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774 Oven Sample Processor

Tutorial

8.774.1023

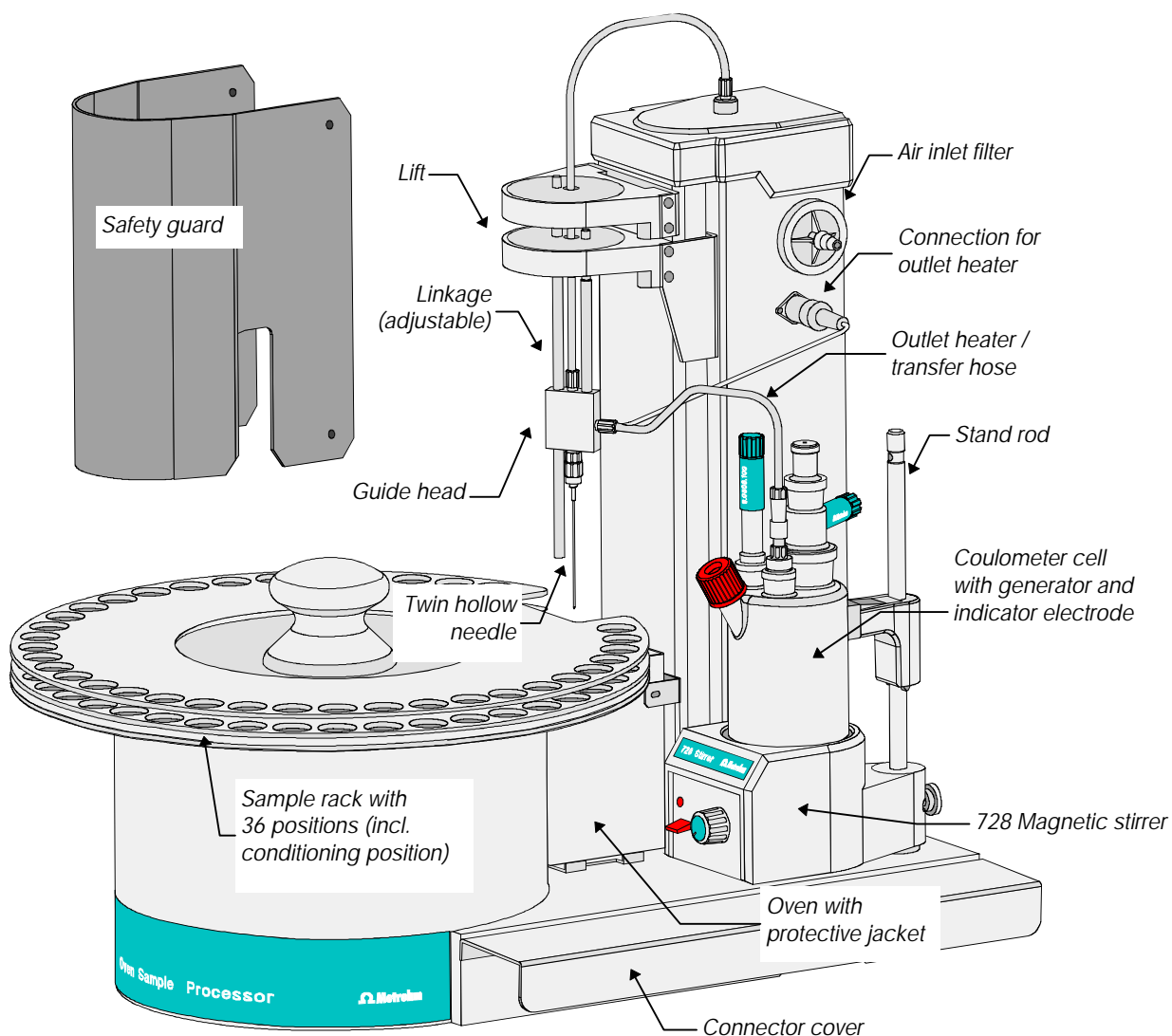
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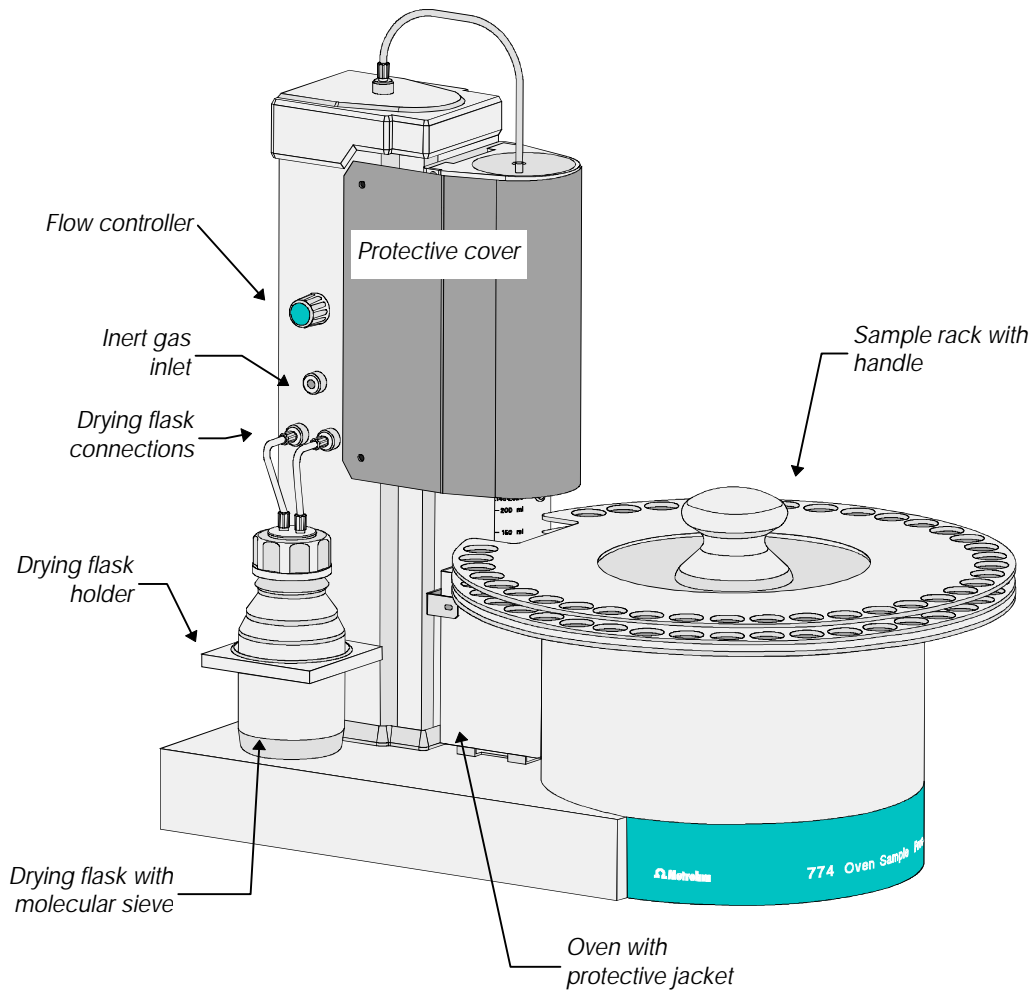
1 Installation

Please refer to the Instructions for Use for detailed information on installation of the 774 Oven Sample Processor and the peripheral devices. Before starting the Tutorial, please check that all components have been correctly installed. The sketches below show you how the system should look when fully installed.

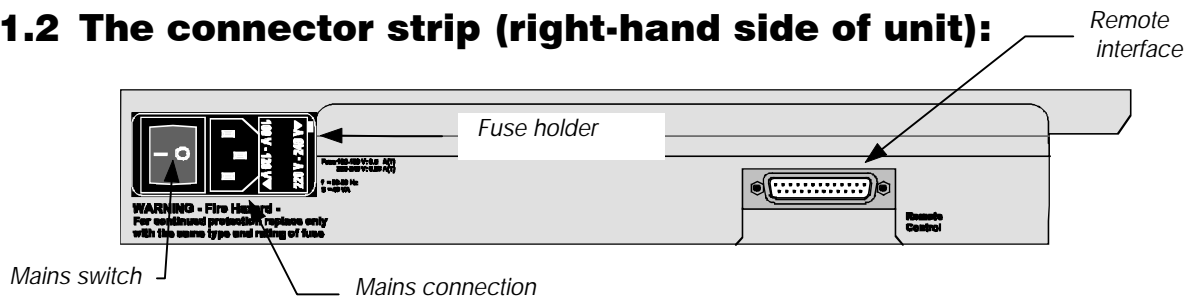
1.1 General views



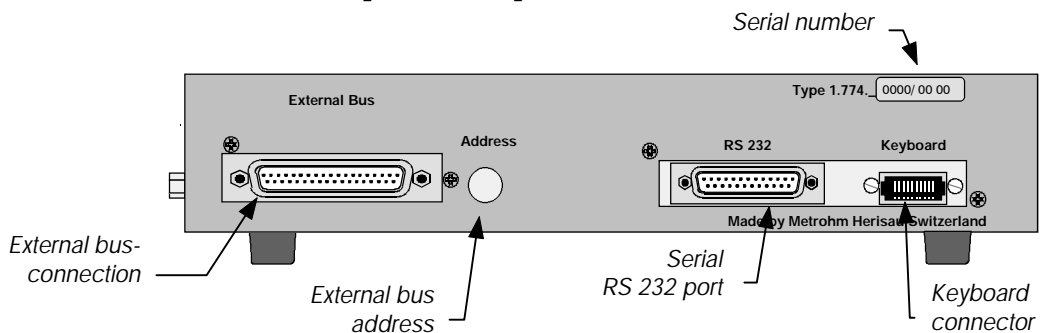
The safety guard and the connector cover must always be fitted for reasons relating to safety. Never operate the 774 Oven Sample Processor without safety guard



