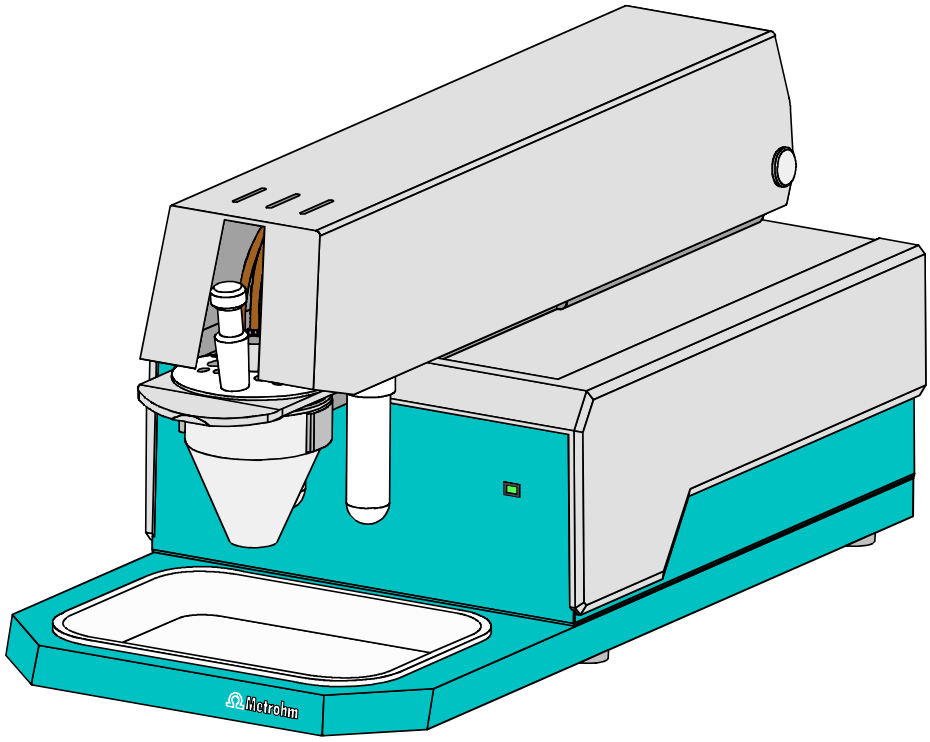
757 VA Computrace



Hardware Manual
8.757.1013

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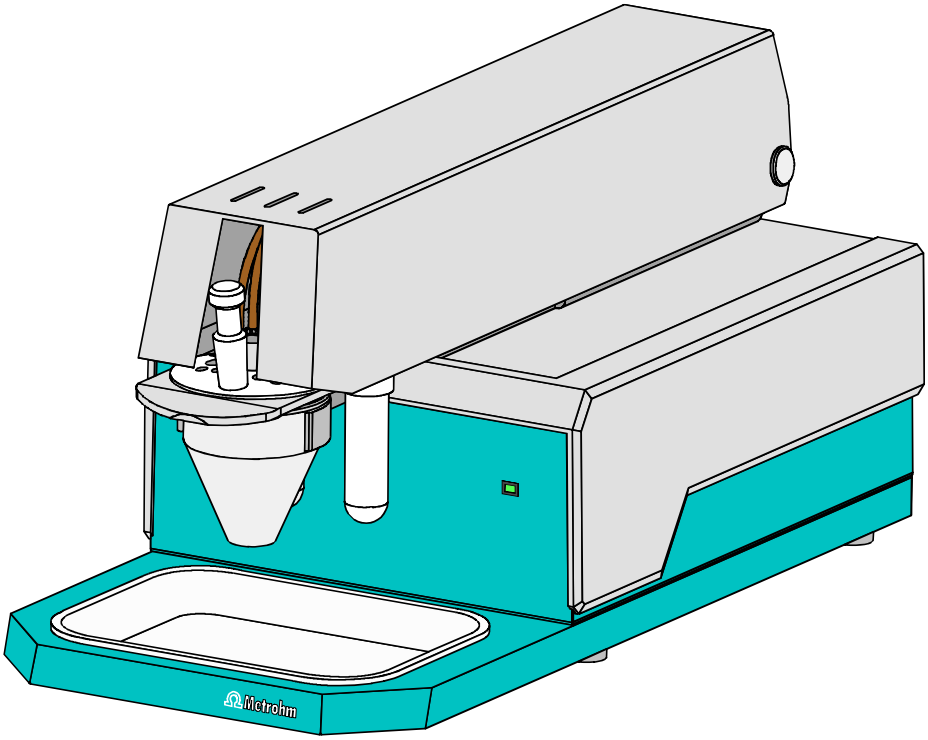
757 VA Computrace



Hardware Manual

8.757.1013

14.09.2001 / dö

Table of contents

List of figures

1 Introduction

1.1 Instrument description

757 VA Computrace is a PC-controlled system for voltammetry, which consists of the following parts:

1.757.0010 **VA Computrace Stand** with accessories

6.5326.000 **VA Computrace Interface**

6.2135.010 **Connecting Cable**

6.6032.100 **VA Computrace Software 2.0**

For a detailed description of the PC software «VA Computrace 2.0» see the **757 Software Manual**.

This **757 Hardware Manual** describes the installation and maintenance of the 757 VA Computrace Stand and its accessories. The central element of this Stand is the multi-mode electrode (MME), which combines the dropping mercury electrode (DME/SMDE) and the stationary hanging mercury drop electrode (HMDE) in a single construction. The rotating disk electrode (RDE) can also be used in the stand.

The parameters necessary for the VA measurement are sent from the PC to the VA Computrace Interface via USB connection. The data acquisition at the 757 VA Computrace Stand is started and controlled by the VA Computrace Interface, which receives and stores the measurement data. At the end of the determination, the recorded data are sent back to the PC where they are evaluated and saved in a determination file.

Operation of the 757 VA Computrace Stand follows the potentiostatic 3-electrode principle in which the voltage of the working electrode is controlled by means of a virtually currentless reference electrode to the preset desired value and the current flows across a separate auxiliary electrode.

1.2 Information about the Instructions for Use

Please read through these Instructions for Use carefully before you put the 757 VA Computrace Stand into operation. The Instructions for Use contain information and warnings to which the user must pay attention in order to assure safe operation of the instrument.

1.2.1 Organization

These **8.757.1013 Hardware Manual** for the 757 VA Computrace Stand provide a comprehensive overview of the installation, operation, and technical specifications of these instruments. The Instructions for Use are divided into the following 6 sections:

Section 1 **Introduction**

Section 2 **Parts and controls**
Numbers and designations of the parts and controls

Section 3 **Installation**
Installation of 757 VA Computrace Stand
Installation of working, reference and auxiliary electrodes
Attachment of 765 Dosimats
Attachment of the 813 Compact Autosampler

Section 4 **Safety**
Electrical safety
Safety considerations in the handling of mercury

Section 5 **Technical data**

Section 6 **Appendix**
Scope of delivery, options, warranty, index

To find the required information on the instrument please use either the **Table of contents** or the **Index** at the back.

1.2.2 Notation and pictograms

The following notations and pictograms (symbols) are used in these Instructions for Use:

Mode	Parameter or entry value
15	**Part or control of 757**
	**Hazard** This symbol draws attention to a possible danger to life or of injury if the associated directions are not followed correctly.
	**Warning** This symbol draws attention to possible damage to instruments or instrument parts if the associated directions are not followed correctly.
	**Caution** This symbol marks important information. First read the associated directions before you continue.
	**Comment** This symbol marks additional information and tips.

1.3 Support documentation

1.3.1 Application Bulletins

The «Application Bulletin» is a collection of analytical methods, application examples and literature references. Of Metrohm's approximately 200 Application Bulletins, ca. 60 refer to Polarography and Voltammetry. All these Application Bulletins are available on request free of charge from your Metrohm supplier.

The examples listed here substantiate the versatility of the polarographic and voltammetric methods for a range of applications including both inorganic and organic substances. At any time you will find an updated list of the Application Bulletins in the Internet under « www.metrohm.com ».

No.	*Title*
7	Literature dealing with the application of polarography for the analysis of petroleum and its derivates
21	Bibliography of polarographic determinations of lead in different materials
23	Some literature indications for the polarographic determination of organic nitro compounds
36	Polarographic analysis – Half-wave potentials of inorganic substances
50	Polarographic determination of lead in petrochemical products
57	Polarographic determination of nicotine
60	Polarographic determination of fructose
70	Polarographic nitrate determination in water samples, soil and plant extracts, vegetable juices, meat and sausage products, fertilizers, liquid manure etc.
73	Polarographic analysis – Half-wave potentials of organic substances
74	Polarographic and stripping voltammetric analysis methods for thallium, antimony, bismuth and iron (copper, vanadium)
76	Polarographic determination of nitrilotriacetic acid (NTA) and ethylenediaminetetraacetic acid (EDTA)
96	Stripping voltammetric analysis of mercury
97	Voltammetric determination of tocopherols (vitamin E) in edible oils and fats
98	Determination of ascorbic acid (vitamin C) and its compounds
104	Polarographic analysis – Half-wave potentials of inorganic substances with complexing agents in the background electrolytes
105	Determination of permissible lead and cadmium levels in crockery and glassware
108	Polarography – Conditions, limits of determination and half-wave potentials of 50 elements not yet listed in Application Bulletins Nos. 36, 73 and 104
110	Polarographic determination of free cyanide
113	Polarographic determination of lead, copper and tin present together in foodstuffs, effluent waters, sewage sludges etc.
114	Polarographic determination of five metal ions (copper, cobalt, nickel, zinc and iron) in a single operation
115	Bibliography concerning inverse voltammetry
116	Polarographic determination of chromium in small quantities
117	Determination of selenium by inverse voltammetry

No.	Title
123	Voltammetric determination of iron and manganese in water samples
124	Polarographic analysis of metals – Half-wave potentials in an oxalate-buffer background electrolyte
126	Polarographic determination of quinine
127	Polarographic determination of ammonium and nitrite
131	Voltammetric determination of aluminum
132	Polarographic determination of molybdenum in strongly ferruginous substances and ferrous metals
136	Polarographic determination of styrene in polystyrenes and copolymers
141	Analysis of edible fats and oils
146	Direct polarographic determination of trace amounts of molybdenum in water
147	Simultaneous trace determination of seven metal ions in «electronic grade» materials with the aid of stripping voltammetry
176	Simultaneous determination of lead and tin by anodic stripping voltammetry
179	Polarographic determination of maleic and fumaric acid alone or in mixtures
186	Adsorptive voltammetric determination of aluminum in water samples
190	Polarographic determination of 4-carboxybenzaldehyde in terephthalic acid
191	Polarographic determination of cystine and cysteine simultaneously
192	Polarographic and stripping voltammetric determination of thiourea in the lower ppm and ppb range
196	Polarographic determination of formaldehyde
199	Polarographic determination of sulphide and sulphite
207	Stripping voltammetric analysis of silver
213	Polarographic determination of nicotinamide
215	Polarographic determination of folic acid (vitamin B_9, vitamin B_C)
218	Polarographic determination of thiamine (vitamin B_1)
219	Polarographic determination of riboflavin (vitamin B_2)
220	Determination of ultratrace levels of platinum by stripping voltammetry
221	Standard methods in water analysis – use of Metrohm instruments
224	Polarographic determination of pyridoxine (vitamin B_6)
226	Determination of the total arsenic content by stripping voltammetry at the rotating gold electrode
231	Voltammetric determination of zinc, cadmium, lead, copper, thallium, nickel and cobalt in water samples according to DIN 38406 E 16
238	Check of Dosimats according to GLP/ISO
241	Determination of cadmium and lead at the «Ultra Trace» graphite electrode by anodic stripping voltammetry
242	Determination of tungsten at the «Ultra Trace» graphite electrode by anodic stripping voltammetry
243	Determination of chromium at the «Ultra Trace» graphite electrode by cathodic stripping voltammetry
250	Polarographic determination of diazepam in body fluids and pharmaceutical preparations

No.	Title
251	Polarographic determination of cinchocaine (dibucaine) in pharmaceutical preparations
254	Determination of zinc, cadmium, lead and copper by anodic stripping voltammetry using carbon electrodes
266	Voltammetric determination of titanium and uranium
276	Validation of Metrohm VA instruments using Standard Operating Procedures

1.3.2 Application Notes

The «Application Notes» present application information in concentrated form. In the field of voltammetry, there are at present approximately 120 Application Notes (in English) which can be viewed in the Internet under « www.metrohm.com » and copied from there. All these Application Notes are printed in the **8.757.2003 VA Applications Collection** supplied with the instrument.

1.3.3 Monographs

The «Metrohm Monographs» listed below impart theoretical fundamentals and general information on measurement techniques and sample preparation of polarography and voltammetry. All these monographs are available on request free of charge from your Metrohm supplier.

Title
First aid for polarography and voltammetry (8.693.1071)
Sample preparation techniques in voltammetric trace analysis
Inorganic Adsorptive Stripping Analysis
Organic Stripping Analysis
Stripping Voltammetry
Electrode Reaction Kinetics determined by Cyclic Voltammetry
The Application of VA Techniques to the Galvanic/Plating Industry
Practical voltammetry (8.757.5003)

1.3.4 Reprints

The following reprints reporting on practical applications are available on request free of charge from your Metrohm supplier.

Title
Investigations of oxidative UV photolysis: I. Sample preparation for the voltammetric determination of Zn, Cd, Pb, Cu, Ni and Co in waters
Investigations of oxidative UV photolysis: II. Sample preparation for the voltammetric determination of mercury in water samples
Determination of Zn, Cd, Pb, and Cu in soils and sewage sludges by microprocessor-controlled voltammetry in comparison with AAS
Voltammetric instrument for training and trace analysis

2 Parts and controls

In this section you will find the numbers and designations of the parts and controls of the 757 VA Computrace Stand. The numbering applies throughout the instructions for use, i.e. bold numbers in the text (e.g. **15***) refer to the parts and controls illustrated here.*

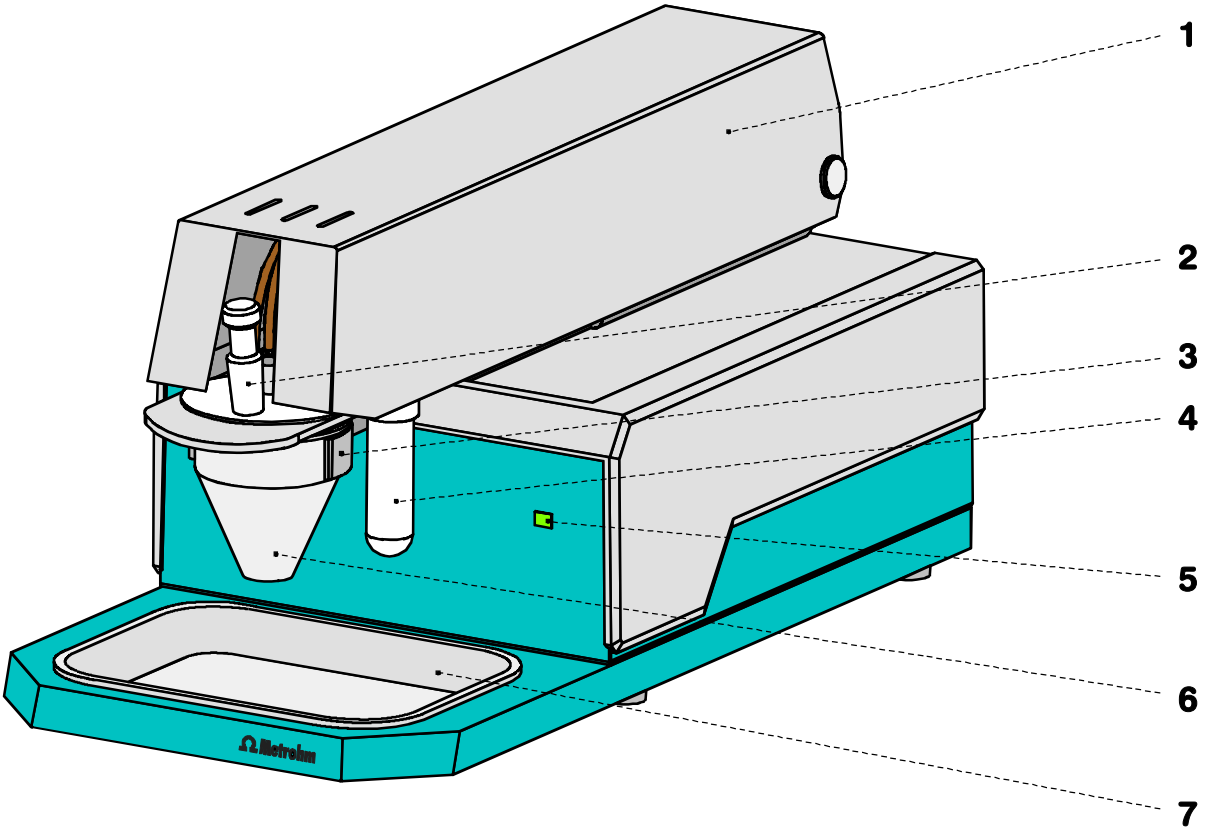


Fig. 1: Front of the 757 VA Computrace Stand

1	**Cover of measuring head arm** hinged	**5**	**Mains pilot lamp** lit up when instrument switched on
2	**Stopper (6.2709.080)** to close the pipetting opening	**6**	**Measuring vessel** when measuring head arm is fully raised, the measuring vessel can be pulled forward out of the holder **3**
3	**Holder for measuring vessel**	**7**	**Drip pan (6.2711.040)**
4	**Gas wash bottle (6.2405.030)** for inert gas supply (filling with dist. water, see *section 3.2.5*)		

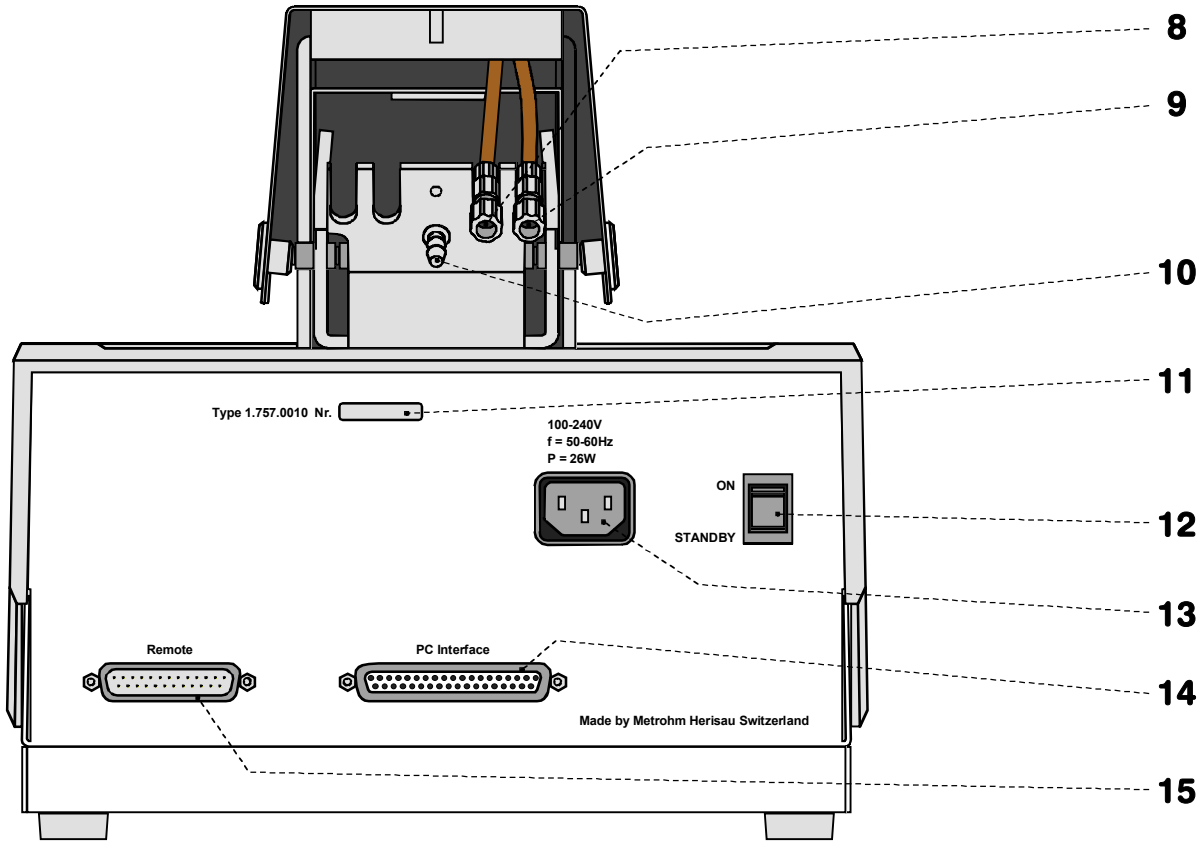


Fig. 2: Rear of the 757 VA Computrace Stand

8 Connection for inert gas lead-off

9 Connection for optional waste solution lead-off

10 Connection for inert gas supply
required pressure:
$p = 1 \pm 0.2$ bar

11 Serial number

12 Mains switch (on/off)
on/off switching of instrument (the pilot lamp **5** is lit up when the instrument is on)

13 Mains connection plug
mains connection, see *section 3.2.1*

14 Connection to VA Computrace Interface
connection socket for 6.2135.010 cable leading to the 6.2155.000 VA Computrace Interface, see *section 3.2.3*

