

760 Sample Changer



Instructions for Use

8.760.1013



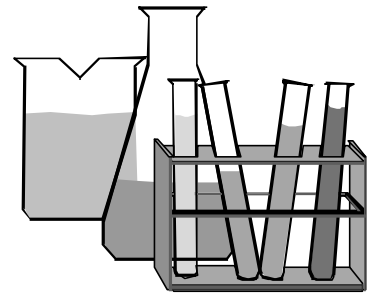
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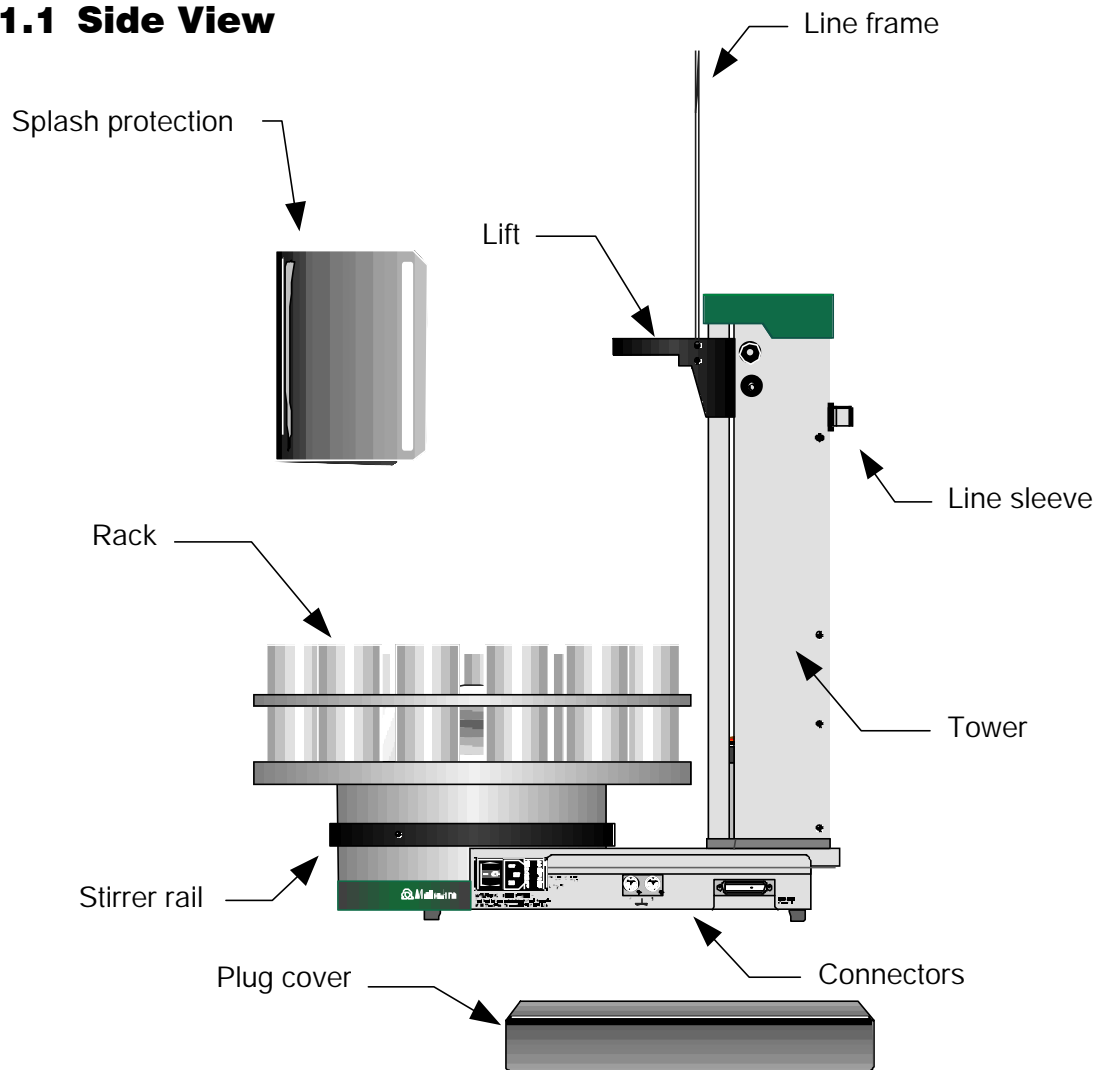
8.760.1013

2000.07 up/dm



1 Overview

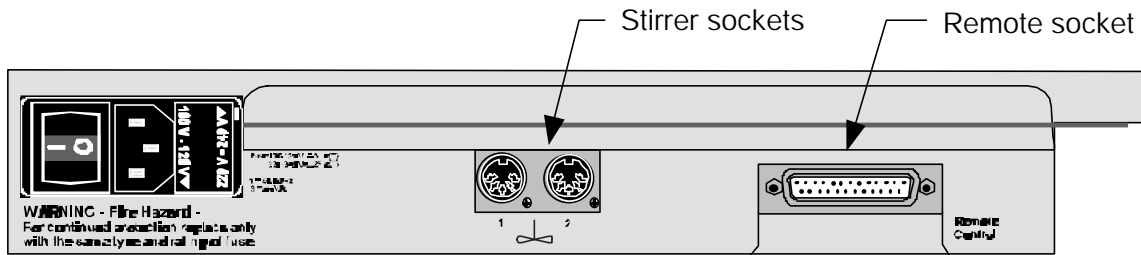
1.1 Side View



Safety note:

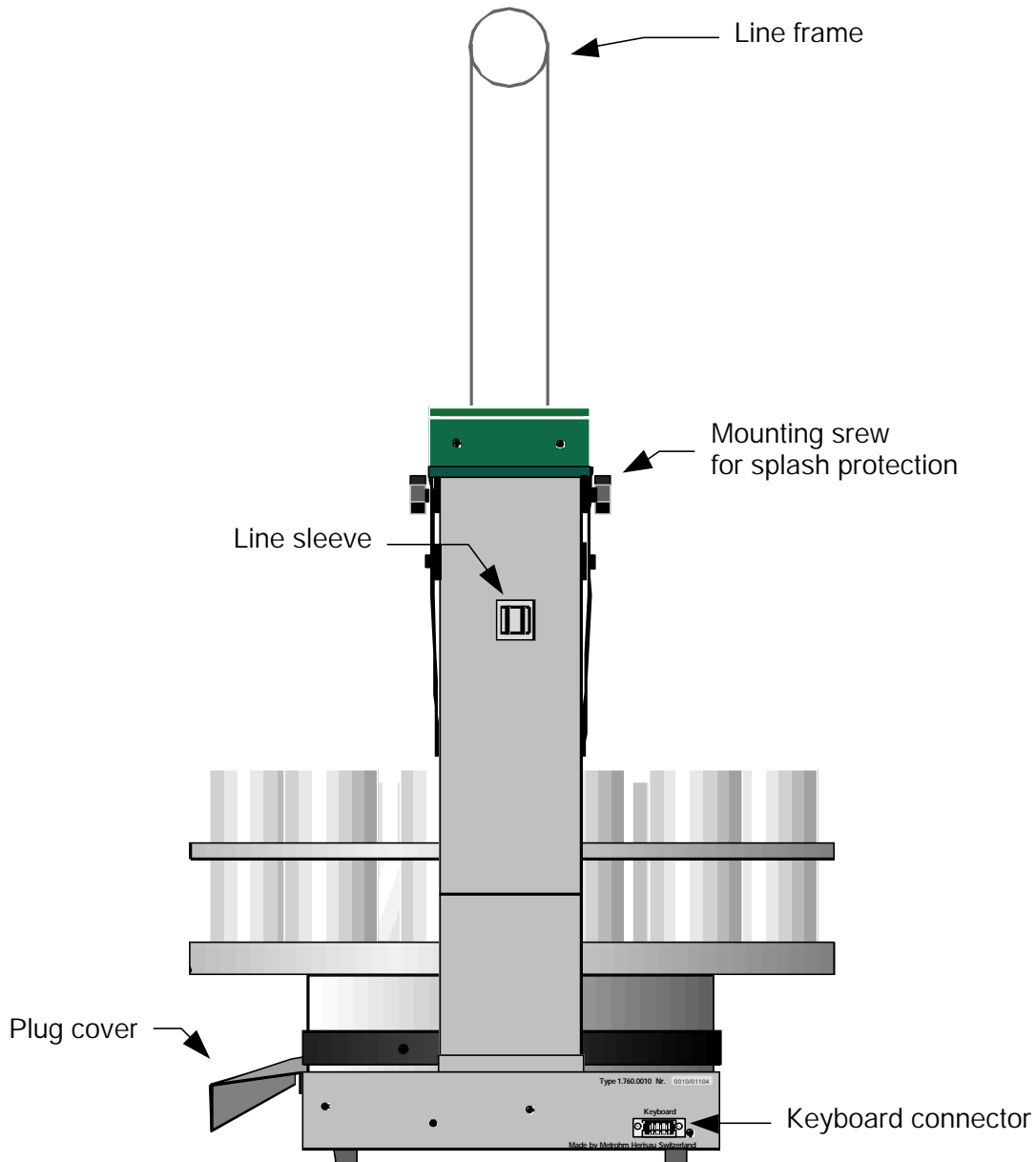
Never operate the 760 Sample Changer without splash protection and plug cover being mounted. The plug cover prevents any contamination of the connectors, caused by spilled solvents or chemicals.