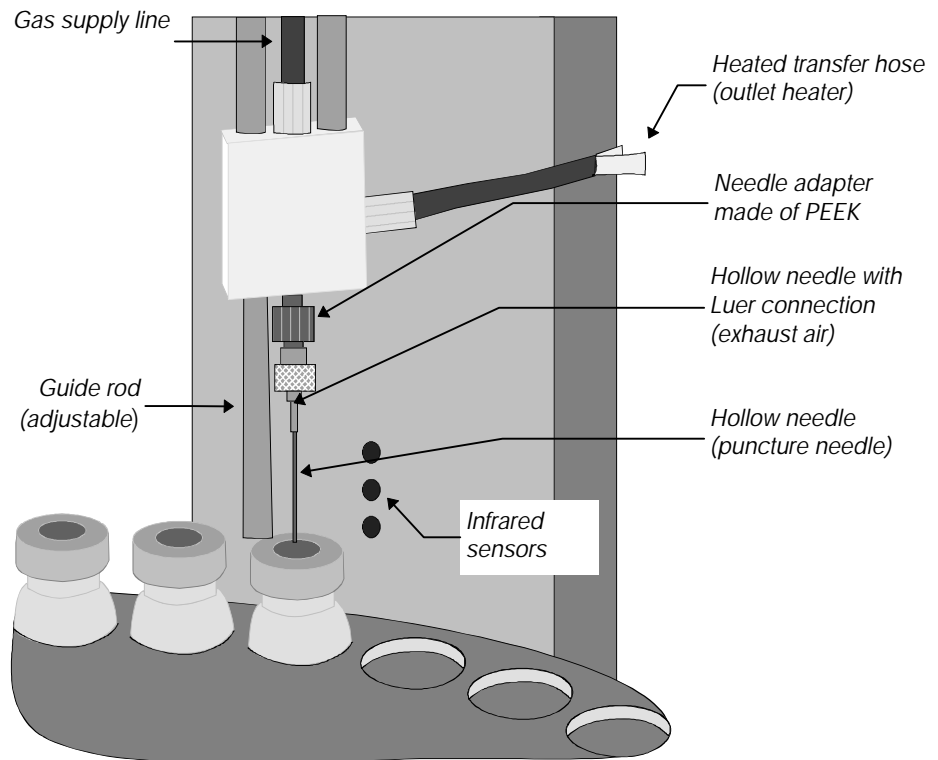
1.2 The connector strip (right-hand side of unit):



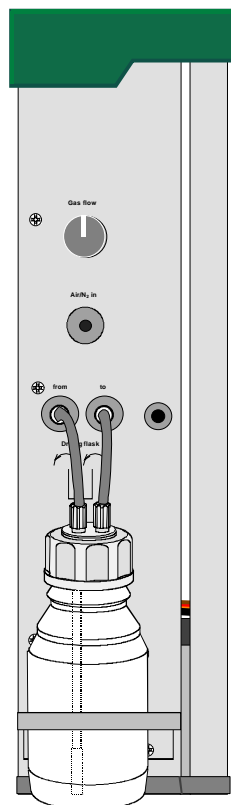
1.3 The connector strip (rear panel):



1.4 The guide head

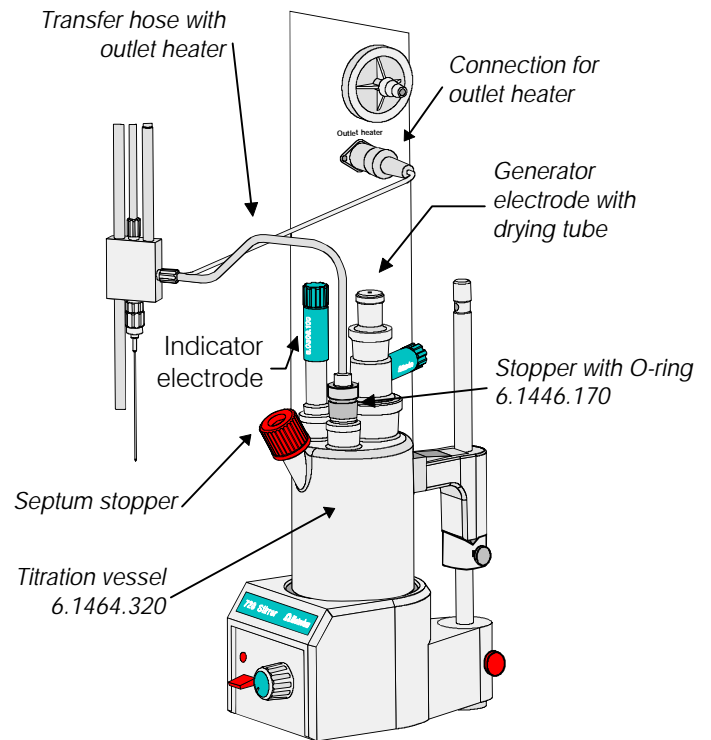


1.5 Drying flask



1.5 Titration cell

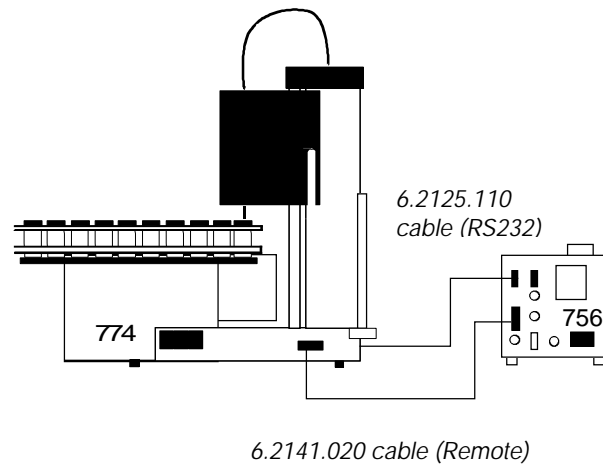
(Example: KF-Coulometer cell)



1.6 Interconnections

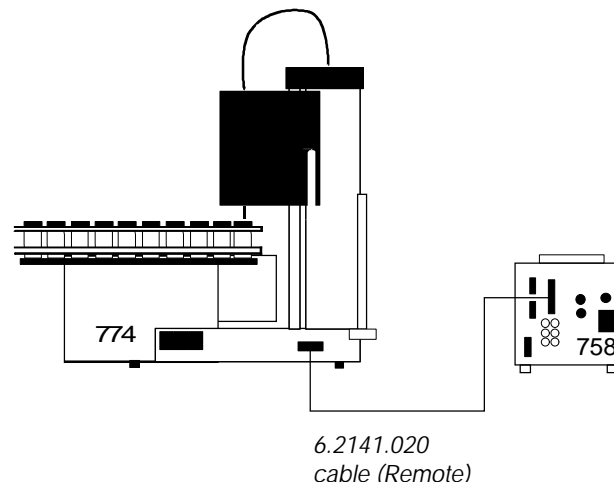
774 Oven Sample Processor — 756 Coulometer

for coulometric determinations



774 Oven Sample Processor — 7xx Titrimo


for volumetric KF titration

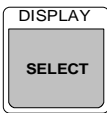
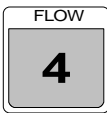
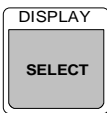




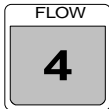
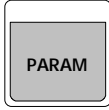
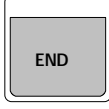
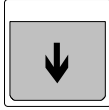
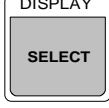

2 Tutorial

In order to familiarise yourself with the 774 Oven Sample Processor and how it works, you are advised to work through the following brief Tutorial. It describes the fundamental operating steps required for preparing an initial sample series and conducting this sample series with a given method.

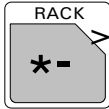
2.1 Preconditions / Preparations / Tests

	<ul style="list-style-type: none"> • It is assumed that the unit has been fully installed. • Connect a Metrohm Coulometer (or a KF Titrino) to the Remote socket (cable 6.2141.020). If you are using a 756 KF-Coulometer, you should also connect this via an RS232 connection (cable 6.2125.110) so as to use all functions of the 774 Oven Sample Processor. If necessary, this Tutorial can also be run "dry", i.e. without the unit connected. • The dialogue language should be set to "english". If it is not, press keys <CONFIG> and <ENTER>. You will then see the first entry in the Configuration sub-menu ">auxiliaries". <p style="text-align: center;">>auxiliaries dialog: english</p> • You can now select a different language. Press the <SELECT>key until you see "english" and then press <ENTER>. Now switch the 774 Oven Sample Processor off and back on again.
	<ul style="list-style-type: none"> • Check that all hoses are correctly connected. • The hoses of the receiver drier on the left-hand side of the unit must be firmly tightened. • This also applies to the hose which leads from the upper side of the tower of the 774 Oven Sample Processor to the connection on the twin hollow needle. • A dust filter must be connected to the air inlet (connection 'Inlet filter' at the right-hand side of the tower). • The outlet heater of the white transfer hose must be plugged on directly beneath this. This must lead from the needle holder into the titration cell.
Caution	<ul style="list-style-type: none"> • Use only the heating hose (6.1830.010) supplied with the 774 Oven Sample Processor. Any other heating hose (e.g. of the 768 KF Oven) may cause serious damage to the unit's electronic circuitry.
	<ul style="list-style-type: none"> • You can check whether the outlet heater is working correctly as follows: • Press key <HEATER> (or <5>). Now enter a temperature of 130 °C for instance and press <ENTER> twice.

	<ul style="list-style-type: none"> The oven is now heated to the preselected temperature and, at the same time, the outlet heater is activated. For as long as the oven heater is on, the transfer hose should be maintained at a temperature of approx. 45 °C in order to prevent condensation of moisture in the transfer hose. The transfer hose should feel warm to the touch approx. two to three minutes after the oven heater has been switched on.
	<ul style="list-style-type: none"> You can read off the current temperature of the oven on the display of the 774 Oven Sample Processor. The blinking 'HEATER' LED indicates to you the heating phases of the oven heater. It will not be possible for the temperature control to immediately stably maintain the temperature setpoint which you have set. In the case of rapid heating, the temperature setpoint will first be exceeded by a few degrees Celsius until the mass of the aluminium heating block has heated uniformly. This is necessary in order to guarantee precise temperature control.
	<ul style="list-style-type: none"> In order to speed up setting of the temperature setpoint, a fan is fitted in the oven block. This fan is automatically switched on if the temperature setpoint is exceeded by 1 °C, thus cooling the oven block. The 'FAN' LED indicates the operating state of the oven fan.
	<ul style="list-style-type: none"> You can also display the current oven temperature in a different notation. Press key <SELECT / DISPLAY>. You will now see the other notation on the display. <p style="text-align: center;"> gas flow 0 mL/min heater temp. 130 °C </p> <ul style="list-style-type: none"> This is the display in which only the measured values are displayed. In addition to the oven temperature you will also see the display of the gas flow. This should now be 0 ml/min.
  	<ul style="list-style-type: none"> Now press the <FLOW> key once. The display now shows a prompt which allows you to select whether you wish to activate the pump in order to pump dry air through the hose system, or you can open the solenoid valve in order to admit inert gas (e.g. nitrogen). <p style="text-align: center;"> manual operation FLOW pump : ON </p> <ul style="list-style-type: none"> Here as well, you can select, with <SELECT>. Confirm 'Pump' with the <ENTER>key. The blinking cursor is now located in front of the word 'on'. Here, once again, you can make a selection. Press the <ENTER> key at 'on'. A lively humming sound now signals to you that the air pump is running. The 'PUMP' LED now also lights and, on the display, you can follow the procedure by which the gas flow adjusts to a stable value.
	<ul style="list-style-type: none"> Now turn the rotary knob 'Gas flow' on the left-hand side of the tower and regulate the gas flow to approx. 70 mL/min. This is an average flow for the gas flow with which you can operate most applications.
	<ul style="list-style-type: none"> You may, perhaps, have noticed that the oven heater has continued to operate in the meantime. This applies in principle, even when conducting a sample series, i.e. even if other functions are being performed by the 774 Oven Sample Processor.