15 Connection
connection socket for 665/765 Dosimats and 813 Autosampler, see *section 3.8* and *3.9*

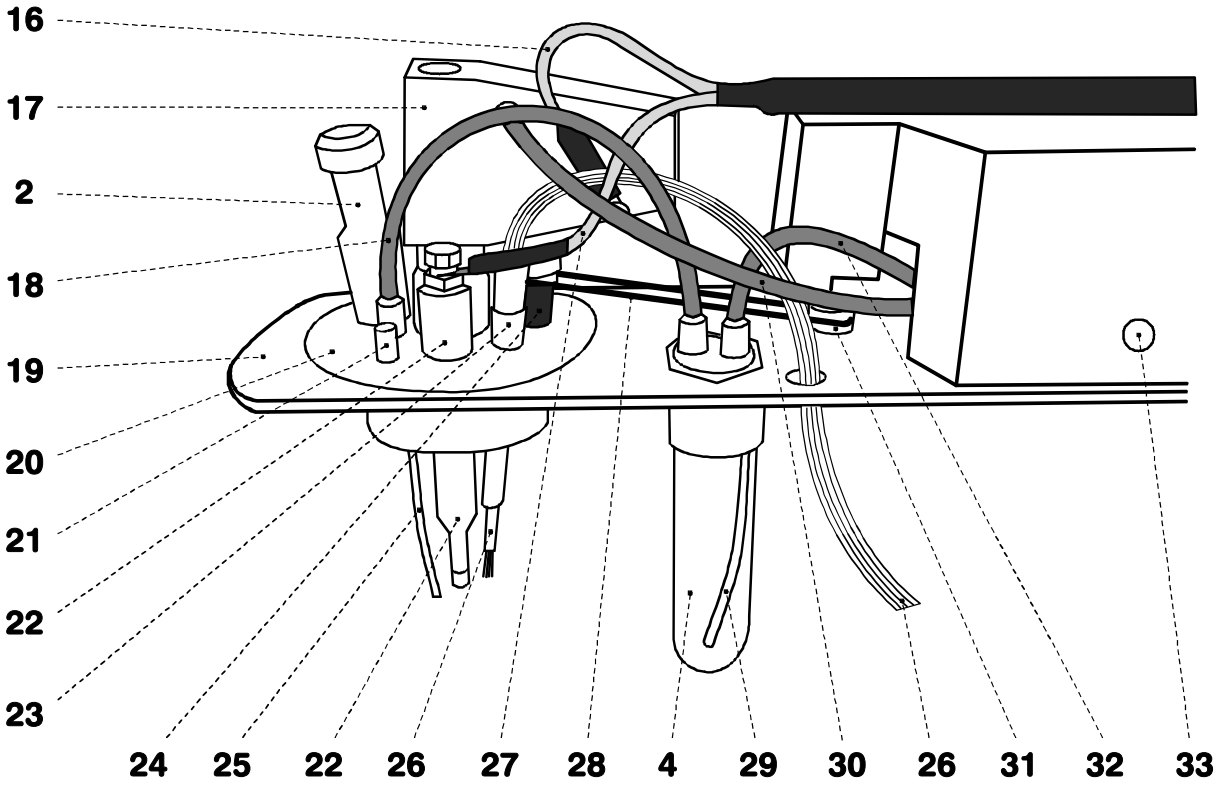


Fig. 3: Right side view of the 757 VA Computrace Stand (fully equipped)

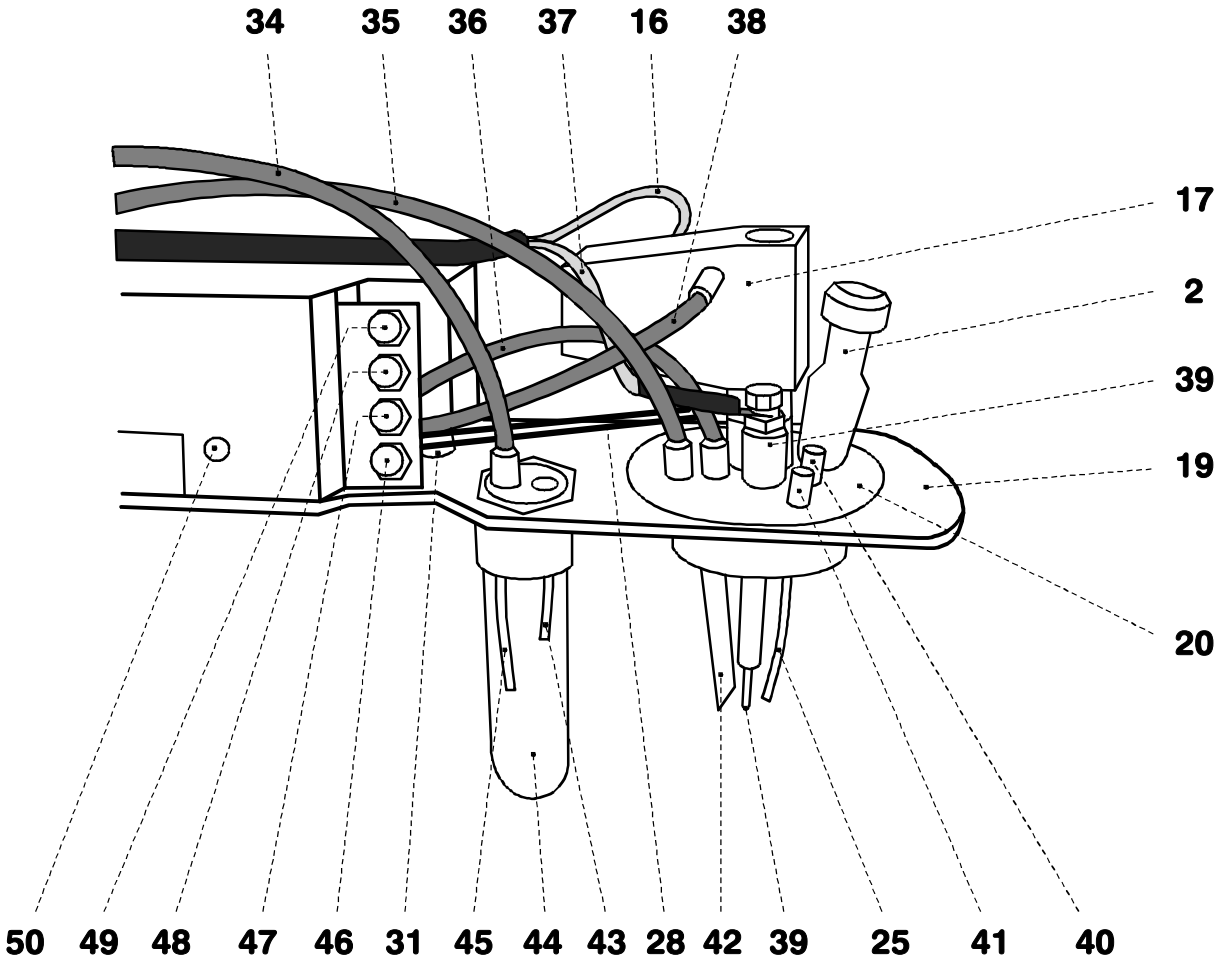


Fig. 4: Left side view of the 757 VA Computrace Stand (fully equipped)

2 **Stopper (6.2709.080)**
to close the pipetting opening

4 **Gas wash bottle (6.2405.030)**
for inert gas supply
(must be filled halfway with dist. H_2O, see *section 3.2.5*)

16 **Electrode cable "WE"**
connection for working electrode (MME or RDE)

17 **Multi-mode electrode (MME) (6.1246.020)**
details, see *section 3.3*

18 **FEP tubing (6.1805.180)**
for inert gas supply to measuring vessel (attached)

19 **Measuring head arm**
carrier plate with permanently attached measuring head, raisable

20 **Measuring head**
measuring vessel upper half made of PTFE; with openings for electrodes, stirrer, gas and liquid supply lines

21 **Dummy stopper (6.1446.040)**

22 **Reference electrode**
comprising 6.0728.020 Ag/AgCl Reference system and 6.1245.010 Electrolyte vessel (details, see *section 3.5*)

23 **Nipple (6.2730.030)**
for mounting the 4-way microtip **26** or a dummy stopper

24 **Drive shaft (6.1246.010)**
holder for stirrer tip **42**

25 **PTFE tube (6.1819.000)**
(attached)

26 **4-way microtip (6.1824.000)**
for delivery of solutions; with 4 lengths of PTFE tubing with connecting nipples for 765 Dosimat

27 **Electrode cable "RE"**
connection for reference electrode **22**

28 **Drive belt (6.1244.020)**
connection between drive wheel **31** and drive shaft **24**

29 **PTFE tube (4.647.1350)**
for inert gas delivery to gas wash bottle **4** (attached)

30 **FEP tubing (6.1805.180)**
for inert gas supply to MME **17**

31 **Drive wheel of drive motor**

32 **FEP tubing (6.1805.040)**
for inert gas delivery to gas wash bottle **4** (attached)

33 **Slotted screw for controlling the inert gas flow**
Note: The factory setting of ca. 20 L/h should not be changed without good reason!

34 **FEP tubing (6.1805.100)**
for waste solution lead-off (attached)

35 **FEP tubing (6.1805.090)**
for inert gas lead-off (attached)

36 **FEP tubing (6.1805.180)**
for inert gas supply to tapping mechanism (attached)

37 **Electrode cable "AE"**
connection for auxiliary electrode **39**

38 **FEP tubing (6.1805.180)**
for inert gas supply to MME **17**

39 **Auxiliary electrode**
details, see *section 3.6*

40 **Dummy stopper (6.1446.040)**

41 **Dummy stopper (6.1446.040)**

42 **Stirrer tip (6.1204.090)**

43 **PTFE tube (6.1819.010)**
for optional supply of the waste solution to gas wash bottle **44** (attached)

44 **Gas wash bottle (6.2405.030)**
for separating mercury from the waste solution (attached)

45 **PTFE tube (6.1819.010)**
for optional siphoning off the waste solution from gas wash bottle **44** (attached)

46 **Dummy cell connection "WE-D"**
differential mode simulation (peak/wave)

47 **Dummy cell connection "WE-L"**
linear mode simulation (RC element)

48 **Dummy cell connection "RE"**

49 **Dummy cell connection "AE"**

50 **Slotted screw for controlling the tapping power in the DME case**
Note: The factory setting should not be changed without good reason!

3 Installation

This section offers a full description of the 757 VA Computrace Stand and provides detailed information on the various electrodes and the stirrer. Reliable operation of the instrument is assured only if you follow the instructions in this section exactly.

3.1 Setting up the instrument

3.1.1 Packaging

The 757 VA Computrace Stand is supplied together with the separately packed accessories in special packages designed to ensure excellent protection. These contain shock-absorbing foam linings foamed to the individual shape and embedded in blue plastic film. The instrument itself is packed in an evacuated polyethylene bag. As only these special packaging guarantees indemnified transport of the instrument, it is essential you store it in a safe place.

3.1.2 Check

After receipt, immediately check whether the shipment is complete and has arrived without damage (compare with delivery note and list of accessories in *sections 6.1*). In the case of transport damage, see instructions in *section 6.3* "Warranty".

3.1.3 Location

Place the 757 VA Computrace on a laboratory bench in a position suitable for operation and which is free from vibrations, protected against corrosive atmospheres and contamination by chemicals. The drip pan **7** (6.2711.040) has to be placed at the front side of the 757 VA Computrace Stand to catch drops (see *Fig. 1*).

3.2 Installation of the 757 VA Computrace Stand

*If the 757 VA Computrace Stand is connected to the power supply, the instrument may not be opened or parts removed as there is a danger of contact with live components. Before you open the 757 VA Computrace Stand to change components or for maintenance or repair work, always switch on the instrument by setting the mains switch **12** to the ON position and then disconnect the mains cable from the mains connection plug **13** of the 757 VA Computrace Stand !*

3.2.1 Mains cable and mains connection

The instrument is supplied with one of three mains cables:

- 6.2122.020 with plug SEV 12 (Switzerland, …)
- 6.2122.040 with plug CEE(7), VII (Germany, …)
- 6.2133.070 with plug NEMA 5-15 (USA, …)

which are three-cored and fitted with a plug with an earthing pin. If a different plug has to be fitted, the yellow/green lead (IEC standard) must be connected to protective earth (protection class 1).

Any break in the earthing inside or outside the instrument can make it a hazard!

Plug the mains cable into mains connection plug **13** of the 757 VA Computrace Stand (see *Fig. 2*).

3.2.2 Switching the instrument on/off

The 757 VA Computrace Stand is switched on and off using mains switch **12**. When the instrument is switched on, the pilot lamp **5** lights up.

3.2.3 Connection to the PC

The 757 VA Computrace Stand is connected to the PC via 6.2155.000 VA Computrace Interface. Proceed as follows:

1 Software installation

- Switch on PC and start operating system (Windows™ 2000) without connection of the VA Computrace Interface via USB cable.
- Insert installation CD into CD drive.
- If the autorun option for the CD drive is disabled, select **<Start>** and **Run**. Browse for the **Setup.exe** file on the installation CD and click on **<OK>**.
- Click on "**757**" and follow the instructions given in the setup program. Select the **VA Computrace Interface (USB)** option for the interface type. The software package will be installed in the desired directory (the default directory is **Programs**/**Metrohm**/**757 VA Computrace**).
- Restart the PC.

2 Connection of the VA Computrace Interface

- Connect 6.2155.000 VA Computrace Interface to connection **14** "PC Interface" of the 757 VA Computrace using the **6.2135.010 cable** and switch on 757 VA Computrace Stand (see *Fig. 5*).
- Connect VA Computrace Interface to the **6.2158.000 Mains Adapter** connected to the mains.
- Connect VA Computrace Interface to the PC using the **6.2151.020 USB cable**. The PC detects a new USB device and starts the setup wizard. Insert installation CD into CD drive and follow the wizard instructions always selecting the recommended default options.
- Start the VA Computrace software.

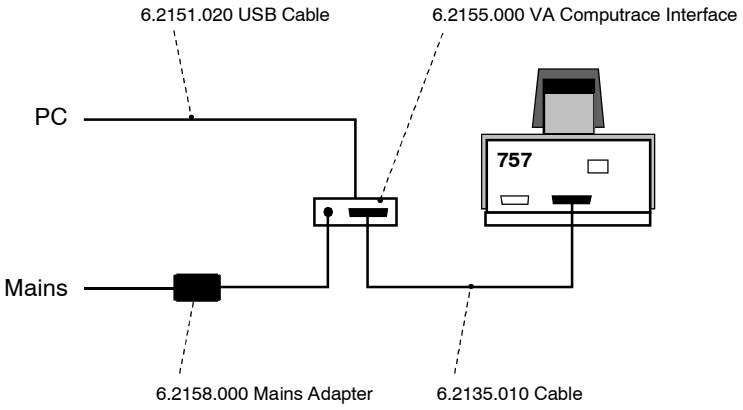


Fig. 5: Connection to the PC

3.2.4 Equipping the measuring head

The fixtures inserted in the openings and connections of the measuring head **20** in the 757 VA Computrace Stand depend on the working electrode selected (MME or DME) (see *Fig. 6*). The fully equipped measuring head for operation with a multi-mode electrode is illustrated in *section 2* (*Figs 3 and 4*), that for operation with a rotating disk electrode in *section 3.4* (*Fig. 12*).

When equipping the measuring head for the first time, the best procedure is as follows:

1 Preparations

- Prepare multi-mode electrode MME **17** (details, see *section 3.3*) or rotating disk electrode RDE (details, see *section 3.4*) for operation.
- Prepare reference electrode **22** (details, see *section 3.5*) for operation.
- Tilt back cover **1** of measuring head arm.

2 Insert dummy stoppers

- Screw dummy stopper **41** (6.1446.040) into opening **52**.
- Screw dummy stopper **40** (6.1446.040) into opening **53**.

3 Insert 4-way microtip (option)

The 6.1824.000 4-way microtip has to be installed if 765 Dosimats are used for automatic solution addition. Proceed as follows:

- Remove stopper from nipple **23** and insert 4-way microtip **26** into nipple **23** as far as it will go.
- Tighten nipple **23** using a 6.2739.010 Wrench until the 4-way microtip **26** can no longer move.
- Pull the 4 lengths of PTFE tubing of the 4-way microtip **26** in succession from above through the opening **65** (connection of 665 or 765 Dosimat, see *section 3.8*).

4 Install stirrer or RDE

in operation with MME:

- Screw stirrer tip **42** to drive shaft **24** (see also *section 3.7*).
- Insert stirrer in opening **60** as far as it will go.
- Stretch drive belt **28** (6.1244.020) between drive wheel **31** and drive shaft **24** of the stirrer.

in operation with RDE (option):

- Screw electrode tip **99** (6.1204.XXX) to drive shaft **100** (6.1246.000) (see also *section 3.4*).
- Insert RDE in opening **60** as far as it will go.
- Stretch drive belt **28** (6.1244.020) between drive wheel **31** and drive shaft **100** of the RDE.
- Attach electrode cable **16** (WE) to the RDE: push cable lug under the screw and then tighten screw firmly.

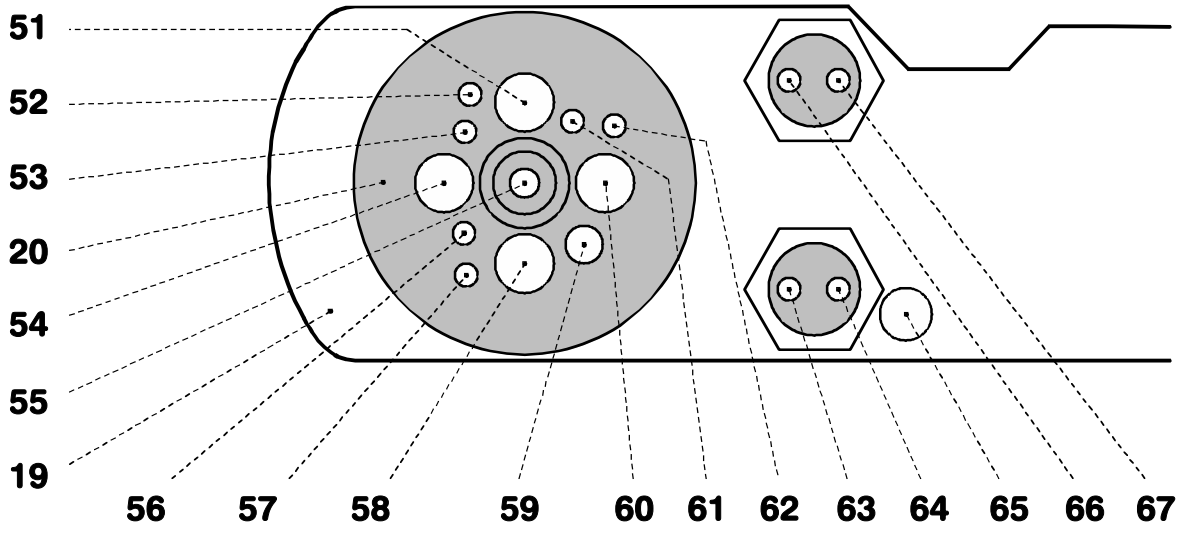


Fig. 6: Measuring head arm

19	**Measuring head arm**
20	**Measuring head**
51	**Opening** for auxiliary electrode **39** (6.0343.000 Pt auxiliary electr. or optional GC electr. comprising 6.1241.020 Electrode holder and 6.1247.000 GC tip)
52	**Threaded opening** for dummy stopper **41** (6.1446.040)
53	**Threaded opening** for dummy stopper **40** (6.1446.040)
54	**Pipetting opening** for the manual addition of solutions, closed with stopper **2** (6.2709.080).
55	**Opening** *in operation with MME:* for multi-mode electrode **17** (6.1246.020) *in operation with RDE:* for 6.2709.040 Stopper (option)
56	**Threaded opening** for FEP tubing **18** (6.1805.180, already permanently attached); inert gas supply to measuring vessel **6**
57	**Threaded opening** for dummy stopper **21** (6.1446.040)
58	**Opening** for reference electrode **22** (6.0728.020 Ag/AgCl reference system and 6.1245.010 Electrolyte vessel)
59	**Threaded opening** for nipple **23** (6.2730.030) with dummy stopper or 4-way microtip **26** (6.1824.000)
60	**Opening** *in operation with MME:* for stirrer, comprising drive shaft **24** (6.1246.010) and stirrer tip **42** (6.1204.090) *in operation with RDE:* for rotating disk electrode (option), comprising drive shaft **100** (6.1246.000) and electrode tip **99** (6.1204.XXX)
61	**Threaded opening** for FEP tubing **36** (6.1805.180, already permanently attached); inert gas supply for tapping mechanism
62	**Threaded opening** for FEP tubing **35** (6.1805.090, already perm. attached); inert gas lead-off
63	**Threaded opening** for FEP tubing **18** (6.1805.180, already permanently attached); inert gas supply from gas wash bottle **4** to measuring vessel **6**
64	**Threaded opening** for FEP tubing **32** (6.1805.040, already permanently attached); inert gas supply to gas wash bottle **4**
65	**Opening** for feedthrough of tubing connections of 4-way microtip **26** (6.1824.000)

66 Threaded opening
for FEP tubing **68** (6.1805.180); optional waste solution lead-off

67 Threaded opening
for FEP tubing **34** (6.1805.090, already permanently attached); optional waste solution supply from gas wash bottle to waste

5 Install reference electrode

- Insert reference electrode **22** in opening **58**.
- Attach electrode cable **27** (RE) to reference electrode **22**: push cable lug under the screw and then tighten screw firmly.
- Turn reference electrode **22** so that the electrode cable **27** points to the rear and not to the side (in the latter position it may become kinked and damaged when cover **1** is closed).