The Connectors (side view):




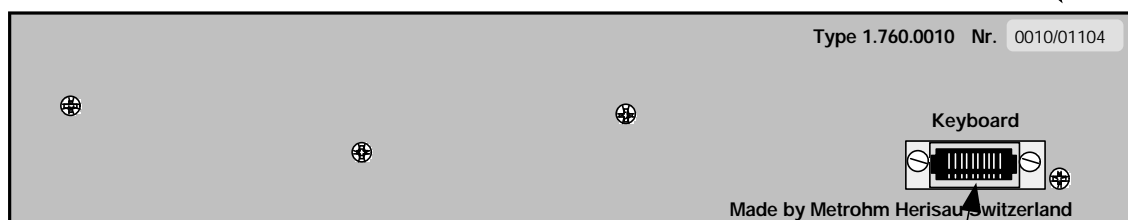
The remote socket serves the connection of Metrohm- or other measuring instruments that communicate via a parallel cable (see p. 11).


1.2 Rear View



Keyboard Connector (rear):

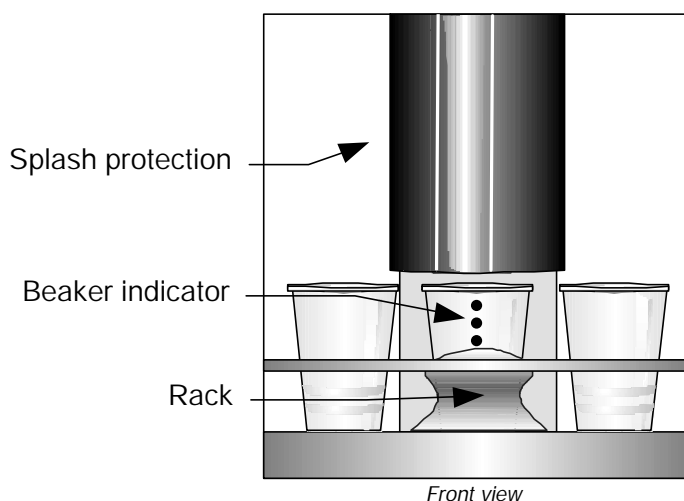
Manufacturing number 



Keyboard connector 

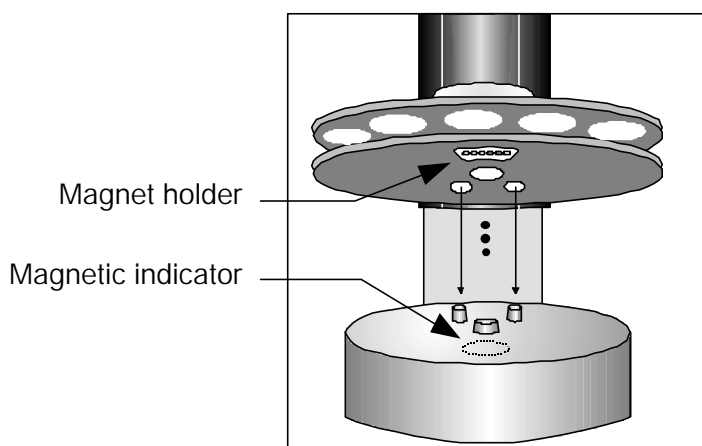
1.3 Sensors

Beaker test



Each tower of the 760 Sample Changer is equipped with a beaker indicator to detect the presence of a beaker in front of the tower. This infrared sensor detects many different materials, if any object is placed in correct position. This beaker test is carried out after each MOVE operation.

Magnetic rack code indicator



The magnetic sensor for the detection of the individual rack codes is mounted below the sample changer's turntable. The magnetic binary code of the racks can only be read, if the rack is in initial position and therefore the magnet holder is in accurate position right above the rack code indicator. For this reason the 760 Sample Changer should be initialized by <RESET> or turned off and on right after every rack change.



2 Installation

2.1 Setting up the Instrument

Packaging

The 760 Sample Changer is supplied with the accessories in separate special packages designed to ensure maximum protection. These contain shock-absorbing foam linings. As only these special packages guarantee damage-free transport of the instrument, it is essential you store them in a safe place.

Control

Immediately following delivery, check that the consignment is complete and undamaged (compare with delivery note and accessories list in the Instructions for Use, page 34). In case of damage see "Warranty", page 31.

Setting up

The 760 Sample Changer is a rugged instrument and may be used in rough environments such as laboratories and manufacturing plants. It must not be exposed to a corrosive atmosphere. If the sample changer is operated in a rough environment, regular maintenance is strongly recommended.

Power Supply



Follow these instructions to connect the 760 Sample Changer to the power supply. Ensure that the instrument is never operated with incorrect voltage ratings and/or with fuses of an incorrect rating, otherwise there is a fire hazard!

Setting the instrument supply voltage

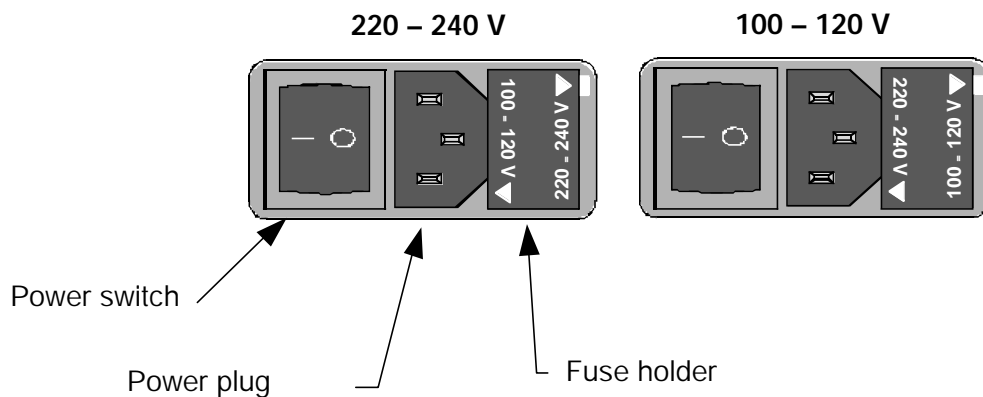
Before switching on the 760 Sample Changer for the first time, check that the line voltage set on the instrument (see next page) matches the local power supply voltage. If this is **not** the case, change the voltage setting as follows:

- **Disconnect line cable**
Unplug the 760 Sample Changer.
- **Remove fuse holder**
Using a screw driver, loosen the fuse holder and pull it out.
- **Checking and replacing fuse**
Carefully remove the built-in fuse and check its specifications.
(The position of the fuse in the fuse holder is marked by the white arrow printed next to the supply voltage):

100¼ 120 V 0.5 A (slow) ord. no. U.600.0014

220¼ 240 V 0.25 A (slow) ord. no. U.600.0011

- **Replace fuse**
Replace fuse if necessary and reinsert it in the fuse holder.
- **Insert the fuse holder**
Insert the fuse holder according to the appropriate supply voltage. The white arrow besides the desired voltage has to point towards the white block mark printed on the fuse holder's panel (see below).



2.2 Safety Considerations



Safety note:

Never operate the 760 Sample Changer without splash protection and plug cover being mounted. The plug cover prevents any contamination of the connectors, caused by spilled solvents or chemicals.

If failure or malfunctioning occurs during operation of the 760 Sample Changer, the Metrohm Service Department should be consulted.

If opening the instrument is unavoidable, the following safety precautions are to be strictly adhered to:



Before opening the instrument disconnect it from all electrical sources. Make sure that the power plug has been pulled out.

Electronic components are sensitive to static electricity and can be destroyed by discharge. Before touching any components inside the instrument, both the person and his tools should be grounded by grasping a grounded object (for example: a metallic part of the casing of the instrument or a radiator) in order to eliminate any static electricity.