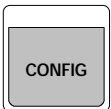
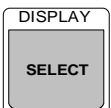
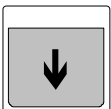
	<ul style="list-style-type: none"> Switch the pump back off. Press <FLOW> and press 'Arrow right' <→>. Now choose 'off' with the <SELECT> key and press <ENTER>.
  <ENTER>	<ul style="list-style-type: none"> If switching off seems (too) complicated, try the following: Press the following keys one after the other <PARAM>, <END> and <ENTER>. The 774 Oven Sample Processor now displays sub-menu 'manual stop' of the Parameters menu. This is used to define the functions performed automatically when pressing the <STOP> key.
  <ENTER>	<ul style="list-style-type: none"> Skip the first two entries by pressing the 'Arrow down' <↓> key twice. <p style="text-align: center;"> >manual stop FLOW cont. </p> <ul style="list-style-type: none"> Press the <SELECT> key and confirm the 'off' setting with <ENTER>.
 <ENTER>	<p style="text-align: center;"> >manual stop HEATER: init °C </p> <ul style="list-style-type: none"> Here, you can now set how the oven is to behave after pressing the <STOP> key. The default setting is that the oven is set automatically to the initial temperature. However, you can also enter any temperature between 50 °C and 250 °C at this point or select the 'off' setting with the <SELECT> key, causing the oven heater to be switched off when the <STOP> key is pressed. Please do not forget to confirm the entry with <ENTER>. The display should now show the initial state again.

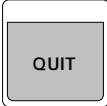
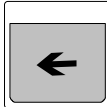
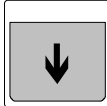
2.2 Basic configuration

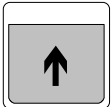
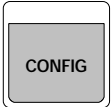
	<ul style="list-style-type: none"> Now perform the basic configuration of the 774 Oven Sample Processor. For this purpose, you will need an empty sample vial ("6 mL Head Space Vials", sealed with a septum stopper. 1000 such sample vials and a pair of stopper tongs are supplied with the 774 Oven Sample Processor. Place the sample vial at position 1 in the sample rack. If you have not done so already, place the sample rack onto the turntable of the 774 Oven Sample Processor. The rectangular recess in the rack must surround the oven. The two circular openings fit the conical guide cams of the turntable. The sample rack can be fitted only in initial position of the turntable. If the rack cannot be fitted, press the <RACK> key or switch the unit off briefly and back on again.
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Two important points to note:

- Turning the turntable by hand could damage the mechanism of the 774 Oven Sample Processor. Do not attempt this even if the unit is switched off.
- With the sample rack in place, its base plate is fixed on the oven so that the sample vials can slide on it when the rack is turned. When the rack is removed, the base plate is connected to the rack upper section by means of a locking mechanism. This prevents the possibility of sample vials falling out of the rack as the result of twisting of the upper section. When the sample rack is fitted, this locking mechanism is released again.

 <p><ENTER></p>	<ul style="list-style-type: none"> • In order to set the basic configuration, now press the <CONFIG> key. You will now see the first item of the Configuration menu. <p style="text-align: center;">Configuration >auxiliaries</p> <ul style="list-style-type: none"> • The bottom line shows the title of the first sub-menu. Press <ENTER> to open this sub-menu.
 <p><ENTER></p>	<p style="text-align: center;">>auxiliaries dialog: english</p> <p>This is where you can set the language for the user dialogue. If the dialog language is not set to english, press <SELECT> until you see entry 'english' then press <ENTER>. If you do not need to change the dialogue language, you can press the cursor key <↓> to move to the next menu item.</p>
	<p style="text-align: center;">>auxiliaries display contrast 3</p> <p>If the display is difficult to read, you can set the contrast of the display at this point in 8 steps (0...7). If you do not wish to make any change, press key <↓> to move to the next menu item.</p>
<p><SELECT> <ENTER></p>	<p style="text-align: center;">>auxiliaries beeper ON</p> <p>In the event of error messages or in the event of entry errors, you will normally hear a beep tone as a warning. If you do not wish to hear this beep tone, choose 'off' at this point with the <SELECT> key and confirm this with <ENTER>. Otherwise, simply press <↓>.</p>
<p><ENTER> <ENTER></p>	<p style="text-align: center;">>auxiliaries device label *****</p> <ul style="list-style-type: none"> • In order to render each laboratory unit uniquely identifiable, you can assigned your unit an 8-character designation comprising letters and/or digits. The procedure for entering text is explained in the Instructions for Use. • Next, you will see the program version of the device software on the display. This cannot be changed. Press <↓> or <ENTER>.
<p><ENTER></p>	<p style="text-align: center;">>auxiliaries max. lift way 90 mm</p> <ul style="list-style-type: none"> • This is where you can define the lowest still permitted lift position for automatic and manual operation. This is a limit value intended to prevent damage to the puncture needle as the result of careless tampering with the lift. It is the lowest lift position possible. Enter 88 mm and press <ENTER>.

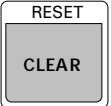
<p><ENTER></p>	<p style="text-align: center;">>auxiliaries beaker sensor: ON</p> <ul style="list-style-type: none"> After turning the rack (Move command), it is possible to check whether there is a sample vial or not at the approached rack position. This is made possible by the infrared beaker sensor integrated in the tower of the 774 Oven Sample Processor. This infrared sensor is on by default. Press <ENTER>.
<p><ENTER></p>	<p style="text-align: center;">configuration >oven settings</p> <ul style="list-style-type: none"> You have now worked your way through the first sub-menu of the Configuration menu and will see the title of the second Configuration sub-menu. The basic settings of the oven can be edited after you press the <ENTER> key.
<p><ENTER></p>	<p style="text-align: center;">>oven settings initial temp.: OFF °C</p> <ul style="list-style-type: none"> The initial temperature is one of the important settings. When the 774 Oven Sample Processor is switched on, the oven is heated automatically to the temperature set at this point. Entering an initial temperature may mean a major time saving. You will learn later in this Tutorial how you can also use the initial temperature. Enter 130 °C for instance at this point and press <ENTER>.
<p><↓></p>	<p style="text-align: center;">>oven settings max. temperature 275 °C</p> <ul style="list-style-type: none"> The maximum temperature serves as a safety setting. The 774 Oven Sample Processor switches the oven heater off automatically when the maximum temperature is reached in order to protect the electronic circuitry of the unit (or your samples) against overheating. Do not change the set value. Press <↓> to move to the next entry.
<p><ENTER></p>	<p style="text-align: center;">>oven settings temp. correction 0 °C</p> <ul style="list-style-type: none"> You should not unnecessarily change the value of temperature compensation either. The temperature compensation influences the temperature control directly and should be used only if the required sample temperatures cannot be maintained precisely. Press <ENTER> to quit the 'oven settings' sub-menu.
	<p style="text-align: center;">configuration >rack definitions</p> <ul style="list-style-type: none"> In the 'rack definitions' sub-menu, you can find settings for the sample rack and the various lift positions. The required lift positions can be set conveniently by manual operation. For this purpose, you must close the Configuration menu. Press the <QUIT> key.
 	<ul style="list-style-type: none"> In initial state of the 774 Oven Sample Processor, you can operate the unit manually. Now have the sample rack turned until the sealed sample vial which you previously positioned on the rack is located beneath the puncture needle. Press key <←> in order to do this, whereupon the rack turns counter-clockwise. If you now press key <↓>, the lift with the puncture needle moves down. The needle now pierces the septum. Release the key again as soon as this has happened. You will now set the work position of the lift. By briefly pressing the <↓> key several times, you can move the sample

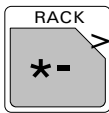
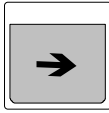
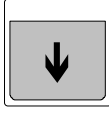
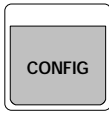
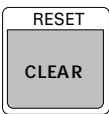
	<p>vial into the oven beneath it. The sample vial must be slid fully into the oven, apart from the stopper. Lower the lift millimetre by millimetre until it no longer responds to a brief keystroke the first time. Then press key <↑> once to lift the lift 1 mm.</p>
 2x <↓> <ENTER>	<ul style="list-style-type: none"> Now once again open the Configuration menu with the <CONFIG> key and press key <↓> twice. <p style="text-align: center;">configuration >rack definitions</p> <ul style="list-style-type: none"> Press <ENTER> to open the Rack definitions sub-menu.

Note

The 774 Oven Sample Processor uses detachable sample racks. Various racks requiring different rack definitions (up to 16) may be used. The sample racks must be uniquely distinguishable. This is why the racks feature a code which is defined by the arrangement of 6 magnetic pins. These magnetic pins are located on the underside of the rack. When the sample rack is placed in position, this code is read out by a special sensor. The appropriate rack settings are then activated.

In this Tutorial, it is assumed that you are using a standard rack with 36 positions for sample vials.

<ENTER>	<ul style="list-style-type: none"> The 'Rack definitions' sub-menu shows the settings of the currently fitted rack. This should be rack No. 1. <p style="text-align: center;">>rack definitions rack number 1</p> <ul style="list-style-type: none"> Confirm the rack number with <ENTER>.
<↓>	<p style="text-align: center;">>rack definitions 1 code 000001</p> <ul style="list-style-type: none"> The rack code corresponds to the arrangement of the magnetic pins in the rack and may not be changed. Press <↓>.
<↓>	<p style="text-align: center;">>rack definitions 1 type: MB6-0</p> <ul style="list-style-type: none"> The type of rack is declared as Metrohm standard rack with 36 positions. Press <↓>.
 <ENTER>	<p style="text-align: center;">>rack definitions 1 work position 0 mm</p> <ul style="list-style-type: none"> This is where you can enter the work position. The lift position set beforehand by manual operation can be read in automatically. Press die <CLEAR> key. This causes the current lift position to be adopted as the work position. <p style="text-align: center;">>rack definitions 1 work position 86 mm</p> <ul style="list-style-type: none"> Your current lift position may deviate slightly from the above value. Confirm your value with <ENTER>.
	<p style="text-align: center;">>rack definitions 1 rinse position 0 mm</p> <ul style="list-style-type: none"> The rinse position of the lift is the lift height to be approached when the needle pierces the conditioning vial. A conditioning vial is used to bridge the gas stream between the individual sample determinations and, when doing this, to allow rinsing and conditioning of the hose system.