6 Install auxiliary electrode

- Insert auxiliary electrode **39** (6.0343.000 Pt auxiliary electrode or GC auxiliary electrode, see *section 3.6*) in opening **51**.
- Attach electrode cable **37**) (AE) to auxiliary electrode **39**: push cable lug under the screw and then tighten screw firmly.
- Turn auxiliary electrode **39** so that the electrode cable **37** points to the rear and not to the side (in the latter position it may become kinked and damaged when cover **1** is closed).

7 Install MME or dummy stopper

in operation with MME:

- Carefully insert multi-mode electrode **17** (6.1246.020) in opening **55** (the underside of the capillary must not touch the measuring head during insertion) and push in as far as it will go.
- Screw FEP tubing **30** (6.1805.180) for inert gas supply into connection **72** of the MME **17**.
- Screw FEP tubing **38** (6.1805.180) for inert gas supply into connection **73** of the MME **17**.
- Attach electrode cable **16** (WE) to screw connection **89** of the MME **17**: push cable lug under the screw and then tighten screw firmly.

in operation with RDE (option):

- Insert stopper **98** (6.2709.040, option) into opening **55** as far as it will go so that the two blind holes point to the rear of the stand.
- Screw FEP tubing **30** (6.1805.180) into upper hole of stopper **98**.
- Screw FEP tubing **38** (6.1805.180) into lower hole of stopper **98**.

8 Install measuring vessel

- Tilt back measuring head arm **19**.
- Slide measuring vessel **6** into holder **3** from the front and fill with analyte solution or dist. H_2O (storage solution) until the tips of the MME and the reference electrode are immersed in the liquid.
- Lower measuring head arm **19** and cover **1**.

3.2.5 Inert gas connection

Nitrogen (N_2) is generally used as the inert gas to deaerate the analyte solution and for operation of the MME. The nitrogen must be of sufficient purity.

$w(N_2) \geq 0.99996$ (= 99.996%)
for general polarography/voltammetry

$w(N_2) \geq 0.99999$ (= 99.999% = "5 × 9")
for analyses in organic solvents; for determinations involving very high current amplification (e.g. in the determination of very low concentrations without preceding enrichment)

The scheme for deaeration of the analyte solution and the inert gas connections at the 757 VA Computrace Stand needed for operation of the MME is shown in *Fig. 7*. The inert gas connections are established as follows:

1 Fill gas wash bottle

- Unscrew gas wash bottle **4** from measuring head arm **19**.
- Fill gas wash bottle **4** half full with dist. H_2O (for long-term measurements with supporting electrolytes such as HAc buffer or NH_3 buffer, fill with supporting electrolyte; for measurements in organic solvents fill with the used solvent).
- Screw gas wash bottle **4** back on measuring head arm **19**.

2 Connect inert gas supply

- Attach one end of 6.1801.080 PVC tubing to connection **10** of the 757 VA Computrace Stand.
- Attach the other end of the 6.1801.080 PVC tubing to connection of the inert gas bottle.
- Set inert gas pressure at gas bottle using the reducing valve to $p = 1 \pm 0.2$ bar.
- Open gas supply line at gas bottle.

3 Connect inert gas lead-off (option)

- Attach a length of suitable tubing (e.g. Metrohm 6.1805.030, length 150 cm) to connection **8** for inert gas lead-off.
- Route the other end of the lead-off tubing to a fume cupboard.

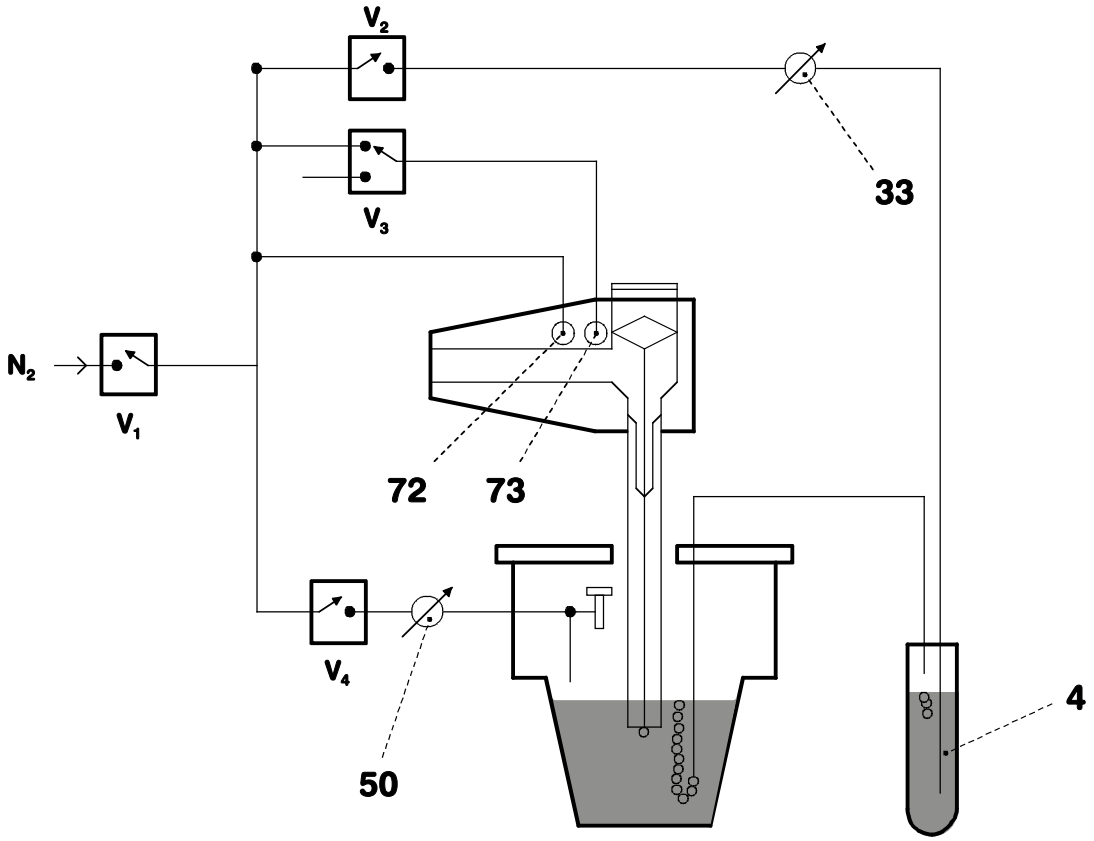


Fig. 7: Scheme showing the inert gas connections at the 757 VA Computrace Stand

4	**Gas wash bottle (6.2405.030)** for inert gas supply (must be filled only halfway with dist. H_2O or supporting electrolyte, see also *Fig. 3*)
33	**Slotted screw for controlling the inert gas flow for deaeration** (see also *Fig. 3*) *Note: The factory setting of ca. 20 L/h should not be changed without good reason!*
50	**Slotted screw for controlling the tapping power in the DME case** (see also *Fig. 4*) *Note: The factory setting should not be changed without good reason!*
72	**Connection for inert gas supply of the MME** for raising and lowering the sealing needle in the MME (see also *section 3.3.1 and Fig. 8*)
73	**Connection for inert gas supply of the MME** for pressurizing the mercury (see also *section 3.3.1 and Fig. 8*)
V_1...V_4	**Valves**

3.3 Multi-mode electrode (MME)

The multi-mode electrode combines the most important polarographic and voltammetric mercury electrodes in a single construction:

- **HMDE** **Hanging mercury drop electrode**
  Mercury is forced through a glass capillary until a drop forms at the capillary tip and the entire voltage sweep performed on this single stationary drop; in general with preceding enrichment (stripping voltammetry).

- **DME** **Dropping mercury electrode**
  The classical electrode, the mercury drops fall from the glass capillary at a controlled rate.

- **SMDE** **Static mercury drop electrode**
  The latest electrode, it combines the features of the DME and the HMDE: during the measurement, the drop surface is constant and stationary (as with the HMDE); however, for the complete voltage sweep several drops are needed (renewal as with the DME).

3.3.1 Construction and operating characteristics of the MME

The construction of the 6.1246.020 Multi-mode electrode is shown in *Fig. 8*. The mercury in the reservoir **82** flows through the glass capillary **88** forming a drop at its end. The mercury flow is controlled by the sealing needle **76**, which can be raised or lowered pneumatically. The different types of electrodes (HMDE, DME, SMDE) are implemented by timed opening or closing of the mercury flow using this sealing needle.

The operating characteristics of the MME are illustrated by *Figs. 7 and 8*. After valve V_1 (inert gas supply) is opened, the mercury in the reservoir **82** is pressurized. In the standby mode, a back pressure is built up in the interior of the slotted screw **75** which causes the built-in spring to press the sealing needle **76** onto the capillary opening of the glass capillary **88** thus preventing the outflow of mercury. Switching the valve V_3 allows the inert gas to escape thus releasing the back pressure. The inert gas pressure in the mercury reservoir **82** presses the sealing needle **76** fixed to the PTFE membrane of the slotted screw **75** upwards and the mercury can now flow out. The tapping mechanism of the DME and SMDE is triggered by brief opening and closing of valve V_4.

The mercury drops formed at the end of the capillary are very small and stable and thus afford a very good signal/noise ratio. The mercury hermetically sealed in the reservoir comes into contact only with inert gas and other inert materials and suffices for around 200'000 drops.

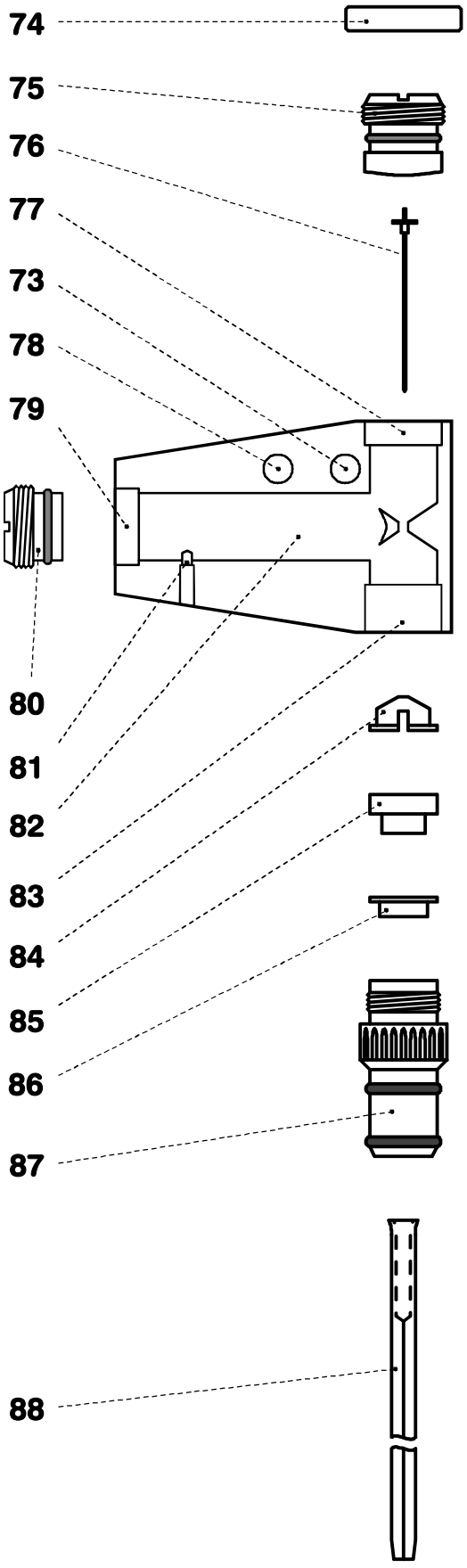
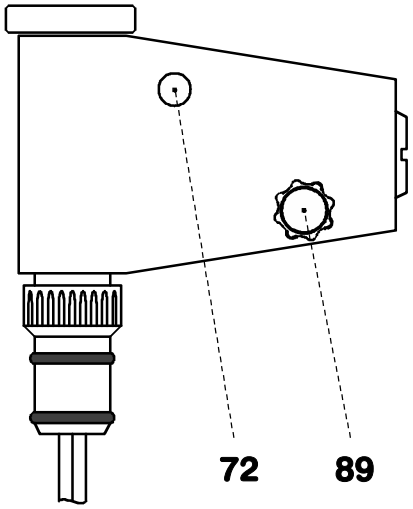


Fig. 8: Multi-mode electrode



72	**Connection for inert gas supply**
73	**Connection for inert gas supply** (for all MME operating modes)
74	**Locking ring (4.420.2920)** for slotted screw **75**
75	**Slotted screw (6.1247.040)** with PTFE membrane and built-in spring
76	**Sealing needle (6.1247.020)**
77	**Screw thread** for slotted screw **75**
78	**Unused connection**
79	**Screw thread** for slotted screw **80**
80	**Slotted screw (4.420.2960)** for replenishing the mercury with capillary fitted
81	**Electrical contact pin for mercury**
82	**Mercury reservoir**
83	**Screw thread** for retaining nut **87**
84	**Insert ring (4.420.3011)**
85	**Sealing ring (4.420.2800)** made of silicone rubber
86	**Locking ring (4.420.2870)**
87	**Retaining nut (4.420.2850)**
88	**Glass capillary (6.1226.030)**
89	**Screw connection** electrical contact for "WE" electrode cable

3.3.2 Filling the MME with mercury

When handling mercury, it is necessary to take special precautionary measures. These are described in detail in section 4.2.

All actions involving the electrode and mercury vessels must be performed in or over the drip pan **92** *supplied (see Fig. 10).*

The Hg reservoir **82** of the multi-mode electrode **17** is filled with mercury of the highest degree of purity (mass fraction $w \geq 0.99999$) as follows:

1 Prepare multi-mode electrode

- Unscrew locking ring **74** from slotted screw **75** (this gray PVC ring is needed only to remove the slotted screws **75** or **80**, see *section 3.3.7* and *section 3.3.9*).
- Turn slotted screw **75** in or out of the screw thread **77** using a suitable coin until the contact surface of the black O-ring at the Plexiglas wall (thin, black stripe) is just visible below the metal thread **77**.
- Remove the plastic cap used as a transport safeguard from the retaining nut **87**.
- Undo retaining nut **87** fully and remove from screw thread **83**.
- Place multi-mode electrode **17** with the capillary opening facing upwards in the electrode holder **93** (see *Fig. 9*).

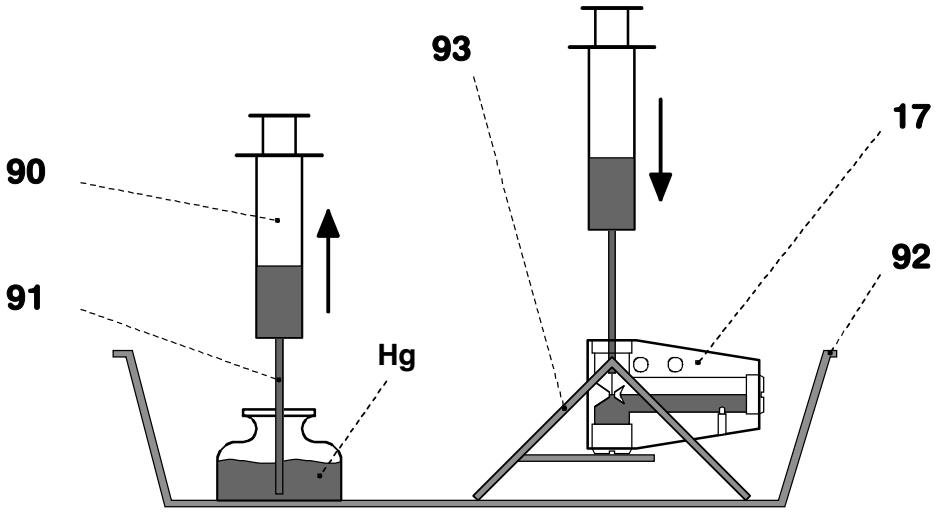


Fig. 9: Adding the mercury

17	**Multi-mode electrode (6.1246.0020)**	**92**	**Drip pan (6.2711.030)**
90	**Syringe (6.2816.020)**	**93**	**Electrode holder (6.2615.030)**
91	**Needle (6.2816.030)**		

2 Draw up mercury

- Attach needle **91** to syringe **90**.
- Draw up 6 mL ultrapure mercury slowly and carefully using syringe **90**.

3 Add mercury to MME

- Lower syringe needle **91** into the top opening of the MME **17** between sealing ring **85** and sealing needle **76**.
- Expel mercury slowly and carefully from the syringe to allow it to flow into the Hg reservoir **82**.

*The Hg reservoir **82** must never be filled more than $^{2}/_{3}$ full with mercury.*

3.3.3 Mounting the capillary

The glass capillaries **88** for the multi-mode electrode **17** are supplied separately in a protective plastic package. After they have been unpacked, avoid any contact whatsoever with the sensitive capillary tip. The capillary **88** is mounted in the MME filled with mercury as described in *section 3.3.2* as follows:

1 Insert retaining nut

- Screw retaining nut **87** into screw thread **83** until a slight resistance is noticeable (on no account screw in retaining nut fully!).

2 Insert capillary

- Cut open plastic package containing the glass capillary **88** on the side of the large capillary opening using scissors (do not tear open), leave capillary in the package.
- Insert glass capillary **88** directly from its protective plastic package through the retaining nut **87** into the sealing ring **85** and push in as far as it will go.

3 Tighten retaining nut

- Firmly tighten retaining nut **87** by hand (do not use a tool). The glass capillary **88** should then be centered in the opening of the retaining nut **87**.
- If this is not the case, undo retaining nut **87** by one full turn and then retighten by hand. When tightening, move glass capillary **88** in a circle so that it is centered in the feedthrough of the retaining nut **87**.

3.3.4 Filling the capillary without vacuum

The glass capillary **88** can normally be filled with mercury by the method described here without vacuum. However, if difficulties regarding stability or reproducibility arise with a capillary filled in this manner, try to fill the capillaries by the alternative method with vacuum (*section 3.3.*5).

To fill the mounted glass capillary **88** (*section 3.3.3*) with Hg without vacuum, proceed as follows:

1 Install multi-mode electrode in 757 VA Computrace Stand

- With the measuring head arm **19** tilted back, slide the empty measuring vessel **6** into the holder **3** of the 757 VA Computrace Stand and then lower the measuring head arm **19**.
- Carefully insert multi-mode electrode **17** in opening **55** of the measuring head **20** (during insertion, the tip of the capillary **88** must not touch the measuring head) and push in carefully as far as it will go. Avoid water drops touch the tip of the capillary.

2 Connect multi-mode electrode

- Screw FEP tubing **30** for the inert gas supply into connection **72** of the multi-mode electrode **17**.
- Screw FEP tubing **38** for the inert gas supply into connection **73** of the multi-mode electrode **17**.
- Attach electrode cable **16** (WE) to screw connection **89** of the multi-mode electrode **17**: push cable lug under the screw and then tighten screw firmly.