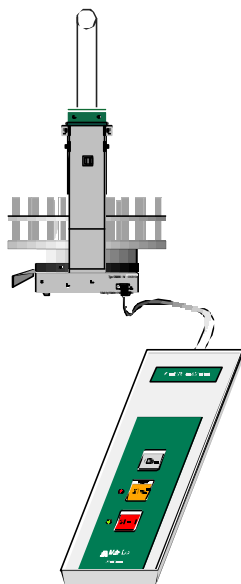
Only in exceptional cases should the instrument be opened while it is switched on. Because parts that conduct current are exposed in this case, this should only be undertaken by an expert who is acquainted with the associated dangers.

When peripheral instruments are connected to the 760 Sample Changer, the sample changer and the instruments to be connected have to be switched off, otherwise all instruments could suffer damage.

If it becomes apparent that the instrument can no longer be operated safely, it must be put out of operation.

2.3 Arranging the Accessories

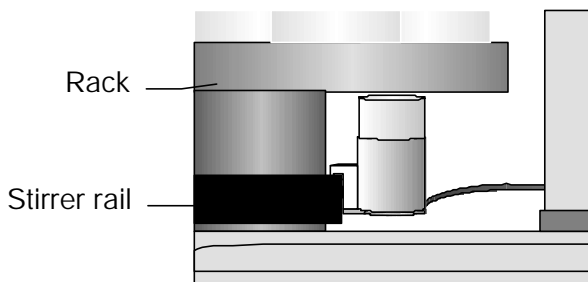
2.3.1 Connecting the Keyboard



The keyboard is to be connected to the keyboard socket on the rear side of the sample changer.

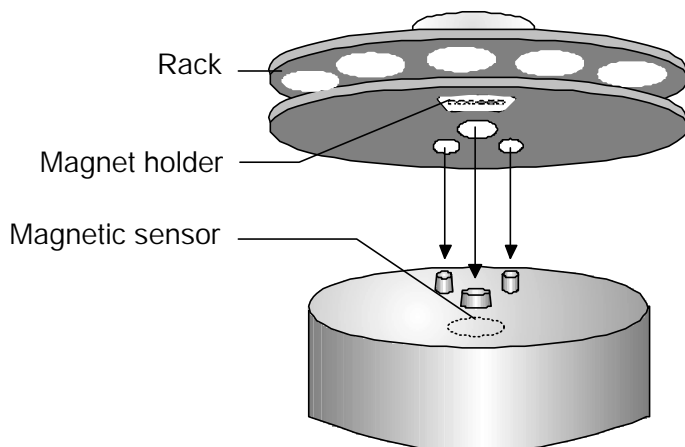
To disconnect press the plug together slightly on both sides.

2.3.2 Magnetic Stirrer



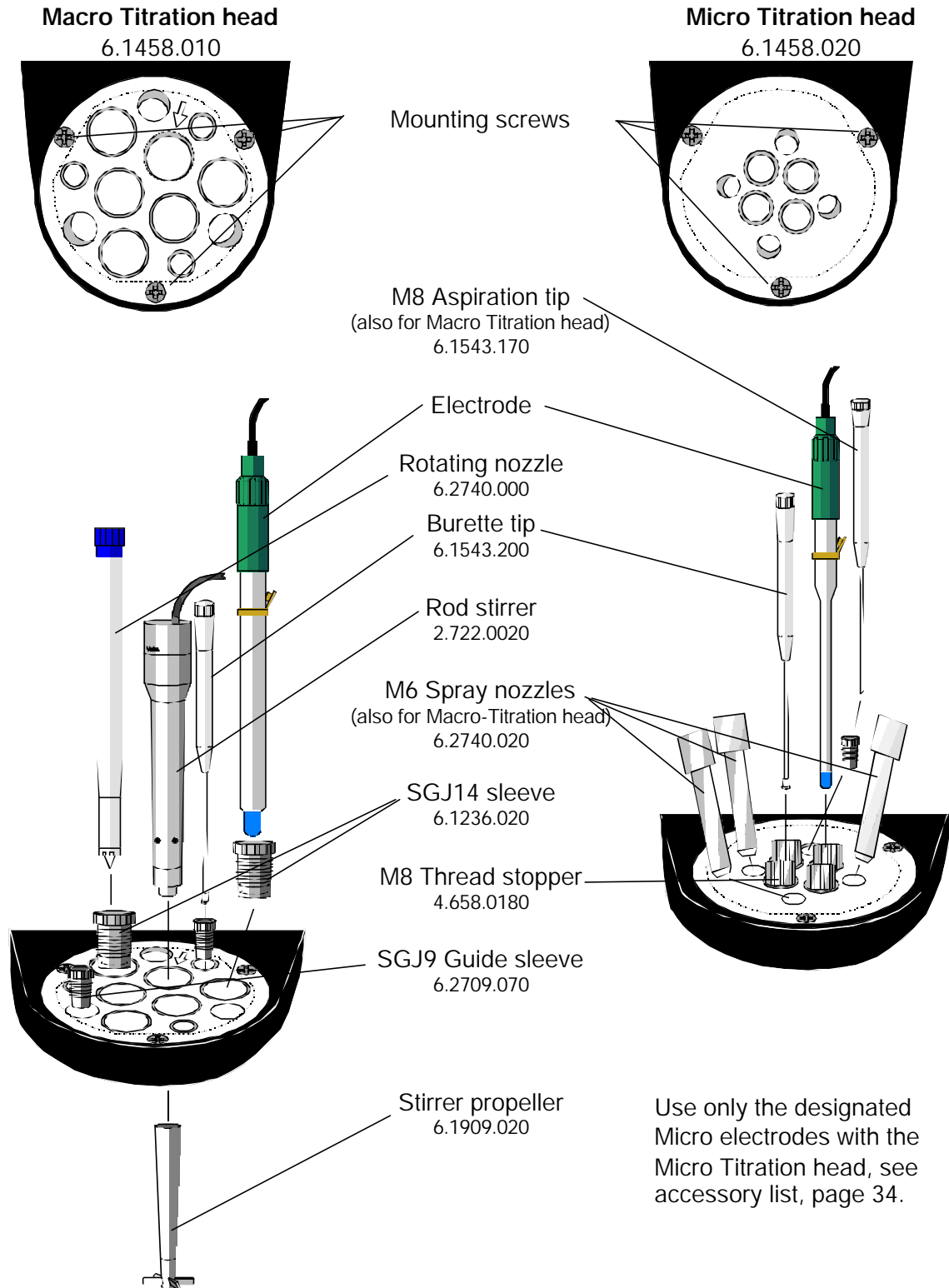
Magnetic stirrers 2.741.0010 may be placed in any position on the stirrer rail beneath the rack.

2.3.3 Racks



After placing the rack on the turntable, the sample changer must be initialized by pressing the <RESET> key or turning the sampler changer off and on. This enables the safe reading of the magnetic rack code and can only be done if rack position 1 is directed to tower 1. Before a rack is used for the first time, the lift positions have to be set (s. Chapter. 3.4).