<p><QUIT></p>	<ul style="list-style-type: none"> The optimum rinse position can be determined by manual operation, analogously to the work position. Press <QUIT> twice. You can now, once again, manually operate the 774 Oven Sample Processor in initial state.
  	<ul style="list-style-type: none"> If you press key <RACK>, the turntable moves to initial position. You can now deposit the sample vial at the reserved conditioning position 36 ('Cond. Pos.'). Have the rack turned clockwise by pressing key <→>. The conditioning vial should now be located beneath the needle. You can now set the rinse position as when setting the work position. Move the lift with the <↓> key down until the twin hollow needle has fully pierced the septum of the sample vial. The outer, shorter outlet air needle must have pierced the septum but the needle fixture may not depress the septum stopper.
 <p>...</p>	<ul style="list-style-type: none"> Now switch back to the Configuration menu. Press the following keys in the following sequence <CONFIG>, 2x <↓>, <ENTER> and 4x <↓>. <pre> >rack definitions 1 rinse position 0 mm </pre>
 <p><ENTER></p>	<ul style="list-style-type: none"> You can now adopt the current lift position as the rinse position with key <CLEAR>. <pre> >rack definitions 1 rinse position 45 mm </pre> <ul style="list-style-type: none"> Your current lift position may deviate slightly from the above value. Confirm your value with <ENTER>.
<p><ENTER></p>	<ul style="list-style-type: none"> The next menu item is the definition of the rotary position of the lift. <pre> >rack definitions 1 shift position 0 mm </pre> <ul style="list-style-type: none"> Leave the value of 0 mm. This also applies to the next item which is the additional special position for the lift. <pre> >rack definitions 1 special position 0 mm </pre> <ul style="list-style-type: none"> Continue with <↓> or <ENTER>.
<p><ENTER></p>	<pre> >rack definitions 1 >>special positions </pre> <ul style="list-style-type: none"> This is followed by a further sub-menu in which you can define the reserved positions on the sample rack. Press <ENTER>. <pre> >>special positions special beaker 1 36 </pre> <ul style="list-style-type: none"> Rack position is already defined as the special position for the standard rack of the 774 Oven Sample Processor. This is the reserved position ('Cond. Pos.') for the conditioning or rinsing vial. If you have followed all instructions correctly up to this point, the puncture needle should now be located in this conditioning vial.

<p><↓></p>	<ul style="list-style-type: none"> Check that no other special beakers are defined. Press <↓>. <pre style="text-align: center;">>>special positions special beaker 2 0</pre> <ul style="list-style-type: none"> If a 0 (zero) is entered at this point for the special beaker 2, this means that this special beaker is not defined. Also check the settings for the other special beaker (up to special beaker 8). If 0 (zero) is entered at all points, this means that you have 35 positions available on the rack for samples.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">QUIT</div> <p><↓></p>	<ul style="list-style-type: none"> When you press <QUIT>, you will move back to the main Configuration menu. <pre style="text-align: center;">configuration >dosing units</pre> <ul style="list-style-type: none"> You do not need to check or change the settings for dosing units for the purposes of this Tutorial. Continue with key <↓>.
<p><ENTER></p> <p><↓></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> DISPLAY SELECT </div>	<pre style="text-align: center;">configuration >RS232 settings</pre> <ul style="list-style-type: none"> Check the settings for the serial RS232 port. If you have connected a 756 KF-Coulometer to the serial port in order to be able to log the oven data in the determination report, it is essential that these settings correspond to those of the Coulometer. Press <ENTER> to open the RS232 Settings sub-menu. <pre style="text-align: center;">>RS232 settings baud rate: 9600</pre> <ul style="list-style-type: none"> We recommend that you use the default setting wherever possible in the case of all Metrohm units. Run through the entire sub-menu with key <↓> and check that the following interface parameters are set. Should this not be the case, you can change the setting in each case with the <SELECT> key. <pre style="text-align: center;">baud rate: 9600 data bit: 8 stop bit: 1 parity: none handshake: HW6 character set: IBM RS control: ON</pre> <ul style="list-style-type: none"> Also check the corresponding settings on your Coulometer.
<p>2x</p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">QUIT</div> <p><RACK></p>	<ul style="list-style-type: none"> Then press key <QUIT> twice so that the display shows the initial state of the 774 Oven Sample Processor. <pre style="text-align: center;">***** counter 0/35 23°C 0 mL/min ready</pre> <ul style="list-style-type: none"> Simply press key <RACK> to set the lift and the turntable back to their initial positions.

2.3 Methods and sequences

The 774 Oven Sample Processor features stored methods for various device combinations in which the required sequences and settings for simple moisture determinations are defined. These methods can be changed easily for more complex tasks and can then be saved under a different name. We will now familiarise you with the required sequences on the basis of the simplest method for the 756 KF-Coulometer and a KF Titrino.

Structure of a method

A method essentially consists of three sequences and various settings which, unlike the configuration settings, may be selected quite differently for different applications. The individual elements of the method are as follows:

Sequence control:

- **Number of samples**
Size of the sample series
- **Start sequence**
Command string of up to 99 lines executed once before the first sample of a sample series.
- **Sample sequence**
Command string comprising up to 99 lines executed when processing each sample.
- **Final sequence**
Command string comprising up to 99 lines executed once after the last sample of a sample series.

Method-specific settings:

- **Report definitions**
Settings for reporting the determination data
- **Changer settings**
Settings of sample rack and lift
- **Timeout settings**
Definition of the behaviour in the case of unforeseen statuses
- **Gas flow settings**
Settings for carrier gas movement
- **Dosing unit definitions**
Settings of any dosing units connected
- **Manual stop options**
Definition of the actions to be performed if the sample series is aborted manually by pressing the <STOP> key

Note

The method settings also apply to Manual mode as soon as the method has been loaded.

2.3.1 Optimised sequences for the 756 KF-Coulometer


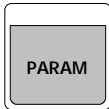



In principle, it is advisable to determine two to three blank samples before the sample series and to deduct the average value of the results of these blank samples when conducting the determinations of the actual samples. The 756 KF-Coulometer is delivered with predefined methods which can also be used for determinations with the 774 Oven Sample Processor. The methods '**774-Det**' (for sample determinations) and '**774-Blk**' (for blank value determinations) stored in the 756 KF-Coulometer have been optimised for working with the 774 Oven Sample Processor. If you use a 756 KF-Coulometer, please load method '**774-Det**' for the purposes of this Tutorial.






Preparations on the 774 Oven Sample Processor


There must be a sealed sample vial as the conditioning vial at Position 36 ('Cond. Pos.') on the sample rack. Position three further sealed sample vials at sample positions 1 to 3.

<div> </div> <div> <p><ENTER></p> </div> <div> </div> <div> <p><ENTER></p> </div>	<ul style="list-style-type: none"> Now open the User Methods menu with key <USER METHOD>. <div> <p>Display: methods >recall method</p> </div> Press <ENTER> to load a predefined method. <div> <p>Display: >recall method method: *****</p> </div> Using the <SELECT>key, choose '756Pump'. This is the simplest of the predefined methods. The method uses the incorporated pump to convey the heated moisture of a sample with the air stream into the Coulometer's measuring cell. When you have confirmed loading of the method with <ENTER>, you will see the name of the method at the top left on the display. You can now run the method step-by-step, using the TRACE function, in order to learn how the method runs. See below.
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"Tracing" the method

 <p><ENTER></p>	<ul style="list-style-type: none"> Before you start "tracing", you must set the position of the first sample with the SAMPLE function. Press key <SAMPLE>. <p style="text-align: center;">Display: manual operation SAMPLE: = 1</p> <ul style="list-style-type: none"> Position 1 is proposed to you as the default entry. Confirm this with <ENTER>.
 <p><3> <ENTER></p>	<ul style="list-style-type: none"> Now press <PARAM> to open the Parameters menu. This contains all parameters and sequences covered by a method. <p style="text-align: center;">Display: parameters number of samples: rack</p> <ul style="list-style-type: none"> The first menu item defines the number of samples (without special vials) to be processed in a series. At this point, you can use <SELECT> to select between 'rack' (= one entire rack rotation, whereby only the positions at which sample vials are located are counted) and '*' (= infinite number of samples). However, for the purposes of this Tutorial, please enter '3' on the keypad and confirm the entry with <ENTER>. As with the other parameters, you can either choose the selection or make a data entry manually.
<p><ENTER></p> 	<p style="text-align: center;">Display: parameters >start sequence</p> <ul style="list-style-type: none"> In the '>Start Sequence' sub-menu, you can find the commands which are run precisely once at the start of a sample series. <p style="text-align: center;">Display: >start sequence 1 CTL: Rm INIT</p> <ul style="list-style-type: none"> This CTL command serves to initialise the remote interface. All output lines of the remote cable are set to logical zero. This command should be used for each method in the start sequence. Do not change anything at this point. Have the command run with the <START> key. You will see that this has no visible direct effect. The next command line is displayed
	<p style="text-align: center;">Display: >start sequence 2 MOVE 1 : spec. 1</p> <ul style="list-style-type: none"> The MOVE command causes the sample rack to be turned. The special beaker 1, our conditioning vial, is positioned beneath the needle with this command. Press the <START> key.
	<p style="text-align: center;">Display: >start sequence 3 CTL: Rm START device1</p> <ul style="list-style-type: none"> The CTL command operates an interface of the 774 Oven Sample Processor. In this case, the connected 756 KF-Coulometer is started via the remote interface ('Rm'). Press the <START> key to execute the command. The Coulometer should now start to condition the titration cell.