3 Fill capillary with mercury

- Switch on 757 VA Computrace Stand with mains switch **12** (the 757 VA Computrace Stand must first be installed properly as described in *section 3.2*).
- Start the VA Computrace program and click on  or **MAIN WINDOW** / **Utility** / **Computrace control** to open the **COMPUTRACE CONTROL** window. Then switch on the inert gas supply to the 757 VA Computrace Stand by clicking on **DME**. This pressurizes the multi-mode electrode **17** and the mercury begins to flow slowly out of the capillary.
- Gently tap the MME with your finger (to remove any air bubbles) and allow the mercury to flow out of the capillary into the empty measuring vessel for approx. 2 min.
- Fill measuring vessel **6** with 10 mL ultrapure water and add 1 drop KCl solution (in pure water, mercury drops from the capillary only with difficulty).
- Allow mercury to flow out of the capillary for ca. 2 min while checking the drop formation: The drop time should be ca. 3 s.

4 Adjusting the sealing needle 76

- Turn slotted screw **75** using a suitable coin slowly in a clockwise direction until the mercury flow stops.
- Open slotted screw **75** slightly in an anticlockwise direction until the mercury flow restarts.
- Gently tap the MME with your finger and turn the slotted screw **75** very slowly clockwise until the mercury flow just stops. (The tapping action is used to knock off the mercury drops so that it is easier to see whether mercury continues to flow.)
- Finally, turn slotted screw **75** a quarter of a turn clockwise.

5 Checking the MME for leaks

- Switch on the dropping mercury electrode by selecting **DME** in the **COMPUTRACE CONTROL** window and clicking on New drop. The mercury drops freely out of the capillary.
- Select **HMDE** and click on New drop. A single mercury drop is formed. Knock this off by gently tapping the MME **17** with your finger and check that the mercury flow has really stopped. Repeat this operation several times.
- If mercury continues to flow, turn slotted screw **75** still further in a clockwise direction and repeat check.
- If it is not possible to stop the mercury flow, both the glass capillary **88** and the sealing needle **76** have to be replaced (see *section 3.3.9*).

3.3.5 Filling the capillary using vacuum

Filling of the glass capillary **88** with vacuum is advisable in all cases where difficulties have been found with the method without vacuum described in *section 3.3.4*. Filling with vacuum is especially recommended when no ultrapure Hg is available.

To fill the mounted glass capillary **88** (*section 3.3.3*) with Hg with vacuum, proceed as follows:

1 Set up filling station

- All actions involving the electrode and the mercury vessels must be performed in or over the drip pan **92** supplied (see *Fig. 10*).
- The MME **17** is placed in the electrode holder **93** for filling.

2 Connection for vacuum pump

- For filling the capillary **88**, the filling tubing **94** is required. At one end it is fitted with a filling cone **95** for mounting on the capillary **88**, and at the other end with the tubing coupling **97** for attachment to the line for the vacuum pump.
- To avoid possible mercury losses, two gas wash bottles **96** are attached to the filling tubing **94**.

3 Vacuum pump

- To draw up mercury a suitable vacuum pump is required (e.g. water jet pump). The partial vacuum Δp should be around 25 mbar.
- A vacuum release tap must be installed at the vacuum pump or in the line between the gas wash bottle and the pump for slowly releasing the vacuum.

4 Mount filling tubing

- Mount filling tubing **94** with filling cone **95** on glass capillary **88**.
- Connect filling tubing **94** with tubing coupling **97** to the two gas wash bottles **96** and the vacuum pump (see *Fig. 10*).

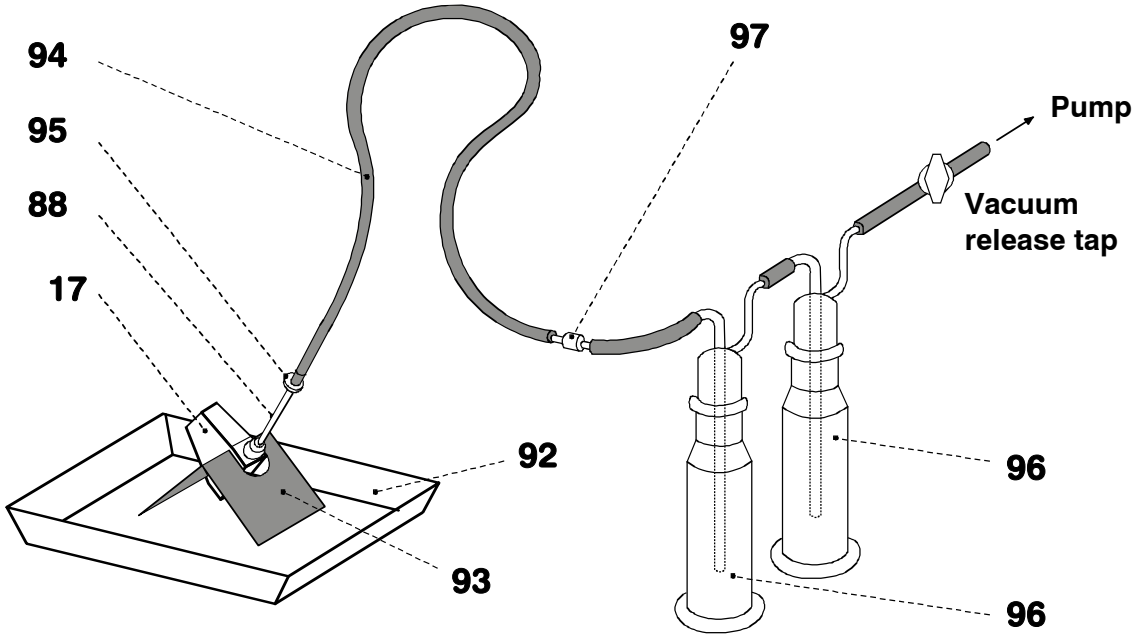


Fig. 10: Setting up the filling station

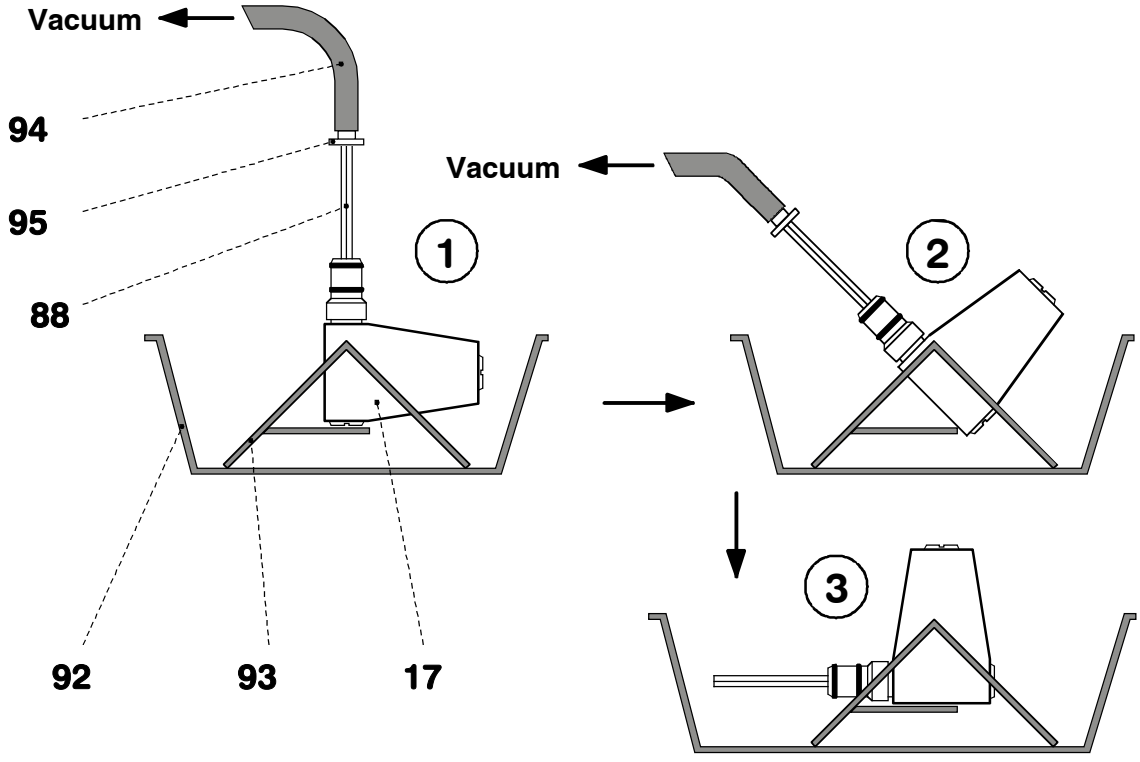


Fig. 11: Filling the capillary

17	**Multi-mode electrode (6.1246.0020)**	**94**	**Filling tubing (6.1817.000)**
88	**Glass capillary (6.1226.030)**	**95**	**Filling cone (4.420.2860)** (part of the filling tubing **94**)
92	**Drip pan (6.2711.030)**	**96**	**Gas wash bottle**
93	**Electrode holder (6.2615.030)**	**97**	**Tubing coupling (6.1809.000)** (part of the filling tubing **94**)

5 Evacuating in vertical position

- Place multi-mode electrode **17** vertically in the electrode holder **93** (see *Fig. 11-1*).
- Evacuate for ca. 2 min in this position.

6 Evacuating in inclined position

- Carefully tilt multi-mode electrode **17** in the electrode holder **93** to an inclined position and continue evacuating (see *Fig. 11-2*).

7 Release vacuum

- As soon as mercury issues from the tip of the glass capillary **88** into the filling tubing **94**, carefully release the vacuum by opening the vacuum release tap.

The filling tubing **94** *must not be disconnected from the glass capillary* **88** *when under vacuum, otherwise the mercury which has issued from the capillary would be sprayed onto the tubing wall and can no longer be disposed of in drop form!*

- Tap the glass capillary **88** gently by hand so that any mercury drops at its tip are knocked into the filling tubing **94**.
- Disconnect filling tubing **94** with filling cone **95** from glass capillary **88**.
- Place multi-mode electrode **17** in a horizontal position in the electrode holder **93** (see *Fig. 11-3*).

From now on, the MME must be left in this position until it is installed in the stand!

8 Install multi-mode electrode in 757 VA Computrace Stand

- With measuring head arm **19** tilted back, push empty measuring vessel **6** into the holder **3** of the 757 VA Computrace Stand and then lower measuring head arm **19**.
- Carefully insert multi-mode electrode **17** in opening **55** of the measuring head **20** (during insertion, the tip of the capillary **88** must not touch the measuring head) and push in as far as it will go.

9 Connect multi-mode electrode

- Screw FEP tubing **30** for the inert gas supply into connection **72** of the multi-mode electrode **17**.
- Screw FEP tubing **38** for the inert gas supply into connection **73** of the multi-mode electrode **17**.
- Attach electrode cable **16** (WE) to screw connection **89** of the multi-mode electrode **17**: push cable lug under the screw and then tighten screw firmly.

10 Pressurize the MME

- Switch on 757 VA Computrace Stand with mains switch **12** (the 757 VA Computrace Stand must first be installed properly as described in *section 3.2*).
- Start the VA Computrace program and click on  or **MAIN WINDOW** / **Utility** / **Computrace control** to open the **COMPUTRACE CONTROL** window. Then switch on the inert gas supply to the 757 VA Computrace Stand by clicking on **DME**. This pressurizes the multi-mode electrode **17** and the mercury begins to flow slowly out of the capillary.
- Gently tap the MME with your finger (to remove any air bubbles) and allow mercury to flow out of the capillary into the empty measuring vessel for approx. 2 min.
- Fill measuring vessel **6** with 10 mL ultrapure water and add 1 drop KCl solution (in pure water, mercury drops from the capillary only with difficulty).
- Allow mercury to flow out of the capillary for ca. 2 min while checking the drop formation: The drop time should be ca. 3 s.

11 Adjusting the sealing needle 76

- Turn slotted screw **75** using a suitable coin slowly in a clockwise direction until the mercury flow stops.
- Open slotted screw **75** slightly in an anticlockwise direction until the mercury flow restarts.
- Gently tap the MME with your finger and turn the slotted screw **75** very slowly clockwise until the mercury flow just stops. (The tapping action is used to knock off the mercury drop so that it is easier to see whether mercury continues to flow.)
- Finally, turn slotted screw **75** a quarter of a turn clockwise.

12 Checking the MME for leaks

- Switch on the dropping mercury electrode by selecting **DME** in the **COMPUTRACE CONTROL** window and clicking on 

. The mercury drops freely out of the capillary.
- Select **HMDE** and click on 

. A single mercury drop is formed. Knock this off by gently tapping the MME **17** with your finger and check that the mercury flow has really stopped. Repeat this operation several times.
- If mercury continues to flow, turn slotted screw **75** still further in a clockwise direction and repeat check.
- If it is not possible to stop the mercury flow, both the glass capillary **88** and the sealing needle **76** have to be replaced (see *section 3.3.9*).

3.3.6 Storing the MME

On completion of the measurements, the MME is stored in the 757 VA Computrace Stand so that the tip of the glass capillary **88** is immersed in pure water (or in the solvent used). This prevents blockage of the capillary by crystallized salts.

An electrode treated in this manner can be taken out of the 757 VA Computrace Stand after a few hours and stored in air for a lengthy period without suffering any damage. Always store the MME so that the glass capillary **88** is horizontal (see *Fig. 11-3*).

3.3.7 Replenishing the mercury (without changing capillary)

The multi-mode electrode **17** can also be refilled with mercury without having to remove the glass capillary **88**.

1 Dismantle multi-mode electrode

- Unscrew FEP tubing **30** and **38** from the MME. Disconnect electrode cable **16** from the MME.
- Take multi-mode electrode **17** out of the measuring head **20** and tap the MME gently to knock off any mercury drops on the glass capillary into the measuring vessel.
- Place multi-mode electrode **17** horizontally in the electrode holder **93** (see *Fig. 11-3*). The slotted screw **80** is now at the top.

2 Replenish mercury

- Unscrew slotted screw **80** using a suitable coin. If the slotted screw **80** can not be loosened by hand, screw on locking ring **74** and pull out of the MME.
- Draw up mercury using the syringe **90** with attached needle **91** and expel into the Hg reservoir **82**.

*The Hg reservoir **82** must never be filled more than $^2/_3$ full with mercury.*

- Reinsert slotted screw **80** into screw thread **79** and screw flush to surface using a suitable coin (this action may expel a few drops of mercury from glass capillary **88**).

*Do not turn so tightly that the cemented-in steel threaded ring **79** becomes loose and hence jeopardizes the tightness and safety of the MME!*

3.3.8 Changing the capillary

Contamination of the glass capillary can necessitate its replacement. In such a case, proceed as follows:

1 Remove multi-mode electrode from 757 VA Computrace Stand

- Unscrew FEP tubing **30** and **38** from the MME, disconnect electrode cable **16** from MME.
- Take multi-mode electrode **17** out of measuring head **20** while gently tapping the MME to knock off any mercury drops on the glass capillary into the measuring vessel.
- Place multi-mode electrode **17** in a horizontal position in the electrode holder **93** (see *Fig. 11-3*).

2 Unscrew slotted screw 75

- Using a suitable coin, unscrew slotted screw **75** out of screw thread **77** until the contact surface of the black O-ring at the Plexiglas wall (thin, black stripe) is just visible below the metal thread **77**.

3 Dismantle old capillary

- Position multi-mode electrode **17** vertically in the electrode holder **93** (see *Fig. 11-1*).
- Undo retaining nut **87** completely by turning anticlockwise and lift up until the lower part of the glass capillary **88** with the wide opening is visible.
- Gently tap the glass capillary **88** to knock off any residual mercury in the wide opening into the MME.
- Press the retaining nut **87** downward with one hand and with your other hand take glass capillary **88** completely out of the mount.

4 Dispose of old capillary

- Connect filling tubing **94** with the tubing coupling **97** to the two gas wash bottles **96** and the vacuum pump (see *Fig. 10*).
- Insert glass capillary **88** (capillary end) in the filling cone **95** of the filling tubing **94**.
- Remove mercury from capillary with the vacuum pump.

5 Replenish mercury if necessary

Proceed as described in *section 3.3.2*.

6 Mount new capillary

Proceed as described in *section 3.3.3*.

7 Fill capillary

Proceed as described in *section 3.3.4* or *section 3.3.5*.

3.3.9 Cleaning the MME

If the mercury in the multi-mode electrode is contaminated and this leads to disturbances, the MME must be cleaned and refilled with ultrapure mercury. Proceed as follows:

1 Remove multi-mode electrode from 757 VA Computrace Stand

- Unscrew FEP tubing **30** and **38** from the MME, disconnect electrode cable **16** from MME.
- Take multi-mode electrode **17** out of measuring head **20** while gently tapping the MME to knock off any mercury drops on the glass capillary into the measuring vessel.

2 Remove old mercury

- Place multi-mode electrode **17** in a horizontal position in the electrode holder **93** (see *Fig. 11-3*). The slotted screw **80** is now at the top.
- Unscrew slotted screw **80** using a suitable coin.
- Carefully turn MME and empty mercury through the threaded opening **79** into a waste container placed in the drip pan **92**. While doing so, gently tap the glass capillary **88** and the MME to ensure that all mercury flows out of the MME.

3 Dismantle MME

- Unscrew retaining nut **87**.
- Take glass capillary **88** out of opening **83**, the sealing ring **85** and the locking ring **86** are removed at the same time. Remove these two parts from the glass capillary **88**.
- Remove insert ring **84** from the MME.
- Unscrew slotted screw **75** with a suitable coin in an anticlockwise direction from screw thread **77**.
- Screw locking ring **74** onto slotted screw **75** and pull out of the MME.

4 Dispose of old capillary

- Connect filling tubing **94** with the tubing coupling **97** to the two gas wash bottles **96** and the vacuum pump (see *Fig. 10*).
- Insert glass capillary **88** (capillary end) in the filling cone **95** of the filling tubing **94**.
- Remove mercury from the capillary with the vacuum pump.

5 Clean MME

- Clean inner compartments of the MME, contact pin **81** and the screw threads **77**, **79** and **83** with a lint-free cloth.
- Thoroughly rinse all inner compartments of the MME and the unscrewed individual parts with dist. water and then dry with N_2.

Do not use any organic solvents.

6 Replace sealing needle 76 if need be

If problems with leaks arise owing to a worn, deformed or damaged sealing needle **76**, this must be replaced. Three spare needles are supplied separately in a protective plastic package. After unpacking a needle, please avoid any contact whatsoever with the needle tip. The spare needle **76** is installed as follows:

- Carefully pull old sealing needle **76** out of PTFE membrane of the slotted screw **75**.
- Carefully insert new sealing needle **76** without tilting into the hole in the PTFE membrane of the slotted screw **75**.

*When the sealing needle **76** is changed, it is always necessary to change the glass capillary **88**!*

7 Replace sealing ring 85 if need be

- If the sealing ring **85** is contaminated or damaged in any way, it must be replaced for the subsequent assembly of the MME. Two new sealing rings **85** are enclosed in the package with the 6.1226.030 glass capillaries.

8 Reassemble MME

- Screw slotted screw **80** using a suitable coin flush into screw thread **79**.

*Do not turn so tightly that the cemented-in steel threaded ring **79** becomes loose and hence jeopardizes the tightness and safety of the MME!*

- Using a suitable coin, screw slotted screw **75** into the screw thread **77** until the contact surface of the black O-ring at the Plexiglas wall (thin, black stripe) is just visible below the metal thread **77**.
- Place multi-mode electrode **17** with the opening **83** facing upwards in the electrode holder **93** (see *Fig. 11-1*).
- Insert insert ring **84** in opening **83**.
- Push sealing ring **85** onto locking ring **86** and insert both in the opening **83**.
- Screw retaining nut **87** by hand into screw thread **83** until a slight resistance is felt.

9 Add mercury

Proceed as described in *section 3.3.2*.

10 Mount new capillary

Proceed as described in *section 3.3.3*.

11 Fill capillary

Proceed as described in *section 3.3.4* or *section 3.3.5*.

3.4 Rotating disk electrode (RDE)

The rotating disk electrode (RDE) is available as an option and can be used in place of the MME in the 757 VA Computrace Stand with different electrode tips as a working electrode. The following accessories have to be ordered (see also *section 6.2*):

- **6.1246.000 Drive shaft for rotating electrode**
- **6.1204.XXX Electrode tip for rotating electrode**
  - 6.1204.100 Ultra Trace Graphite
  - 6.1204.110 GC (Glassy Carbon)
  - 6.1204.120 Pt
  - 6.1204.130 Ag
  - 6.1204.140 Au for Hg determination
  - 6.1204.150 Au for As determination
- **6.2709.040 Stopper for closing the MME opening**
- **6.2802.000 Polishing kit for 6.1204.XXX Electrode tips (Pt, Ag, Au, GC)**
- **6.2827.000 Trimming tool for 6.1204.100 Electrode tip (Graphite)**

It is recommended to use RDE tips (except Pt) only together with a glassy carbon auxiliary electrode!