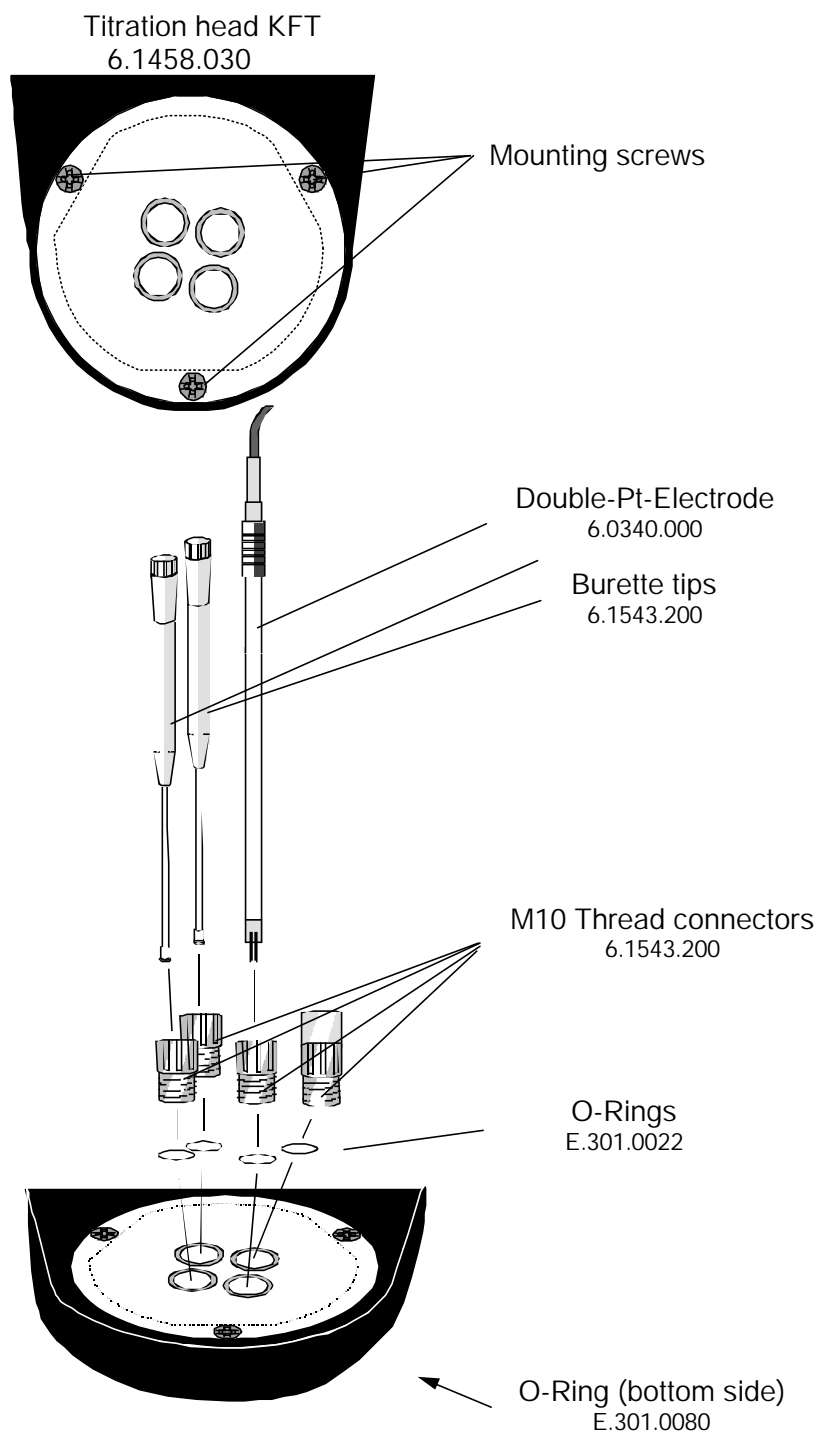
2.3.4 Mounting and Setting up the Titration Heads



Note on Macro Titration head

The arrow sign marks the slightly sloped SGJ14 boring, which enables to center a rod stirrer or an electrode in a narrow titration vessel.

Mounting and Setting up the Titration head KFT

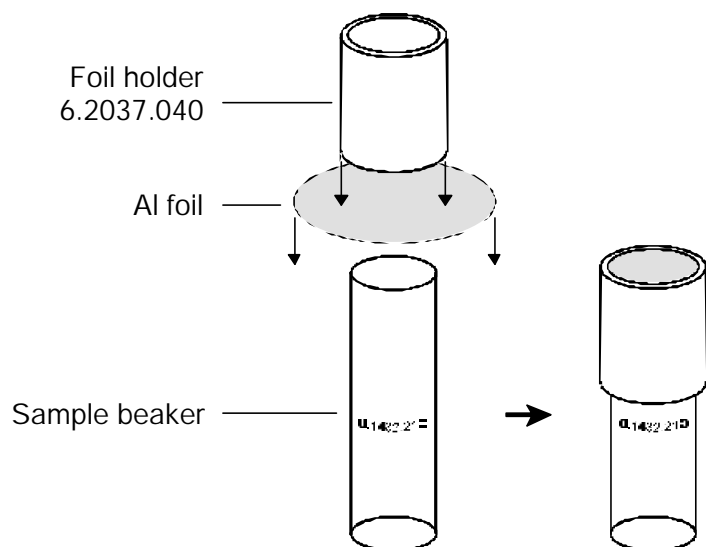


Note:

For an optimal sealing of the titration vessel, the M10 thread connectors should be mounted together with the O-rings.

All tubing and cables connected to the titration head should be guided through the line frame to ensure full motility for the lift. Note that there is enough line reserve for a complete down movement of the lift.

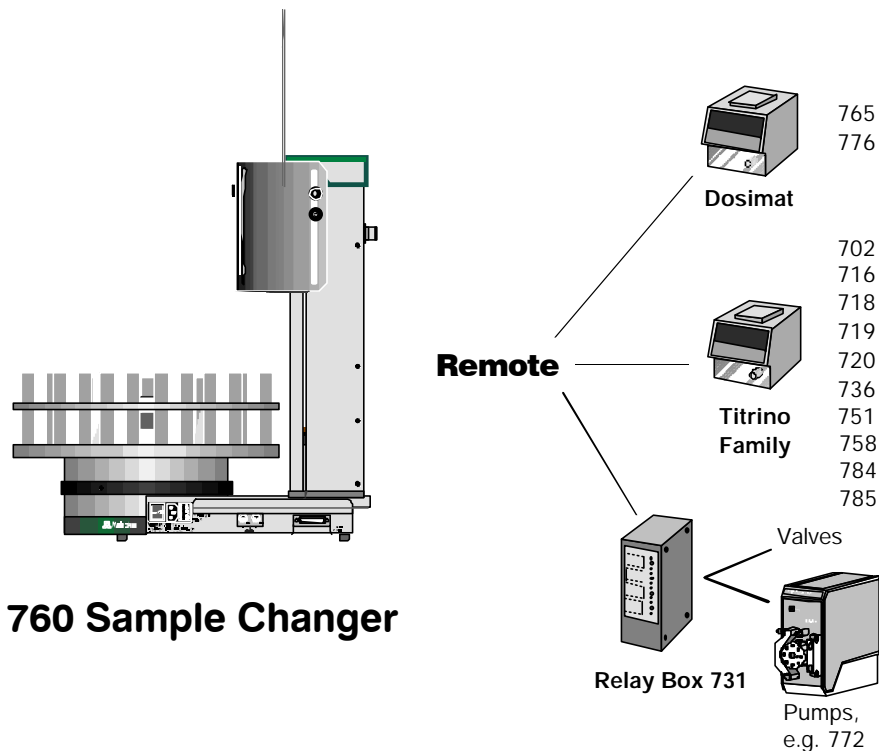
2.3.5 Use of the Sample Beaker for Karl Fischer Titration



For Karl Fischer titration the weighted sample is dosed into the sample beaker together with a stirring bar 6.1903.010. The beaker is sealed with a centered aluminium foil 6.2820.000 using the foil holder.

During the method run the lift is moved down to the working position. Thereby, the electrode and burette tips break through the Al foil. Using Al foil 6.2820.000 this means no risk for the instruments. This step can be facilitated by binding together all three devices approx. 2 cm above the bottom of electrode and burette tips using an O-ring E.301.0022. Thus, the impulse is focused on a small area of the Al foil.

2.4 Remote Connections



760 Sample Changer

Connecting peripheral instruments to the 760 Sample Changer requires Metrohm cables. Otherwise a safe data transmission may not be guaranteed.

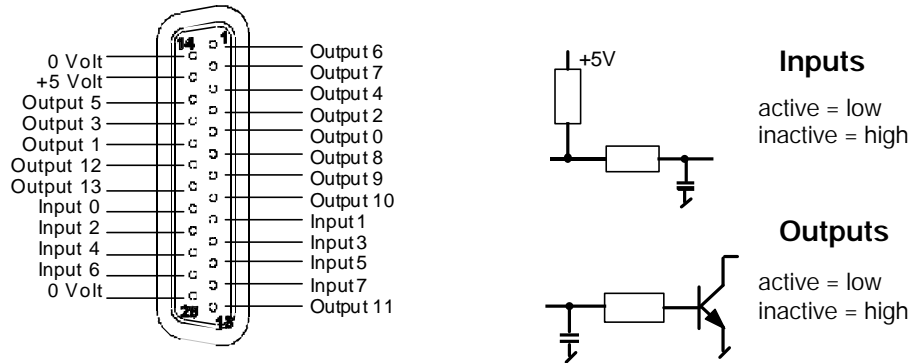
The required cables are listed in the following table. Details about the control commands are given in the Instructions for Use of the corresponding instrument.

Connection of:	Cable ordering no.
Titrimo or 692/712/713 pH-Meter/Ionmeter/Conductometer	6.2141.020
Titrimo and 765 or 776 Dosimat	6.2141.040
691 pH-Meter	6.2141.060
692 Ionmeter and 765 Dosimat	6.2141.070
678/682/686/672 Titroprocessors	3.980.3640
678/682/686/672 Titroprocessors and 671 Switch Box	3.980.3650

All instruments have to be switched off, before they are connected. Otherwise the instruments could suffer from damage.

14 lines (Output 0–13) are available for the emission of signals. For receiving signals 8 lines are provided (Input 0–7). The assignment of these lines is fixed for the 760 Sample Changer.