	<p>Display: >start sequence 4 HEATER: init. °C min</p> <ul style="list-style-type: none"> The HEATER command performs the task of oven control. On the one hand, the temperature to be reached can be entered and, on the other hand however, it is also possible to enter the time interval in which this target temperature is to be reached. Thus, it is possible to "run" a temperature gradient or even a complex temperature profile (by chaining several HEATER commands). In this command line, the initial temperature defined in the configuration should be reached in as short a time as possible. The method sequence is not continued until the target temperature has been reached. Press the <START> key to start the command. The next command line is displayed.
	<p>Display: >start sequence 5 LIFT: 1 : rinse mm</p> <ul style="list-style-type: none"> The LIFT command moves the lift to the specified position. At this point, the twin hollow needle is inserted into the rinsing vial, thus closing the hose system for moisture transfer. Press the <START> key to execute the command.
 	<p>Display: >start sequence 6 FLOW pump : ON</p> <ul style="list-style-type: none"> After the needle has punctured the conditioning vial, the gas flow (air) with the FLOW command. Press <START> to do this. The incorporated pump now forces dried air through the hose system and the conditioning vial. The air is admitted through the transfer hose, which is now heated, into the titration cell where any moisture present is titrated off by the Coulometer. The entire system is thus conditioned and prepared for sample processing. Should you see error message 'Gas flow too low' or 'Gas flow too high' after switch-on of the pump, turn the gas flow control on the left-hand side of the tower of the 774 Oven Sample Processor until the error message disappears.
	<p>Display: >start sequence 7 WAIT 300 s</p> <ul style="list-style-type: none"> This is now followed by a waiting time of 5 minutes to reach a stable setting of the conditioned state in the titration cell. The WAIT command causes an interruption in the method sequence until the specified time (in seconds) has elapsed. You do not need to execute this command. Continue with the next command line. Press <↓>.
	<p>Display: >start sequence 8 SCN: Rm : Cond ok</p> <ul style="list-style-type: none"> After the waiting time has elapsed, you can check, via the remote cable link, whether the titration cell has been fully conditioned. If this is the case, the Coulometer sets the remote line scheduled for this to active. The SCN command monitors the input lines of the remote link and stops the method sequence until the defined signal is received.

 or <↓>	<ul style="list-style-type: none"> If you have connected a Coulometer and if this is conditioning, you can execute the SCN command with the <START> key. Otherwise, continue with key <↓>.
<QUIT>	<p style="text-align: center;">Display: >start sequence 9 NOP</p> <ul style="list-style-type: none"> The NOP entry stands for 'no operation' and marks the end of the start sequence in this case. The preparatory steps for processing the sample series are thus complete. Press <QUIT> to quit the start sequence.
<↓> <ENTER>	<p style="text-align: center;">Display: parameters >start sequence</p> <ul style="list-style-type: none"> Press <↓>. <p style="text-align: center;">Display: parameters >sample sequence</p> <ul style="list-style-type: none"> This is followed by the sample sequence. It contains the command string executed for each individual sample. Press <ENTER>.
<START>	<p style="text-align: center;">Display: >sample sequence 1 MOVE 1 : spec. 1</p> <ul style="list-style-type: none"> The system must be reconditioned in each case between the individual samples. It must be ensured that the same conditions prevail in the titration cell for each sample. For this purpose, the conditioning vial is approached between the sample determinations and the system then waits until the titration cell is reconditioned. Since the conditioning vial is already in the oven directly after execution of the start sequence, this command is then no longer executed when you press the <START> key. Continue with the next command line.
<START>	<p style="text-align: center;">Display: >sample sequence 2 LIFT: 1 : rinse nm</p> <ul style="list-style-type: none"> This is where the needle pierces the conditioning vial and the vial is moved into the oven. Since, as above, this command was executed in the start sequence, the command is not repeated at this point when the <START> key is pressed. Continue with the next command line.
<↓>	<p style="text-align: center;">Display: >sample sequence 3 FLOW pump : ON</p> <ul style="list-style-type: none"> The pump should not be switched on until after the needle has punctured the conditioning vial since, otherwise, major pressure fluctuations in the gas stream would lead to error messages during the puncture process. The pump already runs after execution of the start sequence. Continue with the next command line.
<↓>	<p style="text-align: center;">Display: >sample sequence 4 WAIT: 30 s</p> <ul style="list-style-type: none"> This inserts a waiting time of 30 seconds to guarantee that a state of equilibrium can occur in the titration cell. The conditioning status must be stable before the system can start with the next sample determination. Press <↓>.

<p><↓> <↓> <↓></p>	<ul style="list-style-type: none"> The conditioning status is now polled repeatedly by monitoring the remote line 1. The SCN command is run twice, with a waiting time of 60 seconds in between. <p style="text-align: center;">Display: >sample sequence 5 SCN: Rm : Cond ok</p> <p style="text-align: center;">Display: >sample sequence 6 WAIT 60 s</p> <p style="text-align: center;">Display: >sample sequence 7 SCN: Rm : Cond ok</p> <ul style="list-style-type: none"> These three command lines ensure that the fully conditioned state in the titration cell is stable before the actual sample determination commences. The conditioning status thus, must, be maintained for 60 seconds or must be reached again after at least 60 seconds after first occurrence. Press <↓> three times until line 8 is displayed.
<p><START></p>	<p style="text-align: center;">Display: >sample sequence 8 FLOW pump : OFF</p> <ul style="list-style-type: none"> Before the needle is extracted from the conditioning vial, the pump is switched off and, thus, the gas stream is deactivated. Press <START> to execute the command.
<p><START></p>	<p style="text-align: center;">Display: >sample sequence 9 SCN: Rm : no error</p> <ul style="list-style-type: none"> A safety scan is conducted at this point. If an error has occurred on the Coulometer, the sequence of the method is stopped at this point before a sample is moved into the oven of the 774 Oven Sample Processor. The check is conducted by scanning the error line of the remote link which may not be set if the method is to continue. Press <START> to execute this scan. If the next command line is displayed immediately, there is no problem with your Coulometer (or you have not connected a Coulometer!). Should this not be the case, remedy the error displayed on the display of the Coulometer. Press <QUIT> on the keypad of the Coulometer. After the error state has been remedied, you should be able to continue with this Tutorial.
<p><START></p>	<p style="text-align: center;">Display: >sample sequence 10 CTL: Rm START device1</p> <ul style="list-style-type: none"> The CTL command now starts the determination on the Coulometer via the remote link. Press the <START> key.
<p><START></p>	<p style="text-align: center;">Display: >sample sequence 11 MOVE 1 : sample</p> <ul style="list-style-type: none"> The MOVE command now transports the sample vial onto the oven. Beforehand, the lift is automatically moved to work position. Press <START>.

<START>	<p style="text-align: center;">Display: >sample sequence 12 LIFT: 1 : work mm</p> <ul style="list-style-type: none"> • The sample vial is now moved into the oven and the needle pierces the septum. The sample is heated and the moisture is expelled. Press <START> to execute the command.
<START>	<p style="text-align: center;">Display: >sample sequence 13 FLOW pump : ON</p> <ul style="list-style-type: none"> • Switch-on of the pump is triggered with the FLOW command. If an error message is then displayed, regulate the flow rate on the flow rate control at the left-hand side of the 774 Oven Sample Processor's tower. The air stream now conveys the expelled moisture into the titration cell. • Press <START>.
<↓>	<p style="text-align: center;">Display: >sample sequence 14 SCN: Rm : End1</p> <ul style="list-style-type: none"> • The actual determination is now underway. The 774 Oven Sample Processor must now wait for the end of the determination. The SCN command now, in turn, serves to monitor the input lines of the remote link to the Coulometer. The 756 KF-Coulometer sends a pulse (EOD, End of Determination) on a remote line scheduled for this purpose as soon as the determination is complete. • Press <↓> for the next command line.
<START>	<p style="text-align: center;">Display: >sample sequence 15 FLOW pump : OFF</p> <ul style="list-style-type: none"> • The pump is now switched off again with the FLOW command. Press <START> to execute the command.
<START>	<p style="text-align: center;">Display: >sample sequence 16 WAIT 5 s</p> <ul style="list-style-type: none"> • At the end of a determination, the 756 KF-Coulometer accesses the oven data of the 774 Oven Sample Processor via the serial RS232 link. The Coulometer then prints the results of the determination and thus simultaneously logs the resultant temperatures of the oven. • In order to allow the Coulometer adequate time to do this, there is a further waiting time of 5 seconds before conclusion of the sample sequence. The WAIT command is used for this. Execute this command by pressing the <START> key.
<QUIT>	<p style="text-align: center;">Display: >sample sequence 17 NOP</p> <ul style="list-style-type: none"> • The above display is shown after 5 seconds. This is the end of the sample sequence. The NOP command stands for 'No Operation'. Thus, no function is executed. Quit the sample sequence with <QUIT>.
<↓>	<p style="text-align: center;">Display: parameters >sample sequence</p> <ul style="list-style-type: none"> • Press <↓> and open the final sequence with <ENTER>.

<START>	<p style="text-align: center;">Display: >final sequence 1 RACK</p> <ul style="list-style-type: none"> • The final sequence consists of one single command which is executed after the last determination of a sample series. • The RACK command entered at this point initialises the rack. In this case, the lift is moved up first to initial position. The rack is then turned so that it can be conveniently removed. • Press <START> to execute the Rack command.
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Method-specific settings

<QUIT>	<ul style="list-style-type: none"> • Now that you have familiarised yourself with the sequences of the method, check the most important settings of the method. • Press <QUIT> to return to the main menu of the method.
<↓>	<p style="text-align: center;">Display: parameters >final sequence</p> <ul style="list-style-type: none"> • Press key <↓> to access further sub-menus with various settings of the method. You should take a closer look at some of them.
<ENTER>	<p style="text-align: center;">Display: parameters >report</p> <ul style="list-style-type: none"> • In the 'Report' sub-menu, you can define whether a report (and what report) is to be printed out for each sample (and the start and final sequence). However, this does require that a printer be connected to the serial port in case of the Coulometer. Thus, a list of the temperature values of the oven can be output with a full report. You can freely select the time intervals between these temperature values. • Open the sub-menu with <ENTER>.
<SELECT> <↓>	<p style="text-align: center;">Display: >report report: none</p> <ul style="list-style-type: none"> • Using the <SELECT> key, you can chose a specific report type. The Instructions for Use of the 774 Oven Sample Processor provides more detailed information on the reports. Leave the setting at 'none' and continue with key <↓>.
<QUIT>	<p style="text-align: center;">Display: >report rec. interval 10 s</p> <ul style="list-style-type: none"> • The recording interval defines the intervals between the individual temperature values of the oven if a full report is to be output, see above. Quit the 'Report' sub-menu with the <QUIT> key.
<↓>	<p style="text-align: center;">Display: parameters >report</p> <ul style="list-style-type: none"> • In the next sub-menu, you can make various changer settings. <p style="text-align: center;">Display: parameters >changer settings</p>