3.4.1 Construction and startup of the RDE

The rotating disk electrode RDE comprises the two parts drive shaft **100** (6.1246.000) and electrode tip **99** (6.1204.XXX), which must be screwed together.

The procedure for installing the RDE in the measuring head arm of the 757 VA Computrace Stand is described in detail in *section 3.2.4*. The fully equipped measuring head arm with the RDE is illustrated in *Fig. 12*.

3.4.2 Regenerating the RDE

The RDE is a solid electrode with a stationary surface. This becomes contaminated with the products of the electrode redox processes with increasing use. The surface of the 6.1204.XXX electrode tips (Pt, Ag, Au, GC) must therefore be regenerated from time to time by mechanical cleaning with extremely fine aluminum oxide powder. Proceed as follows:

- Affix polishing cloth (part of 6.2802.000 Polishing kit) to a flat surface (e.g. to the bottom of a Petri dish) then add a little Al_2O_3 powder (part of 6.2802.000 Polishing kit) and dist. H_2O to form a thick paste.
- Polish electrode tip by hand in the paste for ca. 10 s with small, circular movements.
- Rinse electrode tip with dist. H_2O, immerse in diluted HCl for ca. 10 s, rinse again with dist. H_2O and then dry with a cloth or filter paper.

Regeneration of the 6.1204.100 Ultra Trace Graphite Electrode Tip depends on its use (mercury film or adsorptive stripping voltammetry). The procedure is described in detail in the Application Bulletins available for the determinations with this electrode.

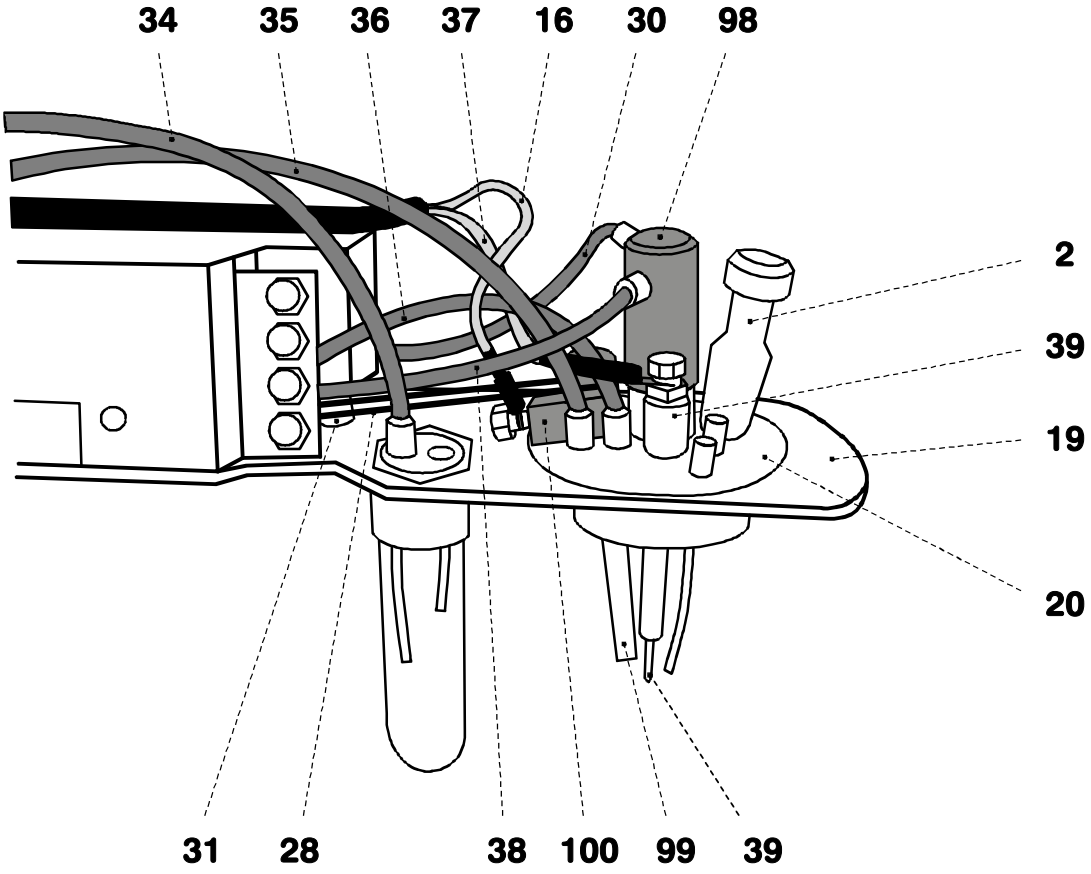


***Fig. 12*: Measuring head arm with rotating disk electrode (RDE)**

2	**Stopper (6.2709.080)** to close the pipetting opening
16	**Electrode cable "WE"** connection for working electr. (RDE)
19	**Measuring head arm** carrier plate with permanently attached measuring head, raisable
20	**Measuring head** measuring vessel upper half made of PTFE; with openings for electrodes, stirrer, gas and liquid supply lines
28	**Drive belt (6.1244.020)** connection between drive wheel **31** and drive shaft **100**
30	**FEP tubing (6.1805.180)**
31	**Drive wheel of drive motor**
35	**FEP tubing (6.1805.090)** for inert gas lead-off (attached)
36	**FEP tubing (6.1805.180)** for inert gas supply to tapping mechanism (attached)
37	**Electrode cable "AE"** connection for auxiliary electrode **39**
38	**FEP tubing (6.1805.180)**
39	**Auxiliary electrode** details, see *section 3.6*
98	**Stopper (6.2709.040)** for closing the MME opening and to accommodate the two lengths of FEP tubing **30** and **38**
99	**Electrode tip (6.1204.XXX)** for RDE
100	**Drive shaft (6.1246.000)** for RDE

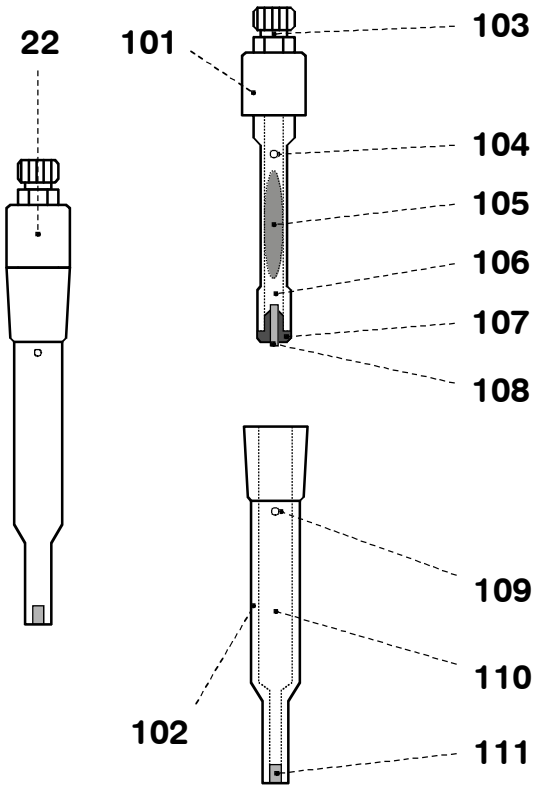
3.5 Reference electrode

3.5.1 Construction

The complete reference electrode (RE) **22** comprises two parts:

- **6.0728.0X0 Ag/AgCl reference system (101)**
  with ceramic diaphragm type D, diameter = 1 mm
  6.0728.020 Reference system: Ag/AgCl/*c*(KCl) = 3 mol/L; supplied in a holder filled with *c*(KCl) = 3 mol/L as standard
  6.0728.010 Reference system: Ag/AgCl supplied dry (option)
- **6.1245.010 Electrolyte vessel (102)**
  with ceramic diaphragm type D, diameter=3 mm; holds a second electrolyte solution (bridge electrolyte) and thus forms with the 6.0728.020 Reference system a complete reference electrode in the so-called double junction construction.

The construction of the reference electrode and the designations of the individual parts are shown in *Fig. 13*.



22	**Reference electrode**
101	**Reference system (6.0728.0X0)**
102	**Electrolyte vessel (6.1245.010)**
103	**Electrical connection for cable "AE"**
104	**Vent opening**
105	**Ag/AgCl filling**
106	**Electrolyte compartment with internal electrolyte**
107	**Diaphragm support made of PCTFE**
108	**Diaphragm**
109	**Vent opening**
110	**Electrolyte compartment with bridge electrolyte**
111	**Diaphragm**

Fig. 13: Construction of the reference electrode

3.5.2 Startup procedure

The reference electrode **22** is supplied in modular form as the reference system **101** and the electrolyte vessel **102** and has first to be filled and assembled as follows:

1 Add internal electrolyte

Filling of the reference system is necessary only when the optional 6.0728.010 Reference system supplied dry is used, if the internal electrolyte solution has to be renewed or if gas bubbles interrupt the electrical connection.

- Hold reference system **101** so that diaphragm **108** faces upwards.
- Unscrew diaphragm support **107**.
- Fill electrolyte compartment **106** completely with the desired internal electrolyte. Expel any air bubbles by tapping shaft gently.
- Screw diaphragm support **107** back on, the electrolyte solution thus displaced is expelled through the vent opening **104**.

2 Add bridge electrolyte

- Fill internal compartment **110** of the electrolyte vessel **102** with a suitable bridge electrolyte whose composition depends on the analyses to be performed (aqueous or non-aqueous solution, composition of the supporting electrolyte, etc.).

If you use the same solution for the bridge electrolyte and the internal electrolyte (single-junction operation), the inner diaphragm **108** *can be omitted to reduce the electrical resistance: Unscrew diaphragm support* **107** *with diaphragm* **108** *from the reference system* **101***.*

3 Screw reference electrode together

- Insert the filled reference system **101** in the vessel **102** filled with bridge electrolyte and screw tight. The electrolyte solution thus displaced is expelled through the vent opening **109**.

4 Install reference electrode in 757 VA Computrace Stand and connect

- Insert reference electrode **22** in opening **58** of the measuring head **20** (see *Fig. 6*).
- Attach electrode cable **27** (RE) to reference electrode **22**:
  push cable lug under the screw and then tighten screw firmly.
- Turn reference electrode **22** so that the electrode cable **27** points to the rear and not to the side (in the latter position it may become kinked and damaged when cover **1** is closed).
- Wait approx. 20 min before first measurement (it takes some time for a new reference electrode to become wet).

3.6 Auxiliary electrode

3.6.1 Construction

The following electrodes can be used as the auxiliary electrode **39** (AE):

- **6.0343.000** **Pt auxiliary electrode**
  supplied as standard
- **6.1241.020** **Electrode holder** and
  6.1247.000 **Glassy carbon tip**
  together form the glassy carbon auxiliary electrode
  available as an option

The construction of the two auxiliary electrodes and the designations of the individual parts are shown in *Fig. 14*.

3.6.2 Startup procedure

The 6.0343.000 Pt auxiliary electrode supplied as standard can be inserted directly in the 757 VA Computrace Stand (→ **2**), whereas the GC auxiliary electrode available as an option must first be assembled (→ **1**):

1 Assembly of the GC auxiliary electrode

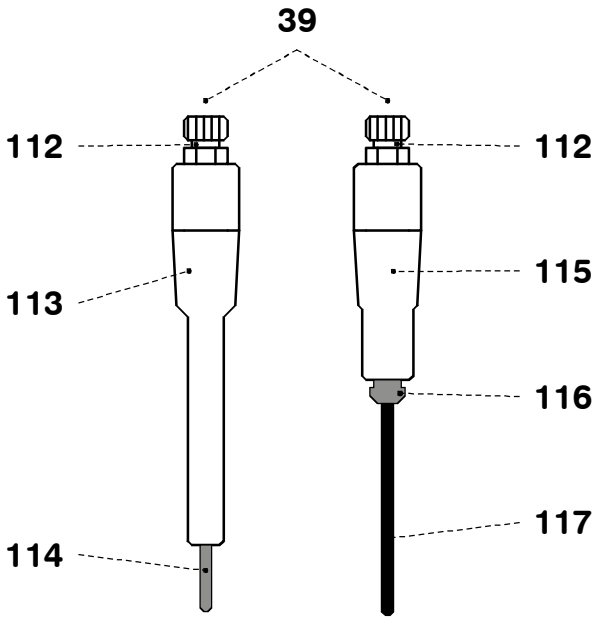
- Insert glassy carbon tip **117** through the locking ring **116** into the electrode holder **115** as far as it will go.

Glassy carbon is a brittle, easily breakable material and must therefore be inserted carefully into the electrode holder and handled gently.

If the GC tip breaks, the part remaining in the holder can be removed by pulling out the locking ring **116**.

2 Install auxiliary electrode in 757 VA Computrace Stand and connect

- Insert auxiliary electrode **39** in opening **51** of the measuring head **20** (see *Fig. 6*).
- Attach electrode cable **37** (AE) to auxiliary electrode **39**:
  Push cable plug under the screw and tighten screw firmly.
- Turn auxiliary electrode **39** so that the electrode cable **37** points to the rear and not to the side (in the latter position it may become kinked and damaged when cover **1** is closed).



39	**Auxiliary electrode**
112	**Electrical connection for cable "AE"**
113	**Pt Auxiliary electrode (6.0343.000)**
114	**Pt tip** (permanently attached)
115	**Electrode holder (6.1241.020)**
116	**Locking ring**
117	**Glassy carbon tip (6.1247.000)**

Fig. 14: Construction of the auxiliary electrode

3.7 Stirrer

The complete stirrer comprises two parts (see also *Fig. 4*):

- **6.1246.010 Drive shaft (24)**
- **6.1204.090 Stirrer tip (42)**

The startup procedure for the stirrer is as follows:

1 Assemble stirrer

- Screw stirrer tip **42** firmly to drive shaft **24**.

2 Insert stirrer in 757 VA Computrace Stand and connect

- Insert complete stirrer in opening **60** of the measuring head **20** as far as it will go (see *Fig. 6*).
- Stretch drive belt **28** between drive wheel **31** and drive shaft **24** of the stirrer (see *Fig. 6*).

3.8 Connection of 765 Dosimats

*The predecessor model **665 Dosimat** can also be connected instead of the 765 Dosimat.*

Up to five 765 Dosimats can be attached to the 757 VA Computrace Stand for the automatic addition of standard and auxiliary solutions. For the connection of 1 or 2 Dosimats, the 6.2141.080 Cable is used, for the connection of up to 5 Dosimats, the 6.9921.170 cable. The 765 Dosimat and the accessories needed have the following ordering designations (see also *section 6.2*):

- **2.765.0010 Dosimat**
- **6.2141.080 Cable 757 – 2 × 765**
- **6.3014.XXX Exchange unit**, with PCTFE/PTFE flat stopcock
  - 6.3014.153 burette volume V = 5 mL
  - 6.3014.213 burette volume V = 10 mL
  - 6.3014.223 burette volume V = 20 mL
  - 6.3014.253 burette volume V = 50 mL

The choice of Exchange unit depends on the volume of liquid the Dosimat should dispense. A burette volume of 5 mL is recommended for additions in the µL range (standard additions solutions), a burette volume of 10 mL or higher is recommended for additions in the mL range (auxiliary solutions).

This section describes the connection procedure; further details on the 765 Dosimat and the various Exchange units can be found in the *765 Instructions for Use*.

3.8.1 Electrical connection and setup

*Before a 765 Dosimat is attached to the 757 VA Computrace Stand, the 757 VA Computrace Stand must be **switched off** using the mains switch* **12**.

One or two 765 Dosimats are connected to the 757 VA Computrace Stand with the optionally available **6.2141.080 Cable**. The "A" socket of the 765 Dosimat is connected to the socket "Remote" **15** of the 757 VA Computrace Stand.

For hardware settings of the 765 Dosimats in the VA Computrace program see *757 Software Manual*.

For settings (dosing rate, filling rate, etc.) and manual operation (manual filling or dispensing) using the keyboard of the 765 Dosimat, see *765 Instructions for Use*.

If 765 Dosimats are connected to the 757 VA Computrace Stand, the instruments must always be switched on in the sequence 765 → 757 → PC.

3.8.2 Tubing connection

For the addition of standard or auxiliary solutions into the measuring vessel of the 757 VA Computrace Stand the 4-way microtip **26** (6.1824.000) can be used. It is fitted with 4 lengths of PTFE tubing with connection nipples for direct attachment to the Exchange unit of the 765 Dosimat. To ready the 765 Dosimat for automatic dispensing, proceed as follows:

1 Mount Exchange unit on 765 Dosimat

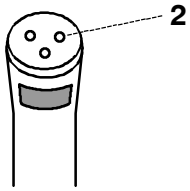
- Procedure, see section *5 of 765 Instructions for Use*.

2 Insert 4-way microtip in 757 VA Computrace Stand (see *section 3.2.4*)

- Remove stopper from nipple **23** and insert 4-way microtip **26** into nipple **23** as far as it will go (see *Figs 3 and 6*).
- Tighten nipple **23** using a 6.2739.000 Wrench (accessory of 6.3014.XXX Exchange unit) so that the 4-way microtip **26** can no longer move.
- Pull the 4 lengths of PTFE tubing of the 4-way microtip **26** in succession from above through the opening **65**.

3 Connect PTFE tubing to Exchange unit

- Unscrew the attached 6.1805.100 FEP Tubing (L = 40 cm) from connection **2** (connection for burette tip) of the flat stopcock on the Exchange unit mounted on the Dosimat.
- Screw connection nipple of the PTFE tubing of the 4-way microtip **26** onto connection **2** of the flat stopcock on the Exchange unit mounted on the Dosimat.



4 Close unused PTFE tubings

- Screw a 6.1808.000 Coupling (accessory of 757 VA Computrace Stand) on each unused PTFE tubing of the 4-way microtip **26**.
- Screw a 6.1446.040 Dummy stopper (accessory of 757 VA Computrace Stand) on each 6.1808.000 Coupling.

5 Initialize Dosimat(s)

- Switch on the 765 Dosimat.
- Switch on the 757 VA Computrace Stand using the mains switch **12**.
- Switch on the PC and start the VA Computrace program.
- Click on  or **MAIN WINDOW** / **Utility** / **Dosimat control** to open the **DOSIMAT CONTROL** window.
- Select the desired Dosimat in the **Burette** field.
- Click the Flush button to empty and refill the exchange unit installed on the Dosimat. Repeat this procedure two times.
- Check if there are air bubbles left in the glass cylinder of the exchange unit. If this is the case, repeat the flushing procedure by clicking the Flush button.
- Close the **DOSIMAT CONTROL** window.

3.8.3 Changing the Exchange unit

The Exchange unit mounted on the 765 Dosimat can be changed only in the exchange position which is reached after filling. Please proceed as follows:

1 Fill exchange unit

At the start of the VA Computrace program, the exchange unit is automatically filled. So this step is only necessary if the Dosimat has already been used during the running program session.

- Click on  or **MAIN WINDOW** / **Utility** / **Dosimat control** to open the **DOSIMAT CONTROL** window.
- Select the desired Dosimat in the **Burette** field.
- Click the 

button to fill the exchange unit installed on the Dosimat.

2 Change Exchange unit

- Unscrew connection nipple of the PTFE tubing of the 4-way microtip **26** from connection **2** and take off old Exchange unit.
- Mount new Exchange unit on Dosimat and screw connection nipple of the PTFE tubing of the 4-way microtip **26** onto connection **2** of the flat stopcock on the Exchange unit.

3 Enter new volume of Exchange unit

If the volume of the new Exchange unit is different to the volume of the old one, proceed as follows:

- Select **MAIN WINDOW** / **Settings** / **General Settings.** Open the **Hardware** tab in the **GENERAL SETTINGS** window.
- Enter the new **Volume** of the Exchange unit installed on the 765 Dosimat.
- Close the VA Computrace software by clicking on  or selecting **File** / **Exit**.
- Restart the VA Computrace software.

4 Initialize Dosimat(s)

- Click on  or **MAIN WINDOW** / **Utility** / **Dosimat control** to open the **DOSIMAT CONTROL** window.
- Select the desired Dosimat in the **Burette** field.
- Click the 

button to empty and refill the exchange unit installed on the Dosimat. Repeat this procedure two times.
- Check if there are air bubbles left in the glass cylinder of the exchange unit. If this is the case, repeat the flushing procedure by clicking the 

button.
- Close the **DOSIMAT CONTROL** window.