Pin assignment of the Remote socket:

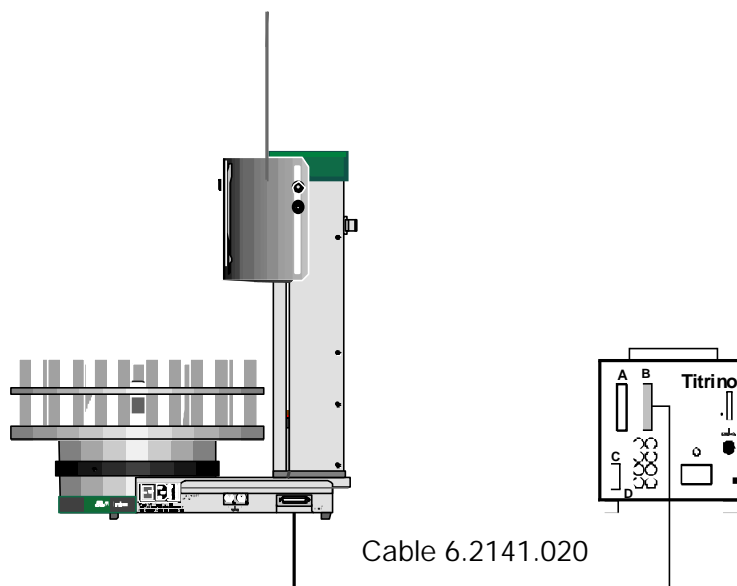


The +5 V supply line may be charged with 20 mA maximally.

2.4.1 Typical Combinations of Instruments

760 Sample Changer — Titrimo

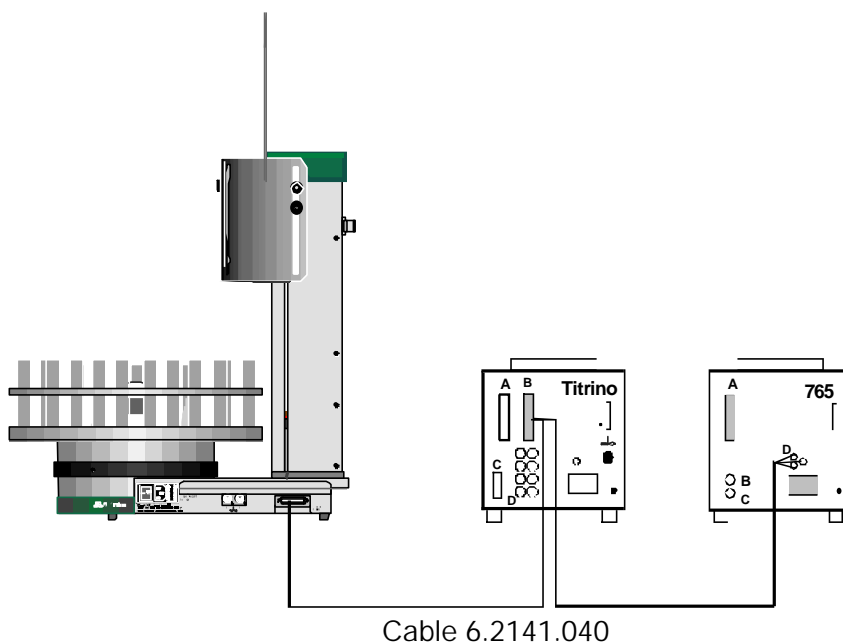
with standard cable



Remote control commands:

Output 0: *****1 starts Titrimo
 Input 3: ****1*** awaits end of titration (EOD pulse)

760 Sample Changer — Titrimo — Dosimat 765/776

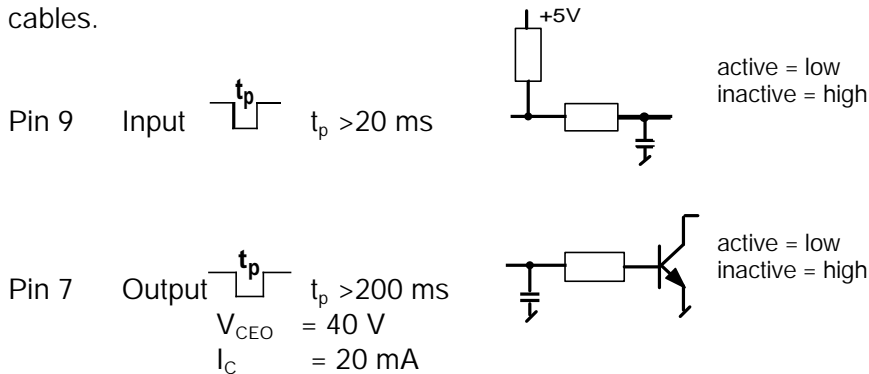


Remote control commands:

- Output 0: *****1 starts Titrimo
- Output 6: *****1***** starts Dosimat
- Input 3: ****1*** awaits end of titration (EOD pulse)

Pump Control via Remote Lines

Using methods 3 and 4, external pumps can be controlled via the remote interface. To start a pump, an inverted pulse of duration of at least 200 ms is sent to pin 7 (Output 9) of the remote socket. To continue with the method the pump must indicate its readiness by setting the input line 1 (pin 9) to low level for at least 20 ms. Ask your pump distributor or Metrohm for customized connecting cables.



2.5 Racks

A sample rack is a sort of turntable for the positioning of beakers which are to be placed on the Sample Changer. Because for titration, various sizes of beakers are common or required, many kinds of racks can be used and are easily interchangeable. The rack offers space for various numbers of samples depending on the diameter of the beakers. Metrohm delivers the following predefined types of standard racks:

Type	Number of beakers	Type of beaker	Predefined Code	Order Number
M12-0	12	250 mL Metrohm glass beaker	000001	6.2041.310
M12-0	12	150 mL glass beaker or 200 mL disposable beaker (Euro)	100000	6.2041.360
M14-0	14	200 mL disposable beaker (Euro)	000011	6.2041.370
M14-0	14	8 oz disposable beaker (US)	000101	6.2041.380
M16-0	16	150 mL glass beaker	000010	6.2041.320
M16-0	16	120 mL disposable beaker (US)	100001	6.2041.390
M24-0	24	75 mL Metrohm glass beaker	001000	6.2041.340

Every single rack can be identified by a unique magnetic code. Rod magnets which are attached to the bottom of the rack can be combined to form a 6-place binary code. The sample changer can then automatically recognize the mounted rack. This is possible when the rack is positioned with the first rack position under lift 1. After changing a rack, the sample changer should first be initialized by pressing the <RESET> key or turning the instrument off and on. This way the save recognition of a rack and therefore the correct beaker positioning is made possible.



3 Introduction

3.1 Important Features

Overview

The 760 Sample Changer provides most of the important features of the 730 Sample Changer:

- Interchangeable Metrohm standard sample racks
- Working, rinsing and shift heights can be specifically defined
- Automatic rack recognition by means of standard rack codes
- Optical beaker test
- Two stirrers (magnetic or rod stirrer) can be connected
- Operation with most Metrohm instruments via Remote I/O lines

Limitations

- 4 fixed procedures that cannot be edited
- No RS 232 interface, no built-in pumps
- Simple keyboard with 3 keys and 2 LEDs (green and red)
- The turning speed of the rack cannot be varied
- No special rack types can be defined

Basic Settings

- Working, rinsing and shift heights can be defined for each rack type
- Stirrer speed can be defined for both stirrers together
- One of 4 methods can be selected as the standard method

3.2 Key Functions

The 760 Sample Changer operates in two different modes where the keys provide different functions:

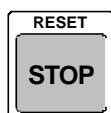
The **Basic Mode** starts when the instrument is turned on. The ready-to-operate status is indicated by the green LED.

Basic Mode:

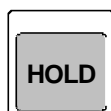
(after **Power on**, green LED on)



Starts processing of a sample series.



Stops processing of a sample series or initializes the 760 Sample Changer.



Interrupts processing of a sample series, green LED blinks.



Continues processing of a sample series.

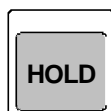
The **Configuration Procedure** starts when the instrument is switched on with pressing <HOLD> simultaneously. The green LED blinks once. Now, the method can be selected and working, rinsing and shift heights as well as the stirrer speed can be defined.

Configuration Procedure:

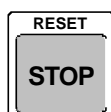
(after **Power on** with <HOLD> pressed, green LED blinks once)



Accepts the setting of a value and moves on to the next value.



Learning mode, manual execution of a changer function for setting a configuration.

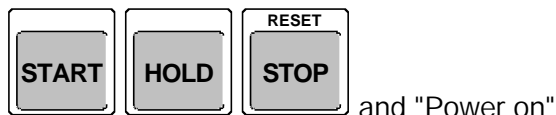


Cancels a configuration setting and initializes the 760 when <STOP> is pressed twice. Switches back to basic condition.