<p><ENTER> 5x <↓></p>	<ul style="list-style-type: none"> If you open this sub-menu with <ENTER>, you will find the following at fifth position, amongst other settings:
<p>(<SELECT>) (<ENTER>) <QUIT></p>	<p style="text-align: center;">Display: >changer settings on beaker error: MOVE</p> <ul style="list-style-type: none"> This setting defines the behaviour of the 774 Oven Sample Processor if no sample vial is present at a sample position after a MOVE command. This is tested by an infrared sensor. If required, you can define that a method sequence be interrupted with an error message. In order to do this, press the <SELECT> key and confirm the 'Message' setting with <ENTER>. In the case of all predefined methods, setting 'MOVE' is preset, causing an automatic approach to the next sample position if there is no sample vial, i.e. a further MOVE command is executed. If you wish to retain this setting, press key <QUIT>.
<p>2x <↓> <ENTER></p>	<p style="text-align: center;">Display: parameters >changer settings</p> <ul style="list-style-type: none"> You can find other important settings in the 'Gas Flow' sub-menu. <p style="text-align: center;">Display: parameters >gas flow</p> <ul style="list-style-type: none"> Open this sub-menu with <ENTER>.
<p>(<SELECT>) <ENTER></p>	<p style="text-align: center;">Display: >gas flow unit gas flow: mL/min</p> <ul style="list-style-type: none"> Here, you can select the unit in which the flow rate of the carrier gas is to be displayed. You can choose between 'mL/min' and 'L/h'. Choose the unit with the <SELECT> key and confirm your selection with <ENTER>.
<p><ENTER></p>	<p style="text-align: center;">Display: >gas flow min. flow 50 mL/min or min. flow 3.0 L/h</p> <ul style="list-style-type: none"> Depending on your previous selection, you will now see the lower warning limit for the flow rate of the carrier gas in mL/min or L/h. If, after switch-on of the pump or the solenoid valve, the flow rate of the carrier gas should drop below this preset value (e.g. in the case of blockage of the hose, this is indicated by a warning tone and a blinking error message. Confirm the preset with <ENTER>.
	<p style="text-align: center;">Display: >gas flow max. flow 100 mL/min or max. flow 6.0 L/h</p> <ul style="list-style-type: none"> This is upper limit for the flow rate of the carrier gas in mL/min or L/h. If, after switch-on of the pump or the solenoid valve, the flow rate of the carrier gas exceeds this preset value (as the result of leakage of the hose system), this is indicated by a warning tone and a blinking error message. Set the two warning limits generously. Slight fluctuations in the flow rate may occur as the result of various factors. Their influence on correctness of the result is minimal.

<ENTER>	<ul style="list-style-type: none"> • Confirm the preset with <ENTER>.
<ENTER>	<p style="text-align: center;">Display: >gas flow gas type: air</p> <ul style="list-style-type: none"> • The Type of gas must be specified for correct measurement of the flow rate. You can select between the following: Air, nitrogen (N₂) and 'others'. You must specify a correction factor for gasses 'other' than air or nitrogen for the gas flow measurement. Please refer to the information provided in the Instructions for Use. • Confirm the preset 'air' with the <ENTER> key.
2x <QUIT>	<ul style="list-style-type: none"> • That completes the most important settings for this method. • Press <QUIT> twice to quit the Parameters menu.

2.3.2 Optimised sequences for a Titrimo

In principle, it is advisable to determine two to three blank samples before the sample series and to deduct the average value of their results when determining the actual samples.

The blank value determinations should be conducted first with the Titrimo method '**Blank_KF**'. You can then conduct the sample determinations with method '**KF-Blank**'.

Load the '**KF-Blank**' method on your Titrimo for the purposes of this Tutorial. Activate the prompt for the sample size. In order to do this, press key <parameters> on the Titrimo keypad, choose the '>preselection' and enter 'value' under 'req. sample size'.

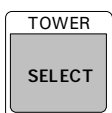
You do not need to start the Titrimo method. The 774 Oven Sample Processor starts the Titrimo automatically via the remote link. The Titrimo must be in initial state (not conditioned) before starting.

Preparations on the 774 Oven Sample Processor

There must be a sealed sample vial as the conditioning vial at position 36 ('Cond. Pos.') on the sample rack. Insert three further sealed sample vials at sample positions 1 to 3.



<ENTER>



<ENTER>

- Now open the User Methods menu with key <USER METHOD>.


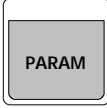



Display: **methods**
 >recall method






- Press <ENTER> to load a predefined method.


Display: **>recall method**
 method: *****

- Select 'Titrimo' with the <SELECT> key. The method uses the incorporate pump to convey the quantity of released moisture of a sample into the Titrimo's titration cell with an air stream.
- When you have confirmed loading of the method with <ENTER>, you will see the name of the method at the top left on the display. You can now execute the method step-by-step with the so-called TRACE function so as to familiarise yourself with the sequence of the method. See below.



"Tracing" the method

 <p><ENTER></p>	<ul style="list-style-type: none"> Before you start "tracing", you must position the first sample with the SAMPLE command. Press key <SAMPLE>. <p>Display: manual operation SAMPLE: = 1</p> <ul style="list-style-type: none"> Position 1 is already proposed as the default. Confirm this with <ENTER>.
 <p><3> <ENTER></p>	<ul style="list-style-type: none"> Now press <PARAM> to open the Parameters menu. This contains all parameters and sequences for a method. <p>Display: parameters number of samples: rack</p> <ul style="list-style-type: none"> The first menu item defines the number of samples (not including special vials) to be processed in a series. Here, you can use <SELECT> to choose between 'rack' (= one entire rack revolution, whereby only the positions at which sample vials are located are counted) and '*' (= infinite number of samples). However, for the purposes of this Tutorial, please enter '3' on the keypad and confirm the entry with <ENTER>. Here, in the same way as with other parameters, you can either select or enter the data manually.
<p><ENTER></p> 	<p>Display: parameters >start sequence</p> <ul style="list-style-type: none"> The '>Start sequence' sub-menu contains the commands which are executed precisely once at the start of a sample series. <p>Display: >start sequence 1 CTL: Rm INIT</p> <ul style="list-style-type: none"> This CTL command serves to initialise the remote interface. All output lines of the remote cable are set logical zero. This command should be used for each method in the start sequence. Do not make any changes here. Have this command executed with the <START> key. You will see that there is no visible direct effect. The next command line is displayed
	<p>Display: >start sequence 2 CTL: Rm START device1</p> <ul style="list-style-type: none"> The CTL command operates an interface of the 774 Oven Sample Processor. This is where the connected Titrino is started via the remote interface ('Rm'). Press the <START> key to have the command executed. The Titrino should now start to condition the titration cell.
	<p>Display: >start sequence 3 MOVE 1 : spec. 1</p> <ul style="list-style-type: none"> The MOVE command causes the sample rack to turn. The special beaker 1, our conditioning vial, is positioned beneath the needle with this command. Press the <START> key.

	<p>Display: >start sequence 4 HEATER: INIT°C min</p> <ul style="list-style-type: none"> The HEATER command performs the task of oven control. On the one hand, the temperature to be reached can be entered and, on the other hand however, the time interval in which this target temperature is to be reached can also be entered. Thus, it is possible to "run" a temperature gradient or even a complex temperature profile (by chaining several HEATER commands). In this command line, the initial temperature stipulated in the configuration should be reached in as short a time as possible. The method sequence is not continued until the target temperature is reached. Press the <START> key to start the command. The next command line is displayed.
	<p>Display: >start sequence 5 LIFT: 1 : rinse mm</p> <ul style="list-style-type: none"> The LIFT command moves the lift to the specified position. At this point, the twin hollow needle is inserted into the rinsing vial, thus closing the hose system for moisture transfer. Press the <START> key to execute the command.
 	<p>Display: >start sequence 6 FLOW pump : ON</p> <ul style="list-style-type: none"> After the needle has pierced the conditioning vial, the gas flow (air) can be activated with the FLOW command. Press <START> for this purpose. The incorporate pump now forces dry air through the hose system and the conditioning vial. The air is admitted into the titration cell by the transfer hose which is now heated, thus titrating off any existing moisture from the Titrino. The entire system is thus conditioned and prepared for sample processing. If error message 'Gas flow too low' or 'Gas flow too high' occurs after pump switch-on, turn the gas flow control on the left hand-side of the tower of the 774 Oven Sample Processor until the error message disappears.
 or <↓>	<p>Display: >start sequence 7 SCN: Rm : Cond ok</p> <ul style="list-style-type: none"> It is possible to check whether the titration cell is fully conditioned via the remote cable link. If this is the case, the Titrino sets the scheduled remote line to active. The SCN command monitors the input lines of the remote link and stops the method sequence until the defined signal is received. If you have connected a Titrino and it is conditioning, you can have the SCN command executed with the <START> key. Otherwise, continue with key <↓>.
	<p>Display: >start sequence 8 WAIT 60 s</p> <ul style="list-style-type: none"> This is now followed by a waiting time of 1 minute so as to allow conditioned state to be reached stably in the titration cell. The WAIT command interrupts the method sequence until the specified time (in seconds) has elapsed.

<↓>	<ul style="list-style-type: none"> You do not need to execute this command. Continue with the next command line. Press <↓>.
 or <↓>	<p style="text-align: center;">Display: >start sequence 9 SCN: Rm : Cond ok</p> <ul style="list-style-type: none"> A check is now conducted again in order to establish whether the titration cell is conditioned. This ensures that the conditioned status is stable. If you have connected a Titrino, you can have the SCN command executed with the <START> key. Otherwise, continue with key <↓>.
<QUIT>	<p style="text-align: center;">Display: >start sequence 10 NOP</p> <ul style="list-style-type: none"> Entry stands for 'no operation' and, at this point, marks the end of the start sequence. The preparatory steps for processing the sample series are thus complete. Press <QUIT> to quit the start sequence.
<↓> <ENTER>	<p style="text-align: center;">Display: parameters >start sequence</p> <ul style="list-style-type: none"> Press <↓>. <p style="text-align: center;">Display: parameters >sample sequence</p> <ul style="list-style-type: none"> This is followed by the sample sequence. It contains the command string executed for each individual sample. Press <ENTER>.
<START>	<p style="text-align: center;">Display: >sample sequence 1 SCN: Rm : no error</p> <ul style="list-style-type: none"> A safety scan is conducted first. If an error has occurred on the Titrino, the sequence of the method is stopped at this point before a sample is moved into the oven of the 774 Oven Sample Processor. The check is conducted by scanning the error line of the remote link which may not be set if the method is to continue. Press <START> to run this scan. If the next command line is displayed immediately, there are no problems with your Titrino (or you have not connected a Titrino!). Should this not be the case, remedy the error which should be displayed on the display of the Titrino. Press <QUIT> on the keypad of the Titrino. After the error state has been remedied you should be able to continue with this Tutorial. <p><i>If error messages (e.g. 'wrong sample' etc.) may occur during the determination on the Titrino and this is not to interrupt the automatic sequence on the 774 Oven Sample Processor, you should delete this command line. You can do this by pressing key <DELETE>. The following command line then moves up automatically to take its place.</i></p>
<START>	<p style="text-align: center;">Display: >sample sequence 2 CTL: Rm START device1</p> <ul style="list-style-type: none"> The CTL command now starts the determination on the Titrino via the remote link. Press the <START> key. The Titrino thus switches over to sample data polling and awaits addition of the sample.