3.9 Connection of the 813 Compact Autosampler

With the 813 Compact Autosampler connected to the 757 VA Computrace Stand, max. 18 samples can be transferred to the measuring vessel at the 757 VA Computrace Stand. After each measurement, the measuring vessel is rinsed by means of two 772 Pump Units connected to a 731 Relay Box. For operation of this sample changer and the automatic addition of standard addition and auxiliary solutions by means of 765 Dosimats, the following instruments and accessory parts are needed (see also *section 6.2*):

Quant.	Order no.	Instrument/Accessory
1	2.813.0020	813 Compact Autosampler for VA applications
1	2.731.0010	731 Relay Box
2	2.772.0010	772 Pump Unit
1	6.2141.150	Cable 813–757–731
1	6.5323.010	Rinsing equipment for VA
1…5	2.765.0010	765 Dosimat
1…5	6.3014.153	Exchange unit 5 mL (for addition solutions)
1…5	6.3014.213	Exchange unit 10 mL (for auxiliary solutions)
1	6.2141.080	Cable 757–2×765
	or	
1	6.9921.170	Cable 757–5×765

This section describes the procedure for the connection of 813 Compact Autosampler, 731 Relay Box and 772 Pump Units. For the connection of 765 Dosimats, see *section 3.8*.

3.9.1 Electrical connection

Before any instruments are attached to the 757 VA Computrace Stand, the 757 VA Computrace Stand must be ***switched off*** *using the mains switch* **12**.

The 813 Compact Autosampler is connected to the socket "Remote" **15** of the 757 VA Computrace Stand with the optionally available **6.2141.150 Cable** (see *Fig. 15*). The second end of the 6.2141.150 cable is used to connect the 731 Relay Box. The third end of the 6.2141.150 cable is used to connect 765 Dosimats with the 6.2141.080 cable (1...2 Dosimats) or the 6.9921.170 cable (1...5 Dosimats). At the 813 Compact Autosampler, "**Method 2**" must be set (procedure see *Instructions for Use 813*).

At the connection "DC1" of the 731 Relay Box, a 772 Pump Unit is connected as **siphoning pump**, at the connection "DC2", a 772 Pump Unit is connected as **rinsing pump** (see *Instruction for Use 731* and *772*). The output voltage of the 731 Relay Box must be set to **+24 V** (default setting, see *section 2.3*, *Instruction for Use 713*). Additionally, the following settings for remote address selection must be done:

DC1: 9 (Siphoning pump) **DC2: A** (Rinsing pump)

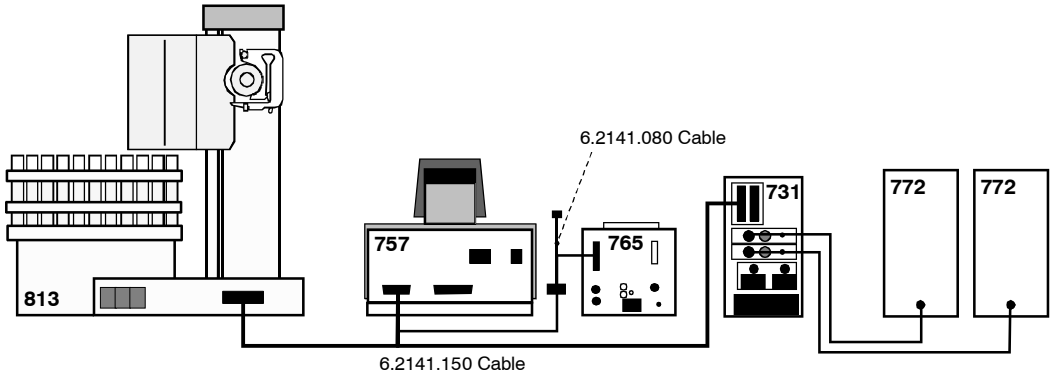


Fig. 15: Electrical connection of the 813 Compact Autosampler

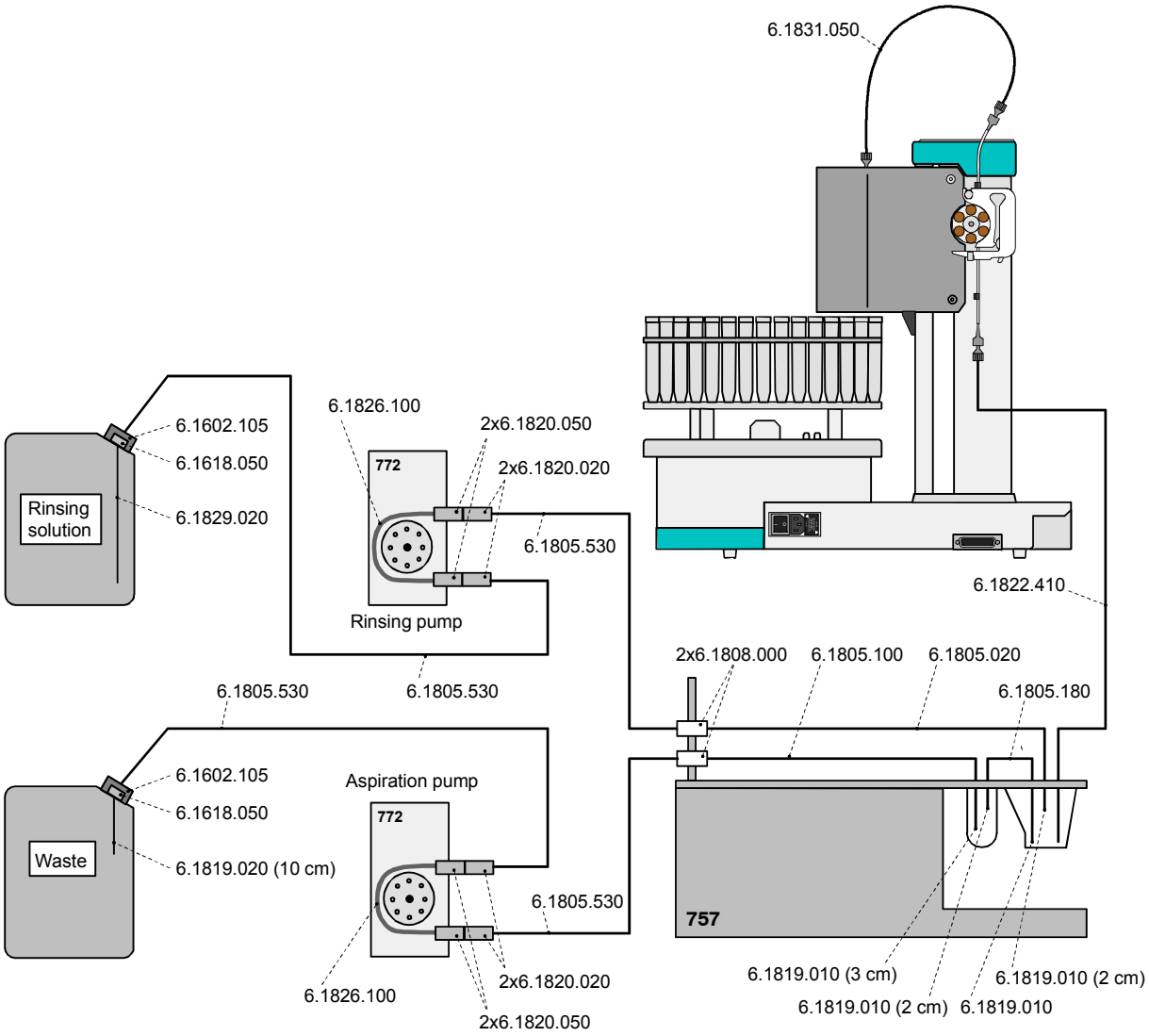


Fig. 16: Tubing connections for operation of the 813 Compact Autosampler

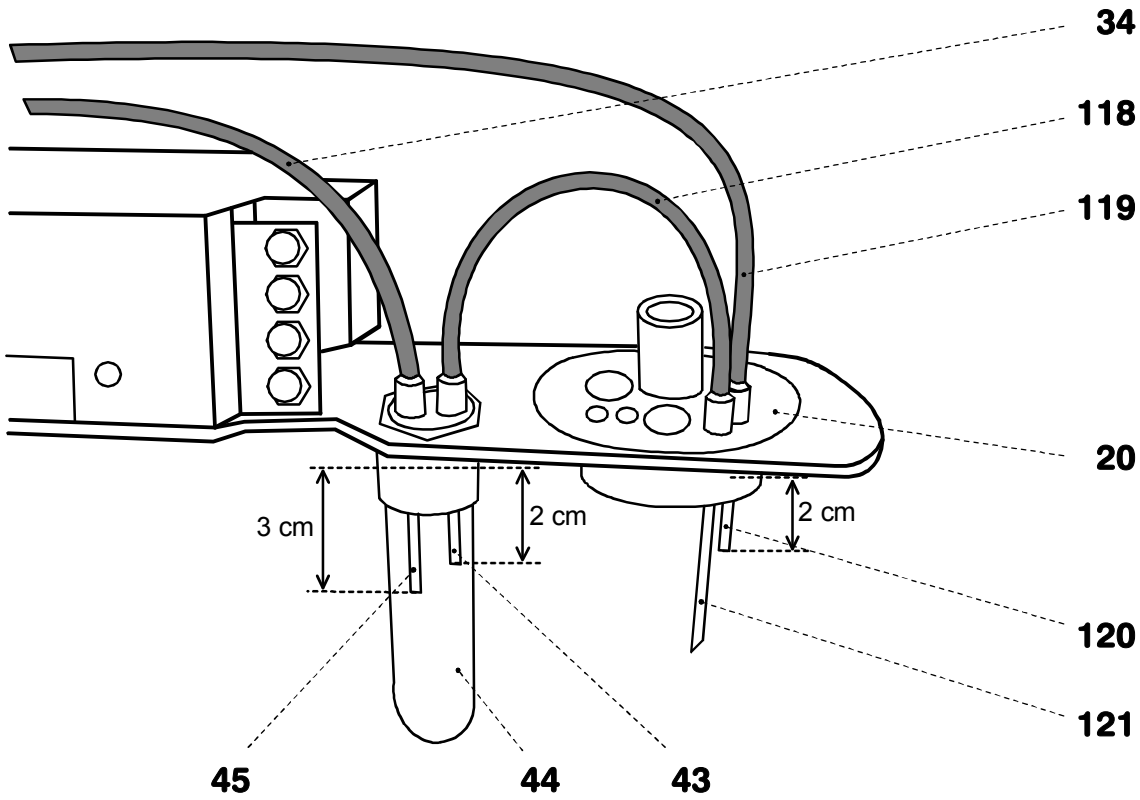


Fig. 17: Installation of accessories for rinsing and siphoning off

19	**Measuring head arm**
20	**Measuring head**
34	**FEP tubing (6.1805.100)** for waste solution lead-off (attached)
43	**PTFE tube (6.1819.010)** for supply of the waste solution to gas wash bottle **44**
44	**Gas wash bottle (6.2405.030)** for separating mercury from the waste solution (attached)
45	**PTFE tube (6.1819.010)** for siphoning off the waste solution from gas wash bottle **44** (attached)
118	**FEP tubing (6.1805.180)** for transferring the waste solution to gas wash bottle **44**
119	**FEP tubing (6.1805.100)** for supply of the rinsing solution
120	**PTFE tube (6.1819.010)** for introduction of the rinsing solution to the measuring vessel
121	**PTFE tube (6.1819.010)** for siphoning-off the waste solution

3.9.2 Tubing connections

For operation of the 757 VA Computrace Stand with 813 Compact Autosampler and 772 Pump Units, the accessories and tubing connections must be installed according to *Fig. 16*. Proceed as follows:

1 Install accessories at 757 VA Computrace Stand

- Instead of the 6.1415.210 measuring vessel, install the 6.1456.210 measuring vessel at the 757 VA Computrace Stand.
- Cut PFTE tube **43** (6.1819.010) inserted in opening **67** of the measuring head **20** to a length of **max. 30 mm** (see *Fig. 6* and *17*).
- Cut PFTE tube **45** (6.1819.010) inserted in opening **66** of the measuring head **20** to a length of **max. 20 mm**.
- Cut PFTE tube **120** (6.1819.010) to a length of **max. 20 mm** and insert from above in opening **53** of the measuring head **20**.
- Cut the bottom end of PFTE tube **121** (6.1819.010) diagonally and insert from above in opening **52** of the measuring head **20**. To ensure that the solution is siphoned off as completely as possible, the end of the tube must be located in the deepest part of the 6.1456.210 measuring vessel (left rear when viewed from front).
- Screw FEP tubing **118** (6.1805.180) into threaded openings **52** and **66**.
- Screw FEP tubing **119** (6.1805.100) into threaded opening **53** of the measuring head **20**. Screw a 6.1808.000 tubing coupling to the other end of FEP tubing **119** and insert the coupling in a slot of the tubing holder at the rear of the 757 VA Computrace Stand.

2 Connect 813 Compact Autosampler

- Install accessories at 813 Compact Autosampler (see *Instructions for Use 813*).
- Adjust 6.1835.030 Pipetting needle at the 757 Compact Autosampler to ensure that the lower end of the needle is positioned max. 0.5 mm above the bottom of the sample vessel (see *Fig. 18*). This is essential to guarantee a complete transfer of the sample from the sample vessel into the measuring vessel of the 757 VA Computrace Stand.
- Insert 6.1822.410 transfer tubing connected to 6.1826.020 pump tubing from above into opening **57** of the measuring head **20** at the 757 VA Computrace Stand (see *Fig. 6*) and fix it by screwing the nipple.

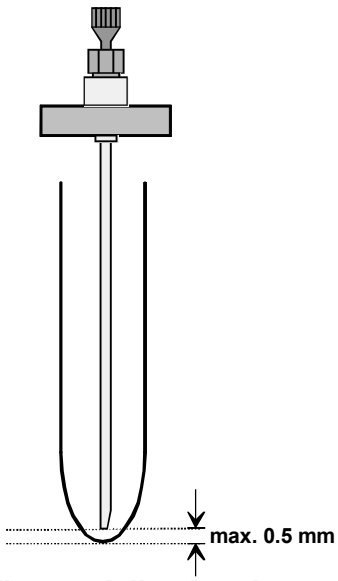


Fig. 18: Adjusting the pipetting needle

3 Connect 772 siphoning pump

- Cut 6.1826.100 pump tubing to a length of ca. 17 cm.
- Attach two 6.1820.050 tubing connectors to both ends of the 6.1826.100 pump tubing and install it at the first 772 Pump Unit (see *Instructions for Use 772*).
- Screw a 6.1820.020 thread onto both 6.1820.050 connectors.
- Using a 6.1805.530 FEP tubing, connect the lower end of the pump tubing on the siphoning pump to the 6.1808.000 connector at the 757 VA Computrace Stand, to which the FEP tubing **34** is connected (see *Fig. 16* and *Fig. 17*).

4 Connect 772 rinsing pump

- Cut 6.1826.100 pump tubing to a length of ca. 17 cm.
- Attach two 6.1820.050 tubing connectors to both ends of the 6.1826.100 pump tubing and install it at the second 772 Pump Unit (see *Instructions for Use 772*).
- Screw a 6.1820.020 thread onto both 6.1820.050 connectors.
- Using a 6.1805.530 FEP tubing, connect the upper end of the pump tubing on the rinsing pump to the 6.1808.000 connector at the 757 VA Computrace Stand, to which the FEP tubing **119** is connected (see *Fig. 16* and *Fig. 17*).

5 Connect waste container

- Unscrew red filling connection from first 6.1621.000 container.
- Screw 6.1618.050 threaded adapter to the container.
- Screw 6.1602.105 siphon onto 6.1618.050 threaded adapter.
- Cut 6.1819.020 FEP tube to a length of ca. 10 cm and insert from above into the smallest opening of the 6.1602.105 siphon.
- Screw a 6.1805.530 FEP tubing into this opening of the 6.1602.105 siphon.
- Attach the other end of the 6.1805.530 FEP tubing at the upper end of the pump tubing of the siphoning pump (see *Fig. 16*).

6 Connect storage container

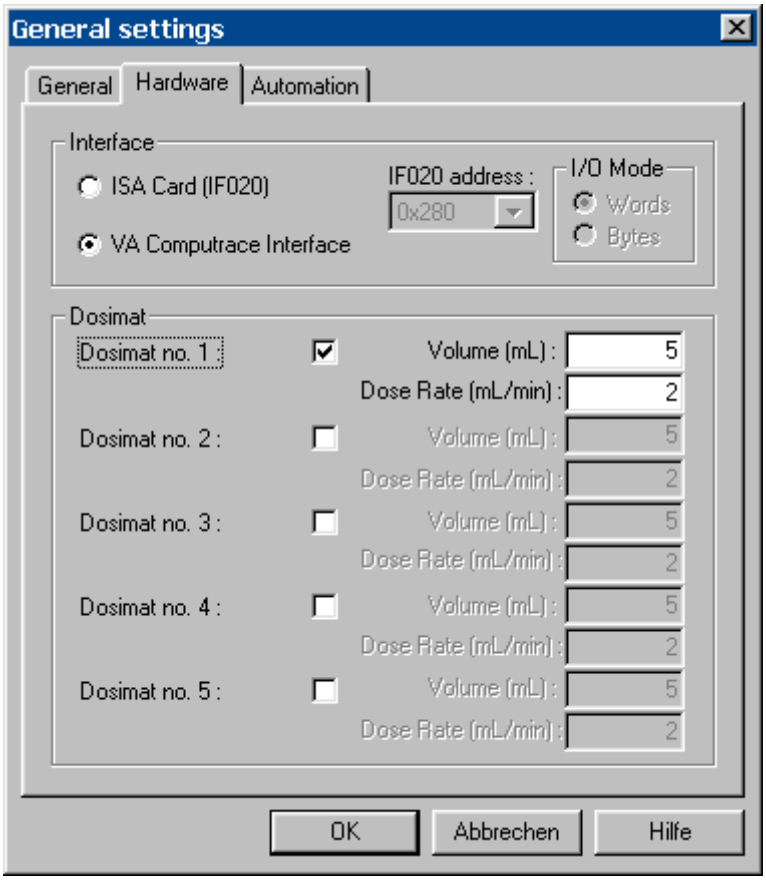
- Unscrew red filling connection from second 6.1621.000 container.
- Using a funnel, add max. 10 L rinsing solution (normally ultrapure water acidified with 100 µL conc. HCl/L) to the storage container through the small vent opening.
- Screw 6.1618.050 threaded adapter to the container.
- Screw 6.1602.105 siphon onto 6.1618.050 threaded adapter.
- Remove screw nipple from 6.1829.020 FEP tube and insert it from above into the smallest opening of the 6.1602.105 siphon.
- Screw a 6.1805.530 FEP tubing into this opening of the 6.1602.105 siphon.
- Attach the other end of the 6.1805.530 FEP tubing at the lower end of the pump tubing of the rinsing pump (see *Fig. 16*).

3.9.3 Software settings

Before putting into operation the 757 VA Computrace Stand with the 813 Compact Autosampler, the following settings have to be made in the "**757 VA Computrace 2.0**" software program:

1 Set Dosimat parameters

- Click on **MAIN WINDOW** / **Settings** / **General settings** and select the **Hardware** tab.
- For each Dosimat connected to the remote interface of the 757 VA Computrace Stand, check the **Dosimat no.** checkbox and enter the **Volume** of the exchange unit installed on the Dosimat and the **Dose rate** of the Dosimat.



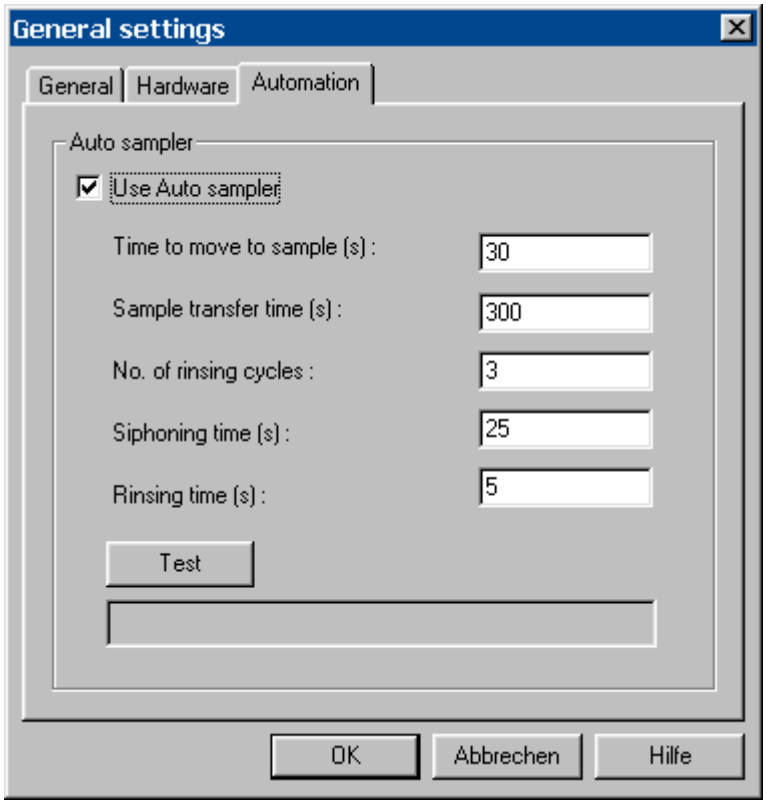
- Define the addition or predose solutions for the desired method in the **DOSIMATS** window (procedure see *Software Manual, section 5.2*).
- Fill the exchange units of the Dosimats with the desired solutions and make sure that there are no gas bubbles in the glass cylinders using the Flush button in the **DOSIMAT CONTROL** window (see *section 6.2*, *Software Manual*).