3.3 Memory Initialization

The system memory can be initialized to set default parameters when required (e.g. in the case of mal-functions). For this purpose press all keys while the sample changer is switched on.

It is recommended to execute an initialization before the first installation of the sample changer.



3.4 Configuration Procedure

The **Configuration Procedure** starts when the instrument is switched on with pressing <HOLD> simultaneously. The method is being selected and working, rinsing and shift heights are defined and assigned to the selected rack type. Additionally, the stirrer speed can be defined.

If the 760 Sample Changer is used for the first time, the lift positions have to be adapted to the selected rack type. This applies also if a new rack type is inserted for the first time.


















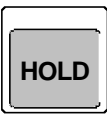




Empty beakers with a stirrer bar if necessary should be used for the definition of the lift positions. Additionally, the foil holder has to be used without Al foil if the Sample Changer is being set up for Karl Fischer titration.








The working position should be defined in such a way that the connected electrode tip stands in the center of the sample. The shift position should allow a free rotation of the sample rack. In the rinsing position, the aspiration tip should touch the bottom of the sample beaker. If no rinsing step is necessary (method 1 and 2), no rinsing position has to be defined.

In order to proceed to the next point in the configuration procedure, <START> must be pressed. This accepts the current setting. <STOP> is pressed in order to cancel a setting. The configuration procedure is terminated by pressing <STOP> again.






The LEDs show either the status of the sample changer or the current step in the configuration procedure.

The Configuration Procedure

Key	LEDs	Explanation
 + "Power ON"	 green 1*	In order to start the configuration procedure the <HOLD> key must be pressed while the sample changer is switched on. The green LED lights up once to show that the configuration procedure is active. The method can now be selected.
	 red 1-4*  green 1*	When the <HOLD> key is pressed the red LED blinks once for the first method. Each time <HOLD> is pressed again the next method is selected up to method 4, then method 1 again.
	 green 2*	<START> accepts the setting. The green LED blinks twice. The working position of the lift can now be set.
	 red blinks  green 2*	When the <HOLD> key is pressed the lift can be moved manually. Each further time the <HOLD> key is pressed the direction in which the lift moves is altered. In this way the working position can be set accurately.
	 green 3*	<START> accepts the setting. The working position is stored specifically for the type of rack inserted. The green LED blinks three times. The rinsing position of the lift can now be set.
	 red blinks  green 3*	When the <HOLD> key is pressed the lift can be moved manually. Each further time the <HOLD> key is pressed the direction in which the lift moves is altered.
	 green 4*	<START> accepts the settings. The rinsing position is stored specifically for the type of rack inserted. The green LED blinks four times. The shift position of the lift can now be set.
	 red blinks  green 4*	When the <HOLD> key is pressed the lift can be moved manually. Each further time the <HOLD> key is pressed the direction in which the lift moves is altered.
	 green 5*	<START> accepts the setting. The shift position is stored specifically for the type of rack inserted. The green LED blinks five times. The stirrer speed can now be set.

	 red blinks  green 5*	<p>The <HOLD> key switches on the stirrer(s). If the <HOLD> key is kept pressed down the speed increases continuously. If the <HOLD> key is pressed again the stirrer speed is reduced in a similar manner. In this way the stirrer speed can be set accurately.</p>
	 blinks	<p><START> accepts the setting. The configuration procedure is now complete. It can be restarted by pressing <HOLD> in order to select the method.</p>
	 lights up	<p>The configuration procedure is terminated with <STOP>. When the green LED is illuminated the sample changer is in the basic condition and is ready to process a series of samples.</p>

The individual steps of the configuration procedure:

-  1* Method selection
-  2* Setting the working position
-  3* Setting the rinsing position
-  4* Setting the shift position
-  5* Setting the stirrer speed

3.5 The Methods

All methods enable the dosing of auxiliary solutions before the titration if a 765 or a 776 Dosimat is used. The dosing volume is to be defined in the Dosimat. The Sample Changer will start the distribution via a remote line.

The following titration instruments can be used with the 760 Sample Changer: all of the Titrino models (701, 702, 716, 718, 719, 720, 736, 751, 758, 784, and 785) and the Titroprocessors. Simple measuring series may be performed as well instead of titrations. The supported Metrohm meters are: 691 and 713 pH-Meter, 692 pH/Ion Meter, 712 Conductometer.

In each method all rack positions will be processed. After the treatment of the last sample the special beaker (highest rack position) is moved to the tower and the lift will be lowered to work position immersing the electrode for rinsing or conditioning.

Method 1 (for exact sequence, see Appendix, p. 25)

Plain working procedure without rinsing

Procedure:

1. move the sample beaker to the tower
2. run lift to work position
3. switch on stirrer
4. start dosing device
5. wait 10 seconds
6. start titrator
7. await end of determination
8. switch off stirrer
9. run lift to shift position

Method 2 (for exact sequence, see Appendix, p. 26)

Working procedure with sensor conditioning by dipping. The special beaker (highest rack position) must be filled before with solvent or water.

Procedure:

1. move the sample beaker to the tower
2. run lift to work position
3. switch on stirrer
4. start dosing device
5. wait 10 seconds
6. start titrator
7. await end of determination
8. switch off stirrer
9. run lift to shift position
10. get special beaker
11. run lift to work position
12. switch on the stirrer for 5 seconds
13. run lift to shift position

Method 3 (for exact sequence, see Appendix, p. 27)

Working procedure with sensor rinsing in a special beaker using an external pump.

Procedure:

1. move the sample beaker to the tower
2. run lift to work position
3. switch on stirrer
4. start dosing device
5. wait 10 seconds
6. start titrator
7. await end of determination
8. switch off stirrer
9. run lift to shift position
10. get special beaker
11. run lift to work position
12. switch on the external pump
13. await readiness of the pump
14. run lift to shift position

Method 4 (for exact sequence, see Appendix, p. 28)

Working procedure with sensor rinsing in the sample beaker using an external pump.

Procedure:

1. move the sample beaker to the tower
2. run lift to work position
3. switch on stirrer
4. start dosing device
5. wait 10 seconds
6. start titrator
7. await end of determination
8. switch off stirrer
9. run lift to rinse position
10. switch on the external pump
11. await readiness of the pump
12. run lift to shift position



4 Appendix

4.1 Error Messages

An error occurring during a sample series is displayed by a blinking red LED. The number of flashes indicates the error number. This must be acknowledged with any key. If an error occurs during processing of a sample series, the changer will then be switched into the 'HOLD' state.

After the cause of the error has been rectified, the sample series can be continued with the next command in the active sequence by pressing the <START> key. If the error cannot be eliminated, the method running can also be halted with <STOP>.

The list of possible error messages and their causes:

1* RAM defect	Call Metrohm-Service.
3* battery low	The battery for the permanent storage of user methods must be replaced.
4* manual stop	The Sample Changer has been stopped manually. No acknowledgement needed.
6* changer low power	The power supply cannot deliver enough power for the simultaneous operation of all components currently in use (stirrer, pumps, lifts).
7* rack data missing	No sample rack is in position or no rack data can be found for the sample rack that is in place.
8* invalid rack code	The rack code read by the changer could not be found in the internal position tables.

9* missing beaker	After a MOVE command no beaker could be found at the selected position.
10* raise lift first	Turning of a rack could not be carried out because a lift was below the defined shift position.
12* changer overload	Load or resistance too large to carry out the chosen action.
14* changer not ready	The changer cannot execute the command chosen because it is busy carrying out another action.

4.2 Method Listings

All four methods of the 760 Sample Changer are briefly described in chapter 3.5 on pages 20 to 22. The present chapter contains the exact program listings of these methods together with more detailed explanations.