<START>	<p style="text-align: center;">Display: >sample sequence 3 FLOW pump : OFF</p> <ul style="list-style-type: none"> The pump is now deactivated with the FLOW command. Press <START> to execute the command.
<START>	<p style="text-align: center;">Display: >sample sequence 4 MOVE 1 : sample</p> <ul style="list-style-type: none"> The MOVE command now transports the sample vial onto the oven. The lift is moved automatically to work position beforehand. Press <START>.
<START>	<p style="text-align: center;">Display: >sample sequence 5 LIFT: 1 : work mm</p> <ul style="list-style-type: none"> The sample vial is now moved into the oven and the needle pierces the septum. The sample is heated and the moisture is expelled. Press <START> to execute the command.
<START>	<p style="text-align: center;">Display: >sample sequence 6 FLOW pump : ON</p> <ul style="list-style-type: none"> The FLOW command triggers switch-on of the pump. If you then see an error message, regulate the flow rate on the flow rate control on the left-hand side of the tower of the 774 Oven Sample Processor. The air stream now conveys the expelled moisture into the titration cell. Press <START>.
<↓>	<p style="text-align: center;">Display: >sample sequence 7 WAIT 30 s</p> <ul style="list-style-type: none"> This is now followed by a waiting time of 30 seconds in order to ensure that moisture is transferred into the titration cell as early as when the Titrimo (in the command which followed) is advanced. The WAIT command causes an interruption in the method sequence until the specified time has elapsed. You do not need to execute this command. Continue with the next command line. Press <↓>.
<START>	<p style="text-align: center;">Display: >sample sequence 8 CTL: Rm ENTER</p> <ul style="list-style-type: none"> The CTL command now starts the determination on the Titrimo via the remote link. For this purpose, confirmation of the entry of the sample size is simulated. Press the <START> key.
<↓>	<p style="text-align: center;">Display: >sample sequence 9 SCN: Rm End1</p> <ul style="list-style-type: none"> The actual determination is now underway. The 774 Oven Sample Processor must now await the end of the determination. The SCN command now, in turn, serves to monitor the input lines of the remote link to the Titrimo. The Titrimo sends a pulse (EOD, End of Determination) on a remote line scheduled for this purpose as soon as the determination is complete. Press <↓> for the next command line.

<START>	<p>Display: >sample sequence 10 FLOW pump : OFF</p> <ul style="list-style-type: none"> The pump is now switched off again with the FLOW command. Press <START> to execute the command.
<START>	<p>Display: >sample sequence 11 MOVE 1 : spec. 1</p> <ul style="list-style-type: none"> The MOVE command causes the sample rack to turn. The special beaker 1, our conditioning vial, is positioned beneath the needle again with this command. Press the <START> key.
<START>	<p>Display: >sample sequence 12 LIFT: 1 : rinse mm</p> <ul style="list-style-type: none"> The LIFT command moves the lift to the specified position. The twin hollow needle is inserted once again into the rinsing vial, thus closing the hose system. Press the <START> key to execute the command.
<START>	<p>Display: >sample sequence 13 FLOW pump : ON</p> <ul style="list-style-type: none"> After the needle has pierced the conditioning vial, the gas flow (air) can be reactivated with the FLOW command. Press the <START> key for this purpose. The entire system is now conditioned again and prepared for the next sample.
 or <↓>	<p>Display: >sample sequence 14 SCN: Rm : Cond ok</p> <ul style="list-style-type: none"> It is possible to recheck whether the titration cell is fully conditioned via the remote cable link. If this is the case, the Titrino sets the remote line scheduled for this purpose to active. The SCN command monitors the input lines of the remote link and stops the method sequence until the defined signal is received. If you have connected a Titrino and this conditioning, you can have the SCN command executed with the <START> key. Otherwise, continue with the <↓> key.
<↓>	<p>Display: >sample sequence 15 WAIT 30 s</p> <ul style="list-style-type: none"> This is now followed by a waiting time of 30 seconds in order to ensure that the conditioned state in the titration cell is stable. The WAIT command causes an interruption in the method sequence until the specified time has elapsed. You do not need to execute this command. Continue with the next command line. Press <↓>.
	<p>Display: >sample sequence 16 SCN: Rm : Cond ok</p> <ul style="list-style-type: none"> A recheck is now conducted in order to establish whether the titration cell is conditioned. This ensures that the condition status is stable. If you have connected a Titrino, you can have the SCN command exe-

or <↓>	cuted with the <START> key. <ul style="list-style-type: none"> Otherwise, continue with the <↓> key.
<QUIT>	<p style="text-align: center;">Display: >sample sequence 17 NOP</p> <ul style="list-style-type: none"> This is the end of the sample sequence. The NOP command stands for 'No Operation'. Thus, no function is executed. Quit the sample sequence with <QUIT>.
<↓>	<p style="text-align: center;">Display: parameters >sample sequence</p> <ul style="list-style-type: none"> Press <↓> and open the final sequence with <ENTER>.
<START>	<p style="text-align: center;">Display: >final sequence 1 FLOW pump : OFF</p> <ul style="list-style-type: none"> The final sequence consists of two commands which are executed after the last determination of a sample series. This switches off the pump with the FLOW command. Press <START> to execute the command.
<START>	<p style="text-align: center;">Display: >final sequence 2 RACK</p> <ul style="list-style-type: none"> The RACK command entered at this point initialises the rack. In this case, the lift is first moved up to initial position. The rack is then turned so that it can be removed easily. Press <START> to execute the Rack command.

Method-specific settings

<QUIT>	<ul style="list-style-type: none"> Now that you have familiarised yourself with the sequences of the method, you should now check the most important settings of the method. Press <QUIT> to move back to the main menu of the method.
<↓>	<p style="text-align: center;">Display: parameters >final sequence</p> <ul style="list-style-type: none"> Use the <↓> key to move to further sub-menus with different settings of the method. You should take a closer look at some of them.
<ENTER>	<p style="text-align: center;">Display: parameters >report</p> <ul style="list-style-type: none"> In the 'Report' sub-menu, you can define whether a report (and which report) is to be printed out for each sample (and the start and final sequence). This means that you must connect a printer to the serial port. This allows a list of the temperature values of the oven to be output with a full report. You can freely select the intervals between these temperature values. Open the sub-menu with <ENTER>.

<p><SELECT> <↓></p>	<p style="text-align: center;">Display: >report report: none</p> <ul style="list-style-type: none"> Using the <SELECT> key, you can select a specific report type at this point. You can find further information on the reports in the Instructions for Use of the 774 Oven Sample Processor. Leave the setting at 'none' and continue with key <↓>.
<p><QUIT></p>	<p style="text-align: center;">Display: >report rec. interval 10 s</p> <ul style="list-style-type: none"> The recording interval defines the intervals between the individual temperature values of the oven if a full report is to be output, see above. Quit the 'Report' sub-menu with the <QUIT> key.
<p><↓> <ENTER> 5x <↓></p>	<p style="text-align: center;">Display: parameters >report</p> <ul style="list-style-type: none"> You can make various changer settings in the next sub-menu. <p style="text-align: center;">Display: parameters >changer settings</p> <ul style="list-style-type: none"> If you open this sub-menu with <ENTER>, you will find the following item at fifth place amongst other settings:
<p>(<SELECT>) (<ENTER>) <QUIT></p>	<p style="text-align: center;">Display: >changer settings on beaker error: MOVE</p> <ul style="list-style-type: none"> This setting defines the behaviour of the 774 Oven Sample Processor if there is no sample vial at a sample position after a MOVE command. This is tested by an infrared sensor. If required, you can define that a method sequence be interrupted with an error message. In order to do this, press the <SELECT> key and confirm the setting 'message' with <ENTER>. Setting 'MOVE' is the default for all predefined methods. This setting means that the next sample position is approached if there is no sample vial, i.e. a further MOVE command is executed. Press key <QUIT> if you wish to retain this setting.
<p>2x <↓> <ENTER></p>	<p style="text-align: center;">Display: parameters >changer settings</p> <ul style="list-style-type: none"> You can find further important settings in the 'gas flow' sub-menu. <p style="text-align: center;">Display: parameters >gas flow</p> <ul style="list-style-type: none"> Open this sub-menu with <ENTER>.
<p>(<SELECT>) <ENTER></p>	<p style="text-align: center;">Display: >gas flow unit gas flow: mL/min</p> <ul style="list-style-type: none"> This is where you can choose the unit in which the flow rate of the carrier gas is to be displayed. You can choose between 'mL/min' and 'L/h'. Choose a unit with the <SELECT> key and confirm your selection with <ENTER>.

<p><ENTER></p>	<p style="text-align: center;">Display: >gas flow min. flow 50 mL/min</p> <p style="text-align: center;">or</p> <p style="text-align: center;"> min. flow 3.0 L/h</p> <ul style="list-style-type: none"> Depending on your previous selection, you will now see the lower warning limit for the flow rate of the carrier gas in mL/min or L/h. If, after switch-on of the pump or the solenoid valve, the flow rate of the carrier gas drops below this value (e.g. if there is a blockage in the hose), this is indicated by a warning tone and a flashing error message. Confirm the preset with <ENTER>.
<p><ENTER></p>	<p style="text-align: center;">Display: >gas flow min. flow 100 mL/min</p> <p style="text-align: center;">or</p> <p style="text-align: center;"> max. flow 6.0 L/h</p> <ul style="list-style-type: none"> This is the upper warning limit for the flow rate of the carrier gas in mL/min or L/h. If, after switch-on of the pump or the solenoid valve, the flow rate of the carrier gas exceeds this preset value (as the result of leakage in the hose system), this is indicated by a warning tone and a blinking error message. Set the two warning limits generously. Slight fluctuations in the flow rate may occur as the result of various factors. Their influence on correctness of the results is minimal. Confirm the preset with <ENTER>.
<p><ENTER></p>	<p style="text-align: center;">Display: >gas flow gas type: air</p> <ul style="list-style-type: none"> You must specify the type of gas for correct measurement of the flow rate. You can choose between the following: Air, nitrogen (N₂) and 'others'. Confirm the preset 'air' with the <ENTER> key.
<p>2x <QUIT></p>	<ul style="list-style-type: none"> That completes the most important settings for this method. Press <QUIT> twice to quit the Parameters menu.