2 Set automation parameters

- Click on **MAIN WINDOW** / **Settings** / **General settings** and select the **Automation** tab.
- Enable the **Use Autosampler** option, modify the automation parameters as desired and close the **GENERAL SETTINGS** window.
- Close the "757 VA Computrace 2.0" program and restart it.

3 Test automation parameters

- Fill two sample vessels with water and place them one after the other on the sample rack of the 813 Compact Autosampler.
- Click on **MAIN WINDOW** / **Settings** / **General settings** and select the **Automation** tab.
- Click on Test, check the automation parameters and modifiy them if need be. The default settings can be normally used for samples with 10 mL volume:



3.9.4 Operation of the 813 Compact Autosampler

After installation of the instruments according to *sections 3.9.1...3.9.3* sample series using the 813 Compact Autosampler can be started. Proceed always in the following sequence:

1 Switch on instruments

- Switch on Dosimats and 757 VA Computrace Stand.
- Switch on 813 Compact Autosampler and 731 Relay Box.
- Switch on PC.
- Start 757 VA Computrace software (see *Software Manual*, *section 2.2*).

2 Load and modify method

- Click on  or **MAIN WINDOW** / **Mode** / **Determination**.
- Click on  or **MAIN WINDOW** / **Window** / **Working method specification** to open the **WORKING METHOD SPECIFICATIONS** window.
- Load the desired method in the **WORKING METHOD SPECIFICATIONS** window.
- If desired, modify the loaded method (details see *Software Manual*).

3 Load and modify sample table

- Click on  or **MAIN WINDOW** / **Window** / **Sample table** to open the **SAMPLE TABLE** window.
- Load the desired sample table or edit the current sample table (details see *Software Manual*).

4 Place samples on 813 Compact Autosampler

- Transfer the desired sample amount (5...10 mL) into the sample vessels and place them at the odd positions on the sample rack of the 813 Compact Autosampler.
- For each sample vessel, place a vessel filled with rinsing solution at the following even position (volume rinsing solution = volume sample solution).

5 Start determination

- Click on  or **MAIN WINDOW** / **Window** / **Monitor** to open the **MONITOR** window.
- Start the measurement by clicking the  icon in the **MAIN WINDOW** or the  button in the **MONITORING** window.
- Press the "START" button on the keypad of the 813 Compact Autosampler.
- Follow the instructions in the appearing message windows.

4 Safety

4.1 Electrical safety

While electrical safety in the handling of the 757 VA Computrace Stand is assured in the context of the specifications IEC 61010-1 (protection class 1), the following points should be noted:

- **Mains connection**

*Setting **mains connection** must be effected in accordance with the instructions in section 3.2.1.*

- **Opening the instrument**

*When the 757 VA Computrace Stand is connected to the power supply, the instrument may not be opened nor parts of them be removed, otherwise there is a danger of coming into contact with components which are live. Before you open the 757 VA Computrace Stand to change components or for maintenance or repair work, always switch on the instrument by setting the mains switch **12** to the ON position and then disconnect the mains cable from the mains connection plug **13** of the 757 VA Computrace Stand !*

- **Protection against static charges**

Electronic components are sensitive to static charging and can be destroyed by discharges. Before you touch any of the components inside the 757 VA Computrace Stand, you should earth yourself and any tools you are using by touching an earthed object (e.g. green housing of the instrument or a radiator) to eliminate any static charges which exist.

4.2 Safety considerations concerning mercury

4.2.1 Properties of mercury

The most important properties of mercury (Hg) are listed in the Table below. This compilation allows the following summary:

- Mercury is a **heavy metal** with a very high density and is **liquid** at room temperature.
- Mercury is mobile at room temperature and tends to **form drops** because of its high surface tension. The surface tension is around 6 times greater than that of water, Hg is thus not wetted by water.
- Mercury has a relatively **high electrical conductivity** (at room temperature it is only some 60 times lower than that of silver).
- Mercury has a relatively **high vapor pressure** compared with other metals. Mercury vapor is some seven times heavier than air (so that it sinks rapidly and specifically to the floor).
- The **odor threshold is very high** relative to the threshold limit value (TLV).
- Air saturated with Hg vapor (which naturally does not occur in practice) contains approximately 250 times the amount of Hg specified by the TLV at room temperature.

Properties of mercury

Property	*Value*			*Ref.*
Density ρ (liquid mercury)	13.5451	g/cm^3	(at Θ = 0 °C)	[1]
Density ρ (mercury vapor)	8.959	g/dm^3	(at Θ = 0 °C)	[2]
Melting point Θ_F	–38.86	°C	(at p_{air} = 1.01325 bar)	[3]
Melting enthalpy ΔH_F	2.295	kJ/mol	(at p_{air} = 1.01325 bar)	[3]
Boiling point Θ_V	356.73	°C	(at p_{air} = 1.01325 bar)	[3]
Boiling enthalpy ΔH_F	59.1	kJ/mol	(at p_{air} = 1.01325 bar)	[3]
Vapor pressure p	0.0253 0.17 0.391 0.81 1.69	Pa Pa Pa Pa Pa	(at Θ = 0 °C) (at Θ = 20 °C) (at Θ = 30 °C) (at Θ = 40 °C) (at Θ = 50 °C)	[2, 4]
Mass concentration ρ in air (after reaching equilibrium)	2.0 13.6 29.6 62.7 126	mg/m^3 mg/m^3 mg/m^3 mg/m^3 mg/m^3	(at Θ = 0 °C) (at Θ = 20 °C) (at Θ = 30 °C) (at Θ = 40 °C) (at Θ = 50 °C)	[2, 4]
Evaporation rate	85	µg/h · cm^2	(at Θ = 25 °C)	[2]
Surface tension σ	$4.67 \cdot 10^{-3}$	N/cm	(at Θ = 20 °C)	[5]
Electrical conductivity κ	$1.044 \cdot 10^4$	S/cm	(at Θ = 20 °C)	[6]
Odor threshold	13	mg/m^3		[2]
Threshold limit value (TLV) for air for mercury for organic mercury compounds (calculated as Hg)	 0.1 0.01	 mg/m^3 mg/m^3		 [4, 7] [2, 4, 7]

4.2.2 Toxicity of mercury and its compounds

Mercury and its compounds are toxic since they react with enzymes containing sulfur and decompose them with the formation of HgS. The toxicity depends on the chemical and physical state of the mercury [4, 8 – 10]:

- **Metallic liquid mercury** is readily resorbed by the skin and finds its way through glandular passages into lower skin regions where it is oxidized and carried on as a salt.
- The low-solubility **mercury (I) compounds** and metallic mercury in the form of a coherent liquid have low toxicity when taken up orally (but not through the skin!).
- **Mercury (II) compounds** are more readily soluble and therefore much more toxic: LD100 (the 100% lethal dose) for oral take-up is approx. 0.2…1 g.
- **Mercury vapor** is highly toxic: vapor with an Hg concentration exceeding the TLV of 0.1 mg/m^3 air causes chronic poisoning after prolonged breathing for 5 to 8 hours per day.

Despite the large number of laboratories involved in polarographic/voltammetric work, sensible and proper handling (see *section 4.2.3*) has ensured that not one single case of mercury poisoning has been reported to date. The real Hg concentrations measured in the laboratory atmosphere are consistently far below the TLV (threshold limit value).

4.2.3 Handling of mercury

Several safety rules, described in detail in what follows, must be observed in the handling of mercury owing to its toxicity (see *section 4.2.2*):

- **Working in a fume cupboard**
  The handling of mercury should, if possible, always be carried out in a fume cupboard (hood). It must be ensured that no metal drops or spilling drop on the floor or the lab bench and that no evaporation of the metal occurs.

- **Working over plastic trays**
  Movements with vessels containing mercury must be carried out in, or at least above, rigid seamless trays made from plastic or enamelled metal. The supplied 6.2711.030 Drip pan made of polystyrene is eminently suitable for this.

- **Collecting mercury from the measuring vessel**
  If work is performed with the MME, at the end of the determination the analysis solution contains mercury which must be collected for later disposal. This can be done by collecting the analysis solutions in a large vessel and then decanting, by filtering the analysis solutions or by siphoning off the mercury using vacuum.

- **Trapping of mercury drops**
  Single mercury drops in this drip pan or any other spilt mercury can be bound in a simple manner by amalgamation:
  - with silver (Ag):
    Metrohm drop catcher Type 6.2406.000 which is included in the standard outfit of the 757 VA Computrace Stand
  - with tin (Sn):
    e.g. the thin tin foil supplied by Merck, Darmstadt/FRG
  - with special laboratory aids:
    e.g. Mercurisorb-Roth™ from Roth, Karlsruhe/FRG; e.g. Mercury Sponge™ and Resisorb™ from Baker, Phillipsburg, N.J./USA

- **Empty reservoir of mercury trap regularly**
  The storage container **4** of the 6.2406.000 mercury trap should be emptied regularly and rinsed thoroughly several times. If the mercury trap is needed outside the fume cupboard, a minimum safety distance of 50 cm between the head and the mercury trap must be observed.

- **Never leave mercury in open vessels**
  Mercury must never be left exposed to the air. The upper layer of water or supporting electrolyte in no way suppresses nor reduces Hg evaporation [11, 12].

- **Store mercury container in fume cupboard**
  The tightly closed mercury container as well as all parts which come into contact with mercury must be stored in a fume cupboard which is always switched on.

- **Use gas wash bottles when siphoning off mercury under vacuum**
  If mercury is siphoned off under vacuum using a water jet pump, one or two gas wash bottles must always be connected between the vacuum pump and the suction tube to ensure trapping of the siphoned-off mercury.

- **Ventilate laboratory areas well**
  Rooms where work with mercury is being carried out should be thoroughly aired from time to time.

- **Dispose of mercury properly**
  Mercury can be cleaned by distillation [13 – 16], but the apparatus is extensive and the time needed considerable. For this reason, waste mercury is normally collected in a closed container and then sent for disposal to the responsible authorities in accordance with the national legal requirements.

4.2.4 References dealing with mercury

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5 Technical data

Subject to changes !
The listed technical data apply to an ambient temperature of 25°C.

Brief characterization

PC-controlled system for voltammetry, set chemical workplace with potentiostat and measuring amplifier.

With multi-mode electrode, rotating disk electrode (RDE) as option.

Tilt-back measuring arm, integrated drip pan.

Current measurement techniques

DC	Direct Current
NP	Normal Pulse
DP	Differential Pulse
SQW	Square Wave (10 ... 2000 Hz)
AC1	Phase-sensitive Alternating Current 1st harmonic (1 … 250 Hz)
AC2	Phase-sensitive Alternating Current 2nd harmonic (1 … 250 Hz)
PSA	Potentiometric Stripping Analysis (chronopotentiometry)
CV	Cyclic Voltammetry (digital ramp)

Potentiostat

Output voltage (AE)	± 12 V
Output current (AE)	± 35 mA
Sweep voltage range	± 5 V
Voltage resolution	150 µV
Input impedance(RE)	$R \geq 1 \cdot 10^{10}\ \Omega$
Input Bias Current (RE)	± 10 pA
Noise	typ. 200 pA Circuit for measurement of the noise: AE —— RE —| 100 nF |— WE Measurement mode: Differential Pulse (method used: DPNoise.mth)

Sweep rate	with voltage step 10 mV CV: 0 … 30 V/s SQW, DC: 0 … 20 V/s DP, NP: 0 … 0.5 V/s AC1, AC2: 0 … 0.02 V/s
Pulse amplitudes	AC1, AC2: 1 mV … 1 V DP, NP: –1 … 1 V SQW: 0.15 mV … 1 V

Current measurement

Current ranges	100 nA … 10 mA in 6 ranges
Current resolution	0.5 % of the current range
Minimum current I_{min}	5 pA
Maximum current I_{max}	35 mA
Integration times	0.1 … 20 ms

Multi-mode electrode MME (working electrode WE)

Designation	6.1246.020
Electrode types	DME (dropping mercury electrode) HMDE (hanging mercury drop electrode) SMDE (static mercury drop electrode)
Drop surface	0.15 ... 0.60 mm^2 (DME and SMDE)
Glass capillary	6.1226.030 (set of 10) internal diameter = 0.05 mm
Mercury reservoir	6 mL ≅ 81.2 g; sufficient for ca. 200'000 Hg drops
Auxiliary power	inert gas (generally nitrogen N_2); $p = 1 \pm 0.2$ bar

Rotating disk electrode RDE (working electrode WE, option)

Construction	6.1246.000 Drive shaft + screw-on 6.1204.XXX Electrode tips
Electrode tips	6.1204.100 Ultra trace graphite 6.1204.110 glassy carbon (GC) 6.1204.120 platinum (Pt) 6.1204.130 silver (Ag) 6.1204.140 gold (Au) for Hg determination 6.1204.150 gold (Au) for As determination
Disk diameter	2.0 +0 / –0.05 mm
Radial eccentricity	≤ 0.2 mm
Regeneration	with 6.2802.000 Polishing kit
Rotational speed	200, 400, 600, ... , 3000 min^{-1}
Speed constancy	± 5 %

Reference electrode (RE)

Construction	double-junction; 6.0728.0X0 Ag/AgCl Ref. system + 6.1245.010 Electrolyte vessel to be filled by user
Reference system	Ag/AgCl/*c*(KCl) = 3 mol/L
Diaphragm	ceramic diaphragm; diameter = 3 mm

Auxiliary electrode (AE)

Pt auxiliary electrode	6.0343.000 Platinum electrode
GC auxiliary electrode (option)	6.1241.020 Electrode holder + 6.1247.000 Glassy carbon tip

Stirrer

Construction	6.1246.010 Drive shaft + screw-on 6.1204.090 Stirrer tip
Material	PTFE
Rotational speed	200, 400, 600, ... , 3000 min^{-1}
Speed constancy	± 5 %

Measuring vessels

6.1415.210	standard measuring vessel made of glass; working volume = 10 ... 90 mL
6.1415.150	measuring vessel made of glass (option); working volume = 5 ... 70 mL
6.1418.220	measuring vessel made of glass with thermostat jacket (option); working volume = 12 ... 70 mL
6.1450.210	measuring vessel made of PFA (option) working volume = 10 ... 90 mL
6.1456.210	measuring vessel made of glass for sample changer operation (option); working volume = 10 ... 90 mL
6.1457.210	measuring vessel made of glass with thermostat jacket for sample changer operation (option); working volume = 10 ... 90 mL

Dummy Cell

Use	Checking the 757 VA Computrace Stand Determination of the signal/noise ratio	
Connections	AE	auxiliary electrode
	RE	reference electrode
	WE-L	working electrode linear mode (RC element)
	WE-D	working electrode differential mode (peak/wave)

Inert gas (in general nitrogen N_2)

Use	Operation of MME deaeration of sample solution
Required pressure	p = 1 ± 0.2 bar (this gas pressure results in a gas flow rate of ca. 20 L/h)

Connection of Dosimats (Remote interface)

Type	665 or 765 Dosimat
Number	1...5
Plug	D-Sub with 25 pins
Manual operation	Dispensing, filling, adjustment of feed and filling rate

VA Computrace Interface

Designation	6.2155.000 VA Computrace Interface
Type	Interface USB – VA Computrace Stand
Plug to 757	D-Sub with 37 pins

Mains connection

Voltage	100...240 V
Frequency	50...60 Hz
Power consumption	26 W
Fuse	2 × 1.0 ATH (to be replaced by Metrohm Service only using the same type). Additional electronic overload protection.

Safety specifications

Construction/testing	According to IEC 61010 / EN 61010 / UL 3101-1, protection class 1
Safety directions	The Instructions for Use include information and warnings which must be heeded by the user to assure safe operation of the instrument.

Electromagnetic compatibility (EMC)

Emitted interference	Standards met: EN55022 (class B), EN50081-1/2
Immunity to interference	Standards met: IEC61000-4-2 (level 4), IEC61000-4-3 (level 2), IEC61000-4-4 (level 4), IEC61000-4-5 (level 2/3), IEC61000-4-6 (level 3), IEC61000-4-8, IEC61000-4-11, ENV50204, EN50082-1/2

Ambient temperature

Nominal operating range	0…+45 °C
Storage, transport	–40…+70 °C

Housing

Material of cover	Polyurethane rigid foam (PUR) with fire protection for fire class UL94VO, FCH-free
Material of base	Steel, enamelled
Material of measuring head arm	Steel, enamelled

Dimensions

Width	259 mm
Height	241 mm (417 mm with cover raised)
Depth	526 mm
Weight	9.7 kg (excl. accessories)

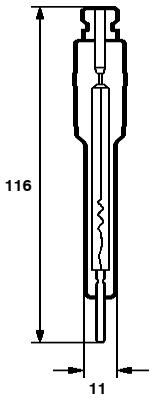
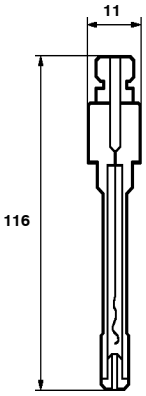
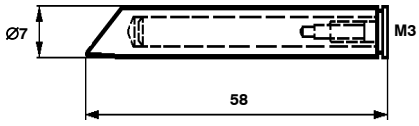
6 Appendix

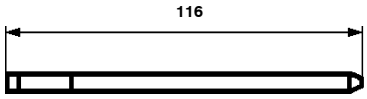
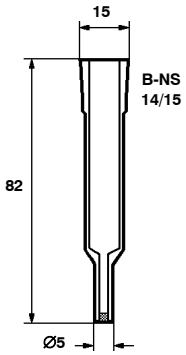
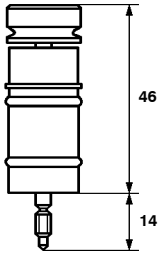
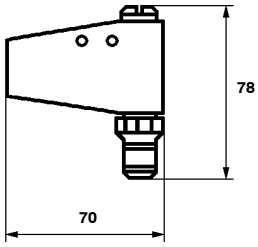
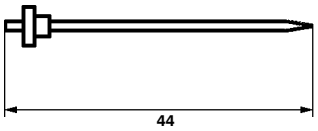
Subject to changes!
All dimensions are given in mm.