Method 1

760 Sample Changer	760.0012	↪ report header with program version
parameters		
method	760_1	↪ method name
number of samples:	rack	↪ number of samples (here full rack)
>start sequence		
1 CTL: Rm:	INIT	↪ initialize remote line
2 SAMPLE:	- 1	↪ initialize
3 SAMPLE:	+ 1	sample position
>sample sequence		
1 MOVE 1 :	sample	↪ move next sample beaker to tower
2 LIFT: 1 :	work mm	↪ run lift with titration head to working position
3 STIR: * :	ON s	↪ switch on stirrer
4 CTL: Rm:	START dos*	↪ start dosing device
5 WAIT	10 s	↪ wait for 10 seconds
6 CTL: Rm:	START device1	↪ start titrator
7 SCN: Rm :	End1	↪ wait for end of titration [EOD]
8 STIR: * :	OFF s	↪ switch off stirrer
9 LIFT: 1 :	shift mm	↪ run lift with titration head to shift position
10 WAIT	3 s	↪ wait for 3 seconds
>final sequence		
1 MOVE 1 :	spec. 1	↪ move special beaker to tower for conditioning
2 LIFT: 1 :	work mm	↪ run lift to work position to immerse sensor
>changer settings ----- settings of sampler functions -----		
rack number	0	
lift rate	25 mm/s	
shift rate	20	
shift direction:	auto.	
beaker test mode:	single	↪ on missing sample beaker, the next one is selected automatically
on beaker error:	MOVE	
>stirring rates ----- stirring rates -----		
stirrer 1	3	↪ cannot be selected independently
stirrer 2	3	
>dosing unit def. ----- settings for dosing devices -----		
>>manual stop ----- action after manual stop -----		
CTL Rmt:	STOP device1	↪ stop device 1
CTL RS232:		

Method 2

760 Sample Changer	760.0012	↪ report header with program version
parameters		
method	760_2	↪ method name
number of samples:	rack	↪ number of samples (here full rack)
>start sequence		
1 CTL: Rm:	INIT	↪ initialize remote line
2 SAMPLE:	- 1	↪ initialize
3 SAMPLE:	+ 1	sample position
>sample sequence		
1 SHIFTRATE:	+ 20	↪ shift direction to increasing numbers
2 MOVE 1 :	sample	↪ move next sample beaker to tower
3 LIFT: 1 :	work mm	↪ run lift with titration head to working position
4 STIR: * :	ON s	↪ switch on stirrer
5 CTL: Rm:	START dos*	↪ start dosing device
6 WAIT	10 s	↪ wait for 10 seconds
7 CTL: Rm:	START device1	↪ start titrator
8 SCN: Rm :	End1	↪ wait for end of titration [EOD]
9 STIR: * :	OFF s	↪ switch off stirrer
10 LIFT: 1 :	shift mm	↪ run lift with titration head to shift position
11 WAIT	3 s	↪ wait for 3 seconds
12 SHIFTRATE:	- 20	↪ shift direction to decreasing numbers
13 MOVE 1 :	spec. 1	↪ move special beaker to tower
14 LIFT: 1 :	work mm	↪ run lift to work position to immerse sensor
15 STIR: * :	ON s	↪ switch on stirrer
16 WAIT	5 s	↪ wait for 5 seconds
17 STIR: * :	OFF s	↪ switch off stirrer
18 LIFT: 1 :	shift mm	↪ run lift to shift position
19 WAIT	3 s	↪ wait for 3 seconds
>final sequence		
1 MOVE 1 :	spec. 1	↪ move special beaker to tower for conditioning
2 LIFT: 1 :	work mm	↪ run lift to work position to immerse sensor
>changer settings ----- settings of sampler functions -----		
rack number	0	
lift rate	25 mm/s	
shift rate	20	
shift direction:	auto.	
beaker test mode:	single	↪ on missing sample beaker, the next one is
on beaker error:	MOVE	selected automatically
>stirring rates ----- stirring rates -----		
stirrer 1	3	↪ cannot be selected independently
stirrer 2	3	
>dosing unit def. ----- settings for dosing devices -----		
>>manual stop ----- action after manual stop -----		
CTL Rmt:	STOP device1	↪ stop device 1
CTL RS232:		

Method 3


760 Sample Changer	760.0012	report header with program version
parameters		
method	760_3	↪ method name
number of samples:	rack	↪ number of samples (here full rack)
>start sequence		
1 CTL: Rm:	INIT	↪ initialize remote line
2 SAMPLE:	- 1	↪ initialize
3 SAMPLE:	+ 1	sample position
>sample sequence		
1 SHIFTRATE:	+ 20	↪ shift direction to increasing numbers
2 MOVE 1 :	sample	↪ move next sample beaker to tower
3 LIFT: 1 :	work mm	↪ run lift with titration head to working position
4 STIR: * :	ON s	↪ switch on stirrer
5 CTL: Rm:	START dos*	↪ start dosing device
6 WAIT	10 s	↪ wait for 10 seconds
7 CTL: Rm:	START device1	↪ start titrator
8 SCN: Rm :	End1	↪ wait for end of titration [EOD]
9 STIR: * :	OFF s	↪ switch off stirrer
10 LIFT: 1 :	shift mm	↪ run lift with titration head to shift position
11 WAIT	3 s	↪ wait for 3 seconds
12 SHIFTRATE:	- 20	↪ shift direction to decreasing numbers
13 MOVE 1 :	spec. 1	↪ move special beaker to tower
14 LIFT: 1 :	work mm	↪ run lift to work position to immerse sensor
15 CTL: Rm:	****1*****	↪ switch on external pump
16 CTL: Rm:	****0*****	↪ reset remote line
17 SCN: Rm :	*****1*	↪ wait for ready signal of pump
18 LIFT: 1 :	shift mm	↪ run lift to shift position
19 WAIT	3 s	↪ wait for 3 seconds
>final sequence		
1 MOVE 1 :	spec. 1	↪ move special beaker to tower for conditioning
2 LIFT: 1 :	work mm	↪ run lift to work position to immerse sensor
>changer settings ----- settings of sampler functions -----		
rack number	0	
lift rate	25 mm/s	
shift rate	20	
shift direction:	auto.	
Beaker test mode:	single	↪ on missing sample beaker, the next one is selected automatically
on beaker error:	MOVE	
>stirring rates ----- stirring rates -----		
stirrer 1	3	↪ cannot be selected independently
stirrer 2	3	
>dosing unit def. ----- settings for dosing devices -----		
>>manual stop ----- action after manual stop -----		
CTL Rmt:	STOP device1	↪ stop device 1
CTL RS232:		

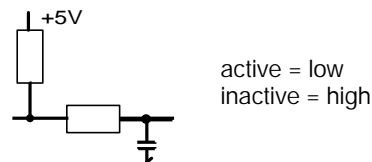
Method 4


760 Sample Changer	760.0012	↪ report header with program version
parameters		
method	760_4	↪ method name
number of samples:	rack	↪ number of samples (here full rack)
>start sequence		
1 CTL: Rm:	INIT	↪ initialize remote line
2 SAMPLE:	- 1	↪ initialize
3 SAMPLE:	+ 1	sample position
>sample sequence		
1 MOVE 1 :	sample	↪ move next sample beaker to tower
2 LIFT: 1 :	work mm	↪ run lift with titration head to working position
3 STIR: * :	ON s	↪ switch on stirrer
4 CTL: Rm:	START dos*	↪ start dosing device
5 WAIT	10 s	↪ wait for 10 seconds
6 CTL: Rm:	START device1	↪ start titrator
7 SCN: Rm :	End1	↪ wait for end of titration [EOD]
8 STIR: * :	OFF s	↪ switch off stirrer
9 LIFT: 1 :	rinse mm	↪ run lift with titration head to shift position
10 CTL: Rm:	****1*****	↪ switch on external pump
11 CTL: Rm:	****0*****	↪ reset remote line
12 SCN: Rm :	*****1*	↪ wait for ready signal of pump
13 LIFT: 1 :	shi ft mm	↪ run lift to shift position
14 WAIT	3 s	↪ wait for 3 seconds
>final sequence		
1 MOVE 1 :	spec. 1	↪ move special beaker to tower for conditioning
2 LIFT: 1 :	work mm	↪ run lift to work position to immerse sensor
>changer settings ----- settings of sampler functions -----		
rack number	0	
lift rate 1	25 mm/s	
shift rate	20	
shift direction:	auto.	
beaker test mode:	single	↪ on missing sample beaker, the next one is
on beaker error:	MOVE	selected automatically
>stirring rates ----- stirring rates -----		
stirrer 1	3	↪ cannot be selected independently
stirrer 2	3	
>dosing unit def. ----- settings for dosing devices -----		
>>manual stop ----- action after manual stop -----		
CTL Rmt:	STOP device1	↪ stop device 1
CTL RS232:		

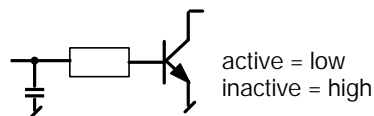
4.3 Technical Specifications

Dimensions	Height: 0.79 m, Width: 0.28 m, Depth: 0.48 m	
Weight	12.5 kg	
Material	Sample Changer case:	metal case, multiple enamelling
	Splash protection:	Polymethylene methacrylate (PMMA)
	Sample rack:	Acrylnitrile butadiene styrene (ABS) or Polypropylene (PP)
Lift path	235 mm	
Lift	Load:	approx. 10 N
	Stroke speed:	adjustable, 3...25 mm/s
Turntable	Turning speed: 20 angular degrees/s	
Stirrer	Stirring rate:	adjustable to 15 levels
	- magnet stirrer	180/min...2600/min
	- rod stirrer	180/min...3000/min
Remote Interface	Programmable parallel interface for controlling external instruments	

Input:  $t_p > 20 \text{ ms}$



Output:  $t_p > 200 \text{ ms}$
 $V_{CEO} = 40 \text{ V}$
 $I_C = 20 \text{ mA}$



+5 V: maximum load = 20 mA

Temperatures	Nominal functional range	5...40 °C	at 20...80% rel. humidity
	Transport und storage	-20...+60 °C	
		60 °C rel. humidity < 50%	
		50 °C rel. humidity < 85%	
		40 °C rel. humidity < 95%	

Power connection	Voltage	100...120 V, 220...240 V
	Frequency	50...60 Hz
	Power input	40 VA
	Fuses	0.5 AT (110 V), 0.25 AT (220 V)

All data are typical values with the exception of those specially marked.