2.3.3 Running a method


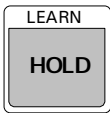

- Before you start a sample series, you should always ensure that the right method has been loaded (in this case '**756Pump**' or '**Titrimo**').
- For each sample series, place a new, empty and sealed conditioning vial at rack position 36 ('Cond. Pos.').
- After you have fitted the well-sealed sample vials in the sample rack, you must enter the rack position of the first sample. In order to do this, press key <SAMPLE>, enter the position and confirm this with <ENTER>.
- Methods '**756Pump**' and '**Titrimo**' control the oven on the basis of the initial temperature. Check what value has been defined for this (under <CONFIG>, >**Oven Settings, Initial temp.**) and whether this temperature has already been reached. If not, set a value, e.g. 130 °C, and confirm this with <ENTER>. If you press the <QUIT> key twice, you can then set the oven to initial temperature. In order to this, press <HEATER>, choose 'init' with the <SELECT> key and confirm by pressing <ENTER> twice.
- Of course, it is also possible to enter the working temperature of the oven directly in the method itself. This is advisable if the 774 Oven Sample Processor is used for different types of sample. In this case, the oven can be pre-heated by manual operation (key <HEATER>).

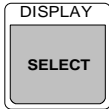



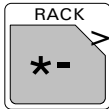
The display of the 774 Oven Sample Processor should now display approximately the following in initial state:

756Pump counter 0/35
130°C 0 mL/min ready

or

Titrimo counter 0/35
130°C 0 mL/min ready

	<ul style="list-style-type: none"> • Start the method with the green <START> key.
<p>You can now track the automatic sequence of the method.</p>	
	<ul style="list-style-type: none"> • If you wish to interrupt the method, press the <HOLD> key. You can resume an interrupted method after pressing the <START> key again.
	<ul style="list-style-type: none"> • You can abort execution of an individual command with the <QUIT> key. Thus, when testing a method, you can skip the waiting times for instance (WAIT command) or suppress scanning of the remote lines (SCN command) if the connected device is not to be included in the test.

	<ul style="list-style-type: none"> The counter in the first line of the display informs you what sample of the sample series is currently being processed. The rack position of the sample is of no significance in this case. If empty rack positions are approached, these are not counted.
	<ul style="list-style-type: none"> During the sequence of the method, you can switch over the display with the <DISPLAY / SELECT> key so that you see only the current oven temperature and the flow rate of the carrier gas. You can switch back to the normal display by pressing the key again.
 	<ul style="list-style-type: none"> You can vary the flow rate of the carrier gas at any time with the flow rate control. You can also change other settings during the sequence of a method. However, please note that only changes to command lines not yet executed take effect directly in the current pass. All other changes are applied only when processing the next sample. It is advisable to interrupt the running method with the <HOLD> key in order to change the setting and then continue this sequence again with <START> after the change.
 	<ul style="list-style-type: none"> In the method '756Pump' or 'Titrimo' which you have loaded, the number of samples is set to 'Rack', i.e. the entire rack is searched for sample vials, these are processed and the sample rack is then initialised. If you wish to abort the sample series beforehand, press the red <STOP> key. This then triggers the functions defined in the 'anual Stop' Parameters sub-menu. However, the final sequence is ignored. In this case, the sample rack is not initialised automatically. Press key <RACK> for this purpose.

3 Example methods

The pages which follow contain a listing of the supplied user methods with explanations of important commands. The configuration must be correct in order to be able to use these methods. In particular, you must ensure that the working height, the rinsing height and a conditioning beaker are defined. The specific determination methods must be set in each case on the connected unit itself. Correct cabling is explained in the description.

It is advisable to run each new method step-by-step before first starting with the TRACE function (press **<START>** in the Parameters menu with each command line) and to then adapt this method to your relevant needs.

The example methods have each been optimised for specific device configurations. Methods which you do not require can be deleted in order to create more memory space for your own methods. In order to do this, press the **<USER METHOD>**key, open sub-menu **>delete method** and choose the name of the method which you wish to delete with the **<SELECT>**key.

The following methods are integrated in the 774 Oven Sample Processor:

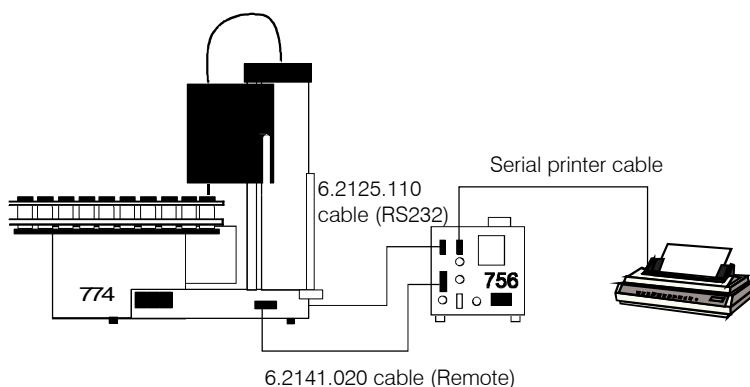
- **756Pump** *Simple sequence method for blank or sample determinations with air as the carrier gas, optimised for the Metrohm 756 KF-Coulometer*
- **756Valve** *Simple sequence method for blank or sample determinations with nitrogen as the carrier gas, optimised for the Metrohm 756 KF-Coulometer*
- **756Coulo** *Extensive sequence method for determinations with the Metrohm 756 KF-Coulometer, blank and determinations in one sequence.
The 774 Oven Sample Processor assumes complete control of the KF-Coulometer, including loading methods.*
- **Titrimo** *Simple sequence method for blank or sample determinations with air as the carrier gas, optimised for Metrohm KF Titrinos*
- **KF-Exch** *Sequence method for blank or sample determinations with air as the carrier gas, optimised for Metrohm KF Titrinos.
Before the sample series is commenced, the titration cell is evacuated and filled with fresh methanol.
Required for this:
729 Dosimat Interface and one 700 Dosino with 50 ml dosing unit*

3.1 Coulometer methods

3.1.1 Method '756Pump'

This method represents the simplest option for automating moisture determinations on the basis of the oven method with the aid of the Metrohm 756 KF-Coulometer. Dried air which is pumped with the pump incorporated in the 774 Oven Sample Processor is used as the carrier gas. Regulate the flow rate to approx. 70 ml/min.

The method can be used equally for conducting a blank value series and a sample series. It is advisable to conduct at least two blank value determinations prior to each sample series.



You will need:

- 774 Oven Sample Processor
- 756 KF-Coulometer with printer
- Coulometer cell
- Remote cable
- RS232 cable (optional)

The 756 KF-Coulometer is controlled via the control cables of the remote link. The 756 KF-Coulometer can automatically poll the temperature values of the 774 Oven Sample Processor via the serial RS232 connection when creating a report and print out these temperature values with the determination report. If you do not wish to use this option, you must change entry '**oven: COM**' to '**oven: no**' in the Coulometer method under **<PARAM>, >preselections**.

Please refer to the KF-Coulometer Instructions for Use for the order number for printer cable for your type of printer.

Blank value determinations

Conduct a series of blank value determinations with two to three empty, sealed sample vials. The mean value of the results should be stored in the KF-KF-Coulometer as a Common Variable C39. Use Coulometer method '**774-Bik**' for this purpose.

Sample determinations

Use KF-Coulometer method '**774-Det**' which automatically subtracts a resultant blank value (Common Variable C39) from the result for processing the sample series. Enter the sample data (sample size and IDs) beforehand in the drift register of the KF-Coulometer. Please consult the Instructions for Use for the 756 KF-Coulometer for this.

The method parameters

774 Oven Sample Proc. 0130/03 5.774.0010
parameters

```

method                756Pump
number of samples:   rack
>start sequence
  1 CTL: Rm              INIT
  2 MOVE 1 :             spec.1
  3 CTL: Rm              START device1
  4 HEATER: INIT°C      min
  5 LIFT: 1 :           rinse mm
  6 FLOW  pump :        ON
  7 WAIT                300 s
  8 SCN: Rm :           Cond ok
>sample sequence
  1 MOVE 1 :             spec.1
  2 LIFT: 1 :           rinse mm
  3 FLOW  pump :        ON
  4 WAIT                30 s
  5 SCN: Rm :           Cond ok
  6 WAIT                60 s
  7 SCN: Rm :           Cond ok
  8 FLOW  pump :        OFF
  9 SCN: Rm :           no error
 10 CTL: Rm              START device1
 11 MOVE 1 :             sample
 12 LIFT: 1 :           work mm
 13 FLOW  pump :        ON
 14 SCN: Rm :           End1
 15 FLOW  pump :        OFF
 16 WAIT                5 s
>final sequence
  1 RACK
>report
  report:               none
  rec. interval        10 s
>changer settings
  rack number          0
  lift rate 1          12 mm/s
  lift rate 2          12 mm/s
  shift rate           20
  shift direction:     auto.
  on beaker error:     MOVE
>timeout settings
  HEATER timeout:     20 min
  on HEATER timeout:  STOP
  SCAN timeout:       20 min
  on SCAN timeout:    error
>gas flow
  unit gas flow:      mL/min
  min. flow           50 mL/min
  max. flow           100 mL/min
  gas type:           air
>dosing unit def.
>manual stop
  CTL Rnt:            *****
  CTL RS232:
  FLOW                OFF
  HEATER:             INIT °C
  -----

```

```

← Report title with device number and
  program version
← Method name
← Sample series size, in this case entire rack
----- Start sequence
← Initialise remote interface
← Approach conditioning vial
← Start conditioning
← Oven heater to initial temperature
← Puncture with needle
← Activate air stream
← Wait for transfer time
← Wait for conditioning
----- Sample sequence
← Approach conditioning vial
← Puncture with needle
← Activate air stream
← Wait for transfer time
← Wait for conditioning
← Pause time for stabilising conditioning
← Wait for reconditioning
← Deactivate air stream
← Check KF-Coulometer status for error *
← Start determination on KF-Coulometer
← Approach sample vial
← Puncture with needle, move sample into oven
← Activate air stream
← Wait for end of determination
← Deactivate air stream
← Waiting time for data transfer of the oven data
----- Final sequence
← Turn rack to initial position

```

Other settings

```

← Approach next sample if sample vial is missing
← Stop sequence if required temperature is not reached
  after 20 minutes
← Display error message if determination on the KF-
  Coulometer is not yet complete after 20 minutes

← Limit values for flow rates; an error message is dis-
  played if a limit is violated

← After you press the <STOP>key, the air stream is
  deactivated and the oven is set to the initial tempera-
  ture