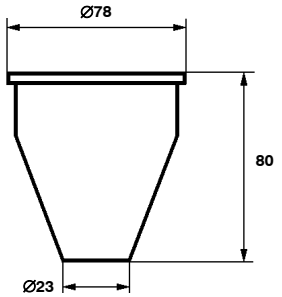
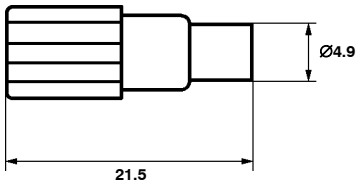
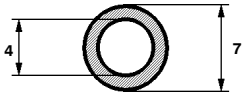
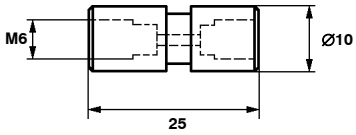
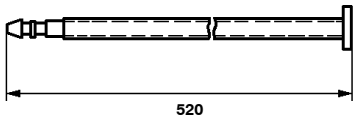
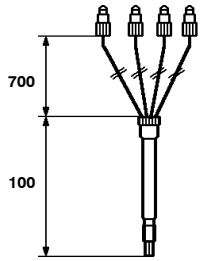
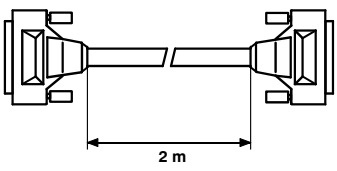
6.1 Scope of delivery

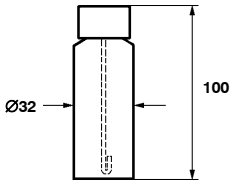
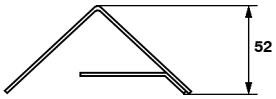
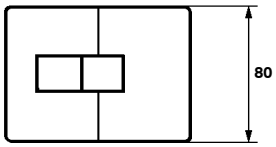
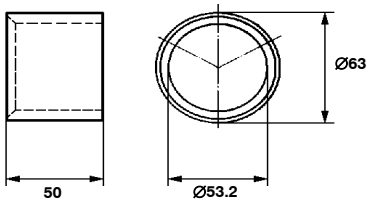
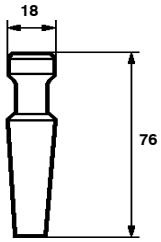
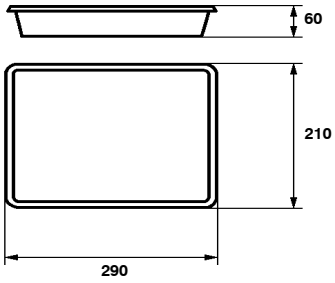
6.1.1 2.757.0110 VA Computrace

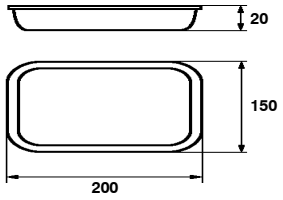
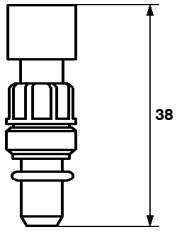
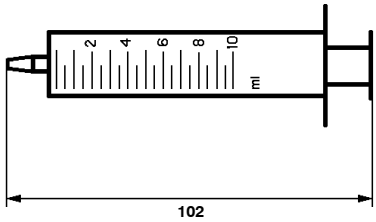
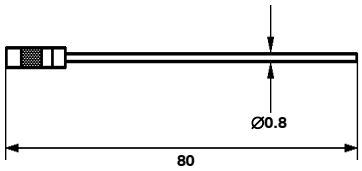
The 2.757.0110 VA Computrace System includes the following accessories:

Quant.	*Order No.*	*Description*
1	1.757.0010	**757 VA Computrace Stand** Instrument without accessories
1	6.0343.000	**Pt Auxiliary electrode** 
1	6.0728.020	**Ag/AgCl reference system** with ceramic diaphragm Ag/AgCl/*c*(KCl) = 3 mol/L Together with the 6.1245.010 Electrolyte vessel forms a complete reference electrode (double-junction construction, assembly, see *section 3.5.2*). The Ag/AgCl reference system is supplied with a screwed-on holder filled with *c*(KCl) = 3 mol/L. 
1	6.1204.090	**Stirrer tip (PTFE)** Together with the 6.1246.010 Drive shaft forms the stirrer. 

Quant.	Order No.	Description
1	6.1226.030	**Glass capillaries** for 6.1246.020 Multi-mode electrode Set of 10 incl. two 4.420.2800 sealing rings 
1	6.1244.020	**Drive belt** made of EPDM (ethylene propylene rubber), set of 3 Connection motor – drive shaft (6.1246.010 or 6.1246.000)
1	6.1245.010	**Electrolyte vessel** with ceramic diaphragm Together with the 6.0728.020 Ag/AgCl reference system forms a complete reference electrode (double-junction construction, assembly, see *section 3.5.2*). 
1	6.1246.010	**Drive shaft** for stirrer incl. 2 O-rings FPM (Viton®) Together with the 6.1204.090 stirrer tip forms a complete stirrer. 
1	6.1246.020	**Multi-mode electrode** incl. 2 O-rings NBR (nitril rubber) Together with the 6.1226.030 glass capillary forms a complete working electrode. 
1	6.1247.020	**Sealing needle** for 6.1246.020 Multi-mode electrode Set of 3 

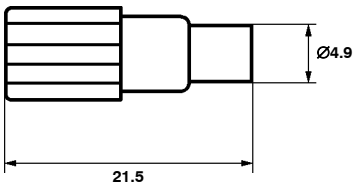
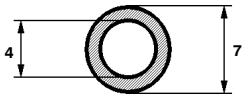
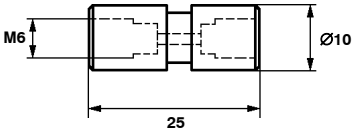
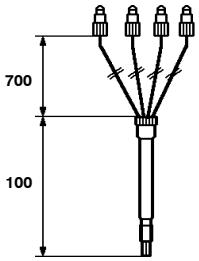
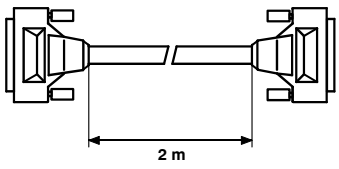
Quant.	Order No.	Description
1	6.1415.210	**Measuring vessel** clear glass Volume: 10 ... 90 mL 
7	6.1446.040	**Dummy stopper** made of PVDF, with M6 thread For closing the unused openings in the measuring vessel upper half 
1	6.1801.080	**PVC tubing** for supply of the inert gas Length L = 4 m 
4	6.1808.000	**Tubing coupling** made of ETFE, with 2 M6 threads For the connection of 2 lengths of tubing with thread M6 (e.g. 6.1805.XXX) 
1	6.1817.000	**Filling tubing**, made of PVC incl. 4.420.2860 Filling cone and 6.1809.000 Tubing coupling For filling the MME with mercury. 
1	6.1824.000	**4-way microtip** made of PTFE With 4 lengths of PTFE tubing with connection nipples with thread M6 for the attachment of 4 765 Dosimats. 
1	6.2122.0X0	**Mains cable** to customer's specifications: Cable socket — Cable plug Type IEC 320/C 13 — Type SEV 12 (CH…) ..... 6.2122.020 Type IEC 320/C 13 — Type CEE (7), VII (D…) ..... 6.2122.040 Type CEE (22), V — Type NEMA 5-15 (USA…) 6.2122.070
1	6.2135.010	**Connection cable to VA Computrace Interface** Connection cable VA Computrace Interface – 757 VA Computrace Stand. 

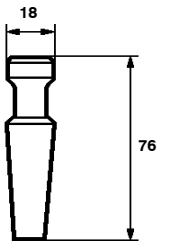
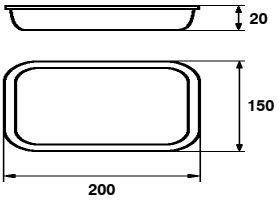
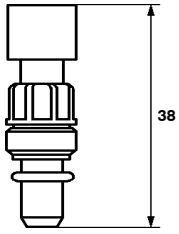
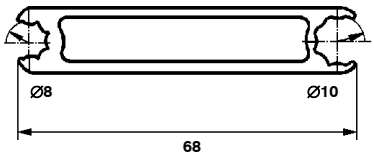
Quant.	Order No.	Description
1	6.2301.100	**Lead standard solution** $\rho(Pb^{2+})$ = 1.000 ± 0.003 g/L plastic bottle, volume V = 50 mL To perform the test methods.
1	6.2308.020	**KCl electrolyte solution** c(KCl) = 3 mol/L plastic bottle, volume V = 250 mL For 6.0728.020/6.1245.010 Ag/AgCl reference electrode
1	6.2406.000	**Mercury drop catcher** silver wire in plastic bottle For the destruction of mercury drops by amalgamation 
1	6.2615.030	**Electrode holder** For filling and storing the 6.1246.020 Multi-mode electrode  
1	6.2703.000	**Stand ring made of PVC** To hold the 6.1415.210 measuring vessel outside the 757 VA Computrace Stand 
1	6.2709.080	**Stopper** For closing the pipetting aperture of the 757 VA Computrace Stand 
1	6.2711.030	**Drip pan** made of PS (polystyrene) For filling the Multi-mode electrode with mercury 

Quant.	Order No.	Description
1	6.2711.040	**Drip pan** made of PS (polystyrene) To be inserted in the 757 VA Computrace Stand 
1	6.2730.030	**Stopper** with nipple and O-ring For closing the opening of the 757 VA Computrace Stand when the 6.1824.000 4-way microtip is not used (inserted in opening **59**) 
1	6.2739.000	**Spanner** for screwing down plastic nipples 
1	6.2816.020	**Syringe** made of PP, with Luer connection Volume V = 10 mL For filling the MME 
1	6.2816.030	**Needle** for 6.2816.020 syringe 
1	6.5326.000	**VA Computrace Interface cpl.** For connection of VA Computrace Stand 757 to PC via USB incl. the following accessories: 1 × 6.2155.000 VA Computrace Interface 1 × 6.2151.020 USB Cable 1.8 m 1 × 6.2158.000 Mains adapter 100...240V/5V DC
1	6.6032.100	**PC Software CD «VA Computrace 2.0»**
1	8.757.1013	**Hardware Manuel (English)** Instructions for Use for 757 VA Computrace Stand
1	8.757.1027	**Registration card (German/English)** for PC program «757 VA Computrace 2.0»
1	8.757.2003	**"VA Application Notes" (English)**
1	8.757.5003	**Metrohm Monograph "Practical voltammetry" (English)**
1	8.757.8023	**Software Manual (English)** Instructions for Use for PC program «757 VA Computrace 2.0»

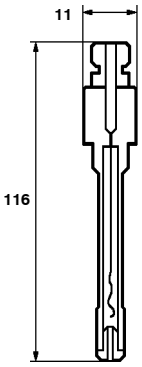
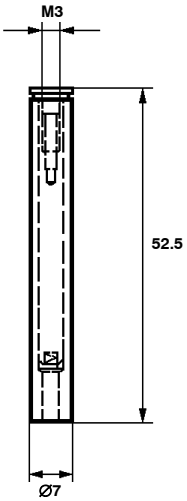
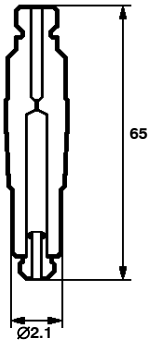
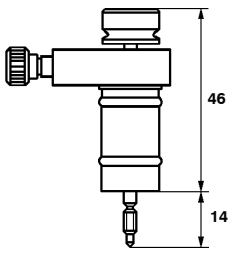
6.1.2 2.757.0120 VA Computrace

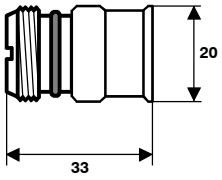
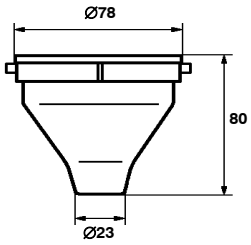
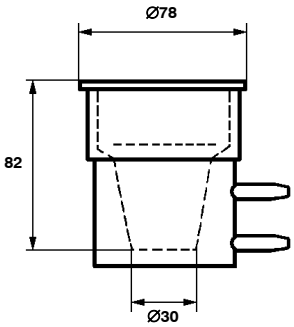
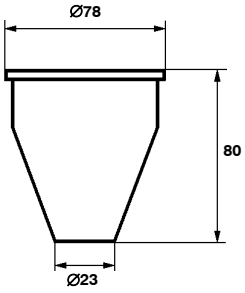
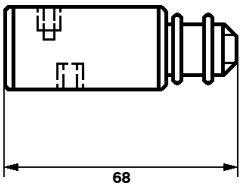
The 2.757.0120 VA Computrace System includes the following accessories:

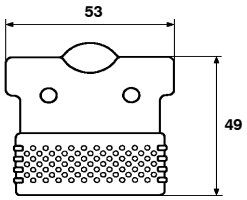
Quant.	*Order No.*	*Description*
1	1.757.0010	**757 VA Computrace Stand** Instrument without accessories
7	6.1446.040	**Dummy stopper** made of PVDF, with M6 thread For closing the unused openings in the measuring vessel upper half 
1	6.1801.080	**PVC tubing** for supply of the inert gas Length L = 4 m 
4	6.1808.000	**Tubing coupling** made of ETFE, with 2 M6 threads For the connection of 2 lengths of tubing with thread M6 (e.g. 6.1805.XXX) 
1	6.1824.000	**4-way microtip** made of PTFE With 4 lengths of PTFE tubing with connection nipples with thread M6 for the attachment of 4 765 Dosimats. 
1	6.2122.0X0	**Mains cable** to customer's specifications: Cable socket — Cable plug Type IEC 320/C 13 — Type SEV 12 (CH…) ..... 6.2122.020 Type IEC 320/C 13 — Type CEE (7), VII (D…) ..... 6.2122.040 Type CEE (22), V — Type NEMA 5-15 (USA…) 6.2122.070
1	6.2135.010	**Connection cable to VA Computrace Interface** Connection cable VA Computrace Interface – 757 VA Computrace Stand. 
1	6.2301.100	**Lead standard solution** $\rho(Pb^{2+})$ = 1.000 ± 0.003 g/L plastic bottle, volume V = 50 mL To perform the test methods.
1	6.2308.020	**KCl electrolyte solution** c(KCl) = 3 mol/L plastic bottle, volume V = 250 mL For 6.0728.020/6.1245.010 Ag/AgCl reference electrode

Quant.	Order No.	Description
1	6.2709.080	**Stopper** For closing the pipetting aperture of the 757 VA Computrace Stand 
1	6.2711.040	**Drip pan** made of PS (polystyrene) To be inserted in the 757 VA Computrace Stand 
1	6.2730.030	**Stopper** with nipple and O-ring For closing the opening of the 757 VA Computrace Stand when the 6.1824.000 4-way microtip is not used (inserted in opening **59**) 
1	6.2739.000	**Spanner** for screwing down plastic nipples 
1	6.5326.000	**VA Computrace Interface kpl.** For connection of VA Computrace Stand 757 to PC via USB incl. the following accessories: 1 × 6.2155.000 VA Computrace Interface 1 × 6.2151.020 USB Cable 1.8 m 1 × 6.2158.000 Mains adapter 100...240V/5V DC
1	6.6032.100	**PC Software CD «VA Computrace 2.0»**
1	8.757.1013	**Hardware Manuel (English)** Instructions for Use for 757 VA Computrace Stand
1	8.757.1027	**Registration card (German/English)** for PC program «757 VA Computrace 2.0»
1	8.757.2003	**"VA Application Notes" (English)**
1	8.757.5003	**Metrohm Monograph "Practical voltammetry" (English)**
1	8.757.8023	**Software Manual (English)** Instructions for Use for PC program «757 VA Computrace 2.0»

6.2 Options

Order No.	*Description*	
6.0728.010	**Ag/AgCl reference system** with ceramic diaphragm Together with the 6.1245.010 Electrolyte vessel forms a complete reference electrode (double-junction construction, assembly, see *section 3.5.2*). The Ag/AgCl reference system is supplied with an empty holder screwed on; the holder can be filled with the desired reference electrolyte.	
6.1204.XXX	**Electrode tip** Together with the 6.1246.000 Drive shaft forms the stirrer. The following electrode tips are available: *Order No.* *Disk material* *Shaft material* **6.1204.100** **Ultra Trace Graphite** PVC **6.1204.110** **Glassy Carbon (GC)** PEEK **6.1204.120** **Pt** PEEK **6.1204.130** **Ag** PEEK **6.1204.140** **Au** PEEK **6.1204.150** **Au** PEEK Disk diameter: 2.0 +0 / –0.05 mm Concentricity error: ≤ 0.2 mm	
6.1241.020	**Electrode holder** to take the 6.1247.000 glassy carbon rod Together with the 6.1247.000 glassy carbon rod forms the GC auxiliary electrode.	
6.1246.000	**Drive shaft for rotating disk electrode** incl. 2 O-rings FPM (Viton®) Together with the 6.1204.XXX electrode tips forms the rotating disk electrode (RDE).	

Order No.	Description
6.1247.000	**Glassy carbon tip** Together with the 6.1241.020 electrode holder forms the GC auxiliary electrode. 
6.1247.040	**Slotted screw** Slotted screw **75** with holding sleeve. 
6.1415.150	**Measuring vessel** clear glass, incl. 6.2036.000 holding ring Volume: 5 ... 70 mL 
6.1418.220	**Measuring vessel** clear glass, with thermostatic jacket; incl. 6.2036.000 holding ring Volume: 12 ... 70 mL 
6.1450.210	**Measuring vessel** Made of PFA (polyfluoralkyloxy-copolymer), incl. 2036.000 holding ring Volume: 10 ... 90 mL 
6.2709.040	**Stopper** made of PVC, incl. 2 E.301.0004 O-rings of NBR (nitril rubber) For closing the MME opening when the RDE is used; with two dummy holes (thread M6) for holding the two MME gas lines not used in operation with the RDE. 
6.2802.000	**Polishing kit** for mechanical regeneration of the active surface of 6.1204.XXX electrode tips comprising: 1 × 2 g α-Al_2O_3 (0.3 μm) 1 × polishing cloth

Order No.	Description
6.2827.000	**Trimming tool** for regeneration of the 6.1204.100 Ultra Trace Graphite electrode 
2.765.0010	**765 Dosimat** Dispensing unit for 757 VA Computrace Stand.
6.3014.XXX	**Exchange unit** with standard reagent bottle of brown glass, rectangular, volume V = 1 L, with GL 45 ISO/DIN glass thread; burette cylinder of clear glass with light protector; PCTFE/PTFE flat stopcock **6.3014.153** burette volume V = 5 mL **6.3014.213** burette volume V = 10 mL **6.3014.223** burette volume V = 20 mL **6.3014.253** burette volume V = 50 mL
6.2141.080	**Connecting cable for 765 Dosimats** Connecting cable 2 × 765 Dosimat – 757 VA Computrace Stand.
6.9921.170	**Connecting cable for 765 Dosimats** Connecting cable 5 × 765 Dosimat – 757 VA Computrace Stand.
2.813.0020	**813 Compact Autosampler for VA applications** Sample changer for up to 18 sample vessels
2.731.0010	**731 Relay Box** Control unit for the two 772 Pump Units needed for operation of the 813 Compact Autosampler
2.772.0010	**772 Pump Unit** Peristaltic pump for operation of 813 Compact Autosampler
6.2141.150	**Connecting cable 757–731–813** Cable for connection of 731 Relay Box and 813 Compact Autosampler to 757 VA Computrace Stand
6.5323.010	**Rinsing equipment for VA Computrace 757** incl. the following accessories: 1 × 6.1456.210 Measuring vessel for sample changer operation 2 × 6.1602.105 Siphon GL45 2 × 6.1618.050 Thread adapter 40 mm/GL45 2 × 6.1621.000 PE container, V = 10 L 1 × 6.1805.020 FEP tubing, L = 52 cm 1 × 6.1805.100 FEP tubing, L = 40 cm 1 × 6.1805.180 FEP tubing, L = 16 cm 4 × 6.1805.530 FEP tubing, L = 200 cm 1 × 6.1808.000 Coupling bush, with 2 threads M6 2 × 6.1819.010 PTFE tube, L = 86 mm 1 × 6.1819.020 FEP tube, L = 250 cm 4 × 6.1820.020 Screw connector 1 × 6.1829.020 FEP aspiration tubing, L = 500 cm

6.3 Warranty

The warranty on our products is limited to defects that are traceable to material, construction or manufacturing error, which occur within 12 months from the day of delivery. In this case, the defects will be rectified in our workshops free of charge. Transport costs are to be paid by the customer.

For day and night operation, the warranty is limited to 6 months.

Glass breakage in the case of electrodes or other 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 the regard to the guarantee of accuracy, the technical specifications in the instruction manual are authoritative.

Concerning defects in material, construction or design as well as the absence of guaranteed features, the orderer 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, burette cylinders and PTFE pistons. Before embedment 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 that arises as a result of non-compliance with these instructions, no warranty responsibility whatsoever will be accepted by Metrohm.

6.4 EU Declaration of conformity

CE

EU Declaration of Conformity

The METROHM AG company, Herisau, Switzerland hereby certifies, that the instrument:

757 VA Computrace

meets the requirements of EC Directives 89/336/EWG and 73/23/EWG.

Source of the specifications:

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

Description of the instrument:

PC-controlled system for polarographic and voltammetric trace analysis of organic and inorganic substances.

Herisau, April 28, 1998

Dr. J. Frank	Ch. Buchmann
Development Manager	Production and Quality Assurance Manager

6.5 Certificate of conformity and system validation

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:	**757 VA Computrace**	
Name of manufacturer:	Metrohm Ltd., Herisau, Switzerland	
Principal technical information:	Voltage:	100…240 V
	Frequency:	50…60 Hz
	Power consumption:	26 W

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

IEC61000-4-2 (level 4), IEC61000-4-3 (level 2), IEC61000-4-4 (level 4), IEC61000-4-5 (level 2/3), IEC61000-4-6 (level 3), IEC61000-4-8, IEC61000-4-11, ENV50204, EN55022 (class B), EN50081-1/2, EN50082-1/2 — *Electromagnetic compatibility*

IEC61010, EN61010, UL3101-1 — *Security specifications*

The technical specifications 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, April 28, 1998

Dr. J. Frank	Ch. Buchmann
Development Manager	Production and Quality Assurance Manager

6.6 Index

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