Safety Specifications

Constructed and tested according to IEC 1010 / EN 61010 /
 UL 3101-1, Safety Class III
 Degree of protection IP 22

The instruction manual contains information and warnings which the user should follow to guarantee the safe operation of the instrument.

Electromagnetic Compatibility (EMC)

Emitted Interference: The instrument complies with the basic specifications EN 50081-1/2 1992, EN 55011 (class B), EN 55022 (class B).

Interference immunity: The basic specifications EN 50082-1 1997, and IEC 801-2 to IEC 801-4 are adhered to.

4.4 Servicing and Maintenance

4.4.1 Servicing

The maintenance of the 760 Sample Changer should include a yearly service check carried out by a specialist from Metrohm. If caustic or corrosive chemicals are frequently used, shorter time intervals between service checks can be necessary.

The Metrohm Service Department can offer technical advice regarding servicing and maintenance of all Metrohm instruments at any time.

4.4.2 Maintenance / Attendance

Not only highly sensitive measuring instruments do require proper care, a sample changer also requires this. Serious contaminations can lead to functional disorders and a shortened life-span of the rugged mechanics and electronics of the sample changer.

Heavy soiling of the titration heads can influence the results of measurements. Regular cleaning of exposed parts can prevent this for the most part.

Chemical or solvent spills should be cleaned up immediately. The connectors (in particular the power supply) should be protected from contamination. The sample changer should never be operated without the covering foreseen for this purpose.

If corrosive media has entered the inside of the instrument, the power plug has to be disconnected immediately to avoid massive damage to the instruments electronic components. In case of such damage, the Metrohm service personnel should be notified.

The instrument should not be opened by untrained personnel.

4.5 Warranty and Conformity

4.5.1 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 which arises as a result of non-compliance with these instructions, no warranty responsibility whatsoever will be accepted by Metrohm.

4.5.2 Certificate of Conformity and System Validation for the 760 Sample Changer

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:	760 Sample Changer
System software:	Stored in ROMs
Name of manufacturer:	Metrohm Ltd., Herisau, Switzerland
Principal technical information:	Voltages: 100...120, 220...240 V
	Frequency: 50...60 Hz

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

Electromagnetic compatibility

IEC 801-2 (level 3), IEC 801-3 (level 2), IEC 801-4 (level 3),
EN 55011 / class B, EN 55022 / class B, EN 50081-1/2 1992,
EN 50082-1 1997

Security specifications

IEC 1010, EN 61010, UL 3101-1

It has also been certified by the Swiss Electronical Association (SEV), which is member of the International Certification Body (CB / IEC).

The technical specifications are documented in the instruction manual.

The system software, stored in Read Only Memories (ROMs) has been validated in connection with standard operating procedures in respect to functionality and performance. The features of the system software are documented in the instruction manual.

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

Herisau, March 5th, 1998



Dr. J. Frank
Development Manager

Ch. Buchmann
Production and
Quality Assurance Manager

Ionenanalytik • Analyse des ions • Ion analysis • Análisis iónico

760 Sample Changer**EU Declaration of Conformity**

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

760 Sample Changer

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

Source of specifications:

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

Description of the instrument:

Sample changer for the automation of batch processing of larger sample series, applying titration, dosing and measuring methods in laboratory and industry.

Herisau, March 5th, 1998



Dr. J. Frank

Ch. Buchmann

Development Manager

Production and
Quality Assurance Manager

4.6 Accessories

760 Sample Changer **2.760.0010**

includes the following accessories:	Number of pieces	
SGJ14 sleeve	2	6.1236.020
FEP tubing connector M6 80cm		6.1805.110
Spiral band 7x0,75 0,5m		6.1815.010
Keyboard for 760		6.2142.100
Guiding sleeve	3	6.2709.070
Splash protection		6.2751.010
Plug cover		6.2752.010
Instructions for use		8.760.1013

760 Sample Changer KFT **2.760.0020**

includes the following accessories:	Number of pieces	
Magnetic stirrer		1.741.0010
Double Pt electrode		6.0340.000
Sample beaker	24	6.1432.210
Titration head for FKT		6.1458.030
FEP tubing connector M6 80cm	2	6.1805.110
Spiral band 7x0,75 0,5m		6.1815.010
Aspirating tube for 676 (Behr)		6.1821.000
Stirring bar 12mm	24	6.1903.010
Foil holder for beaker 6.1432.210	24	6.2037.040
Sample rack 24x75ml M24-0		6.2041.340
Cable 760-Titrino-765/776		6.2141.040
Keyboard for 760		6.2142.100
Splash protection		6.2751.010
Plug cover		6.2752.010
Al foil 0,010/80mm 1000 sheets		6.2820.000
O-ring 5,28/1,78	4	E.301.0022
O-ring 30/5		E.301.0080
Instructions for use		8.760.1013

Options

Accessories to separate order at additional charge:

722 Propeller Rod Stirrer for Sample Changer

Propeller rod stirrer	2.722.0020
Stirring propeller PP (104 mm) (incl.)	6.1909.020

741 Magnetic Stirrer

Magnetic stirrer	2.741.0010
------------------	------------

Macro titration head (6 x SGJ 14, 3 x SGJ 9)	6.1458.010
--	------------

Micro titration head (4 x M10) for rack 6.2041.340	6.1458.020
--	------------

Sample Racks and Beakers

Sample Rack 12 x 250 mL M12-0	6.2041.310
--------------------------------------	-------------------

Metrohm sample beaker glass 250 mL	6.1432.320
------------------------------------	------------

Metrohm sample beaker PP 200 mL	6.1453.220
---------------------------------	------------

Metrohm sample beaker PP 250 mL	6.1453.250
---------------------------------	------------

Sample Rack 12 x 150 mL M12-0	6.2041.360
--------------------------------------	-------------------

for 150 mL standard beaker (high form) or	
---	--

200 mL disposable beaker (Euro) PP 1000 pcs.	6.1459.310
--	------------

Sample Rack 14 x 200 mL M14-0	6.2041.370
--------------------------------------	-------------------

for 200 mL disposable beaker (Euro) PP	6.1459.310
--	------------

Sample Rack 14 x 8 oz M14-0	6.2041.380
------------------------------------	-------------------

for disposable beaker (US) PP 8 oz	
------------------------------------	--

Sample Rack 16 x 150 mL M16-0	6.2041.320
--------------------------------------	-------------------

for standard beaker (high form)	
---------------------------------	--

Sample Rack 16 x 120 mL M16-0	6.2041.390
--------------------------------------	-------------------

for disposable beaker (US) 120 mL	
-----------------------------------	--

Sample Rack 24 x 75 mL M24-0	6.2041.340
-------------------------------------	-------------------

for Metrohm glass beaker 75 mL	6.1432.210
--------------------------------	------------

(Micro titration head necessary)	
----------------------------------	--

Electrodes for sample changer

For titrations with the macro titration head it is advisable to use long life LL electrodes. Electrodes without standard ground joint should be used with the SGJ sleeve 6.1236.040 made of silicone rubber.

For direct titrations using the micro titration head, the following special micro electrodes can be used:

LL Combined pH micro-electrode	16 cm	6.0234.110
Micro reference electrode Ag/AgCl	16 cm	6.0736.110
Micro pH glass electrode	16 cm	6.0134.110
Micro Ag-titrode	16 cm	6.0433.110
Micro-Pt-titrode	16 cm	6.0434.110
Micro Au-titrode	16 cm	6.0435.110
Pt 1000 Temperature sensor	16 cm	6.1110.110

Dosing Instruments

Dosimat 765 **2.765.0010**

Dosimat 776 **2.776.0010**

Exchange unit with ceramics stopcock	1 mL	6.3013.113
	5 mL	6.3013.153
	10 mL	6.3013.213
	20 mL	6.3013.223
	50 mL	6.3013.253
Exchange unit with PTFE stopcock	1 mL	6.3014.113
	5 mL	6.3014.153
	10 mL	6.3014.213
	20 mL	6.3014.223
	50 mL	6.3014.253

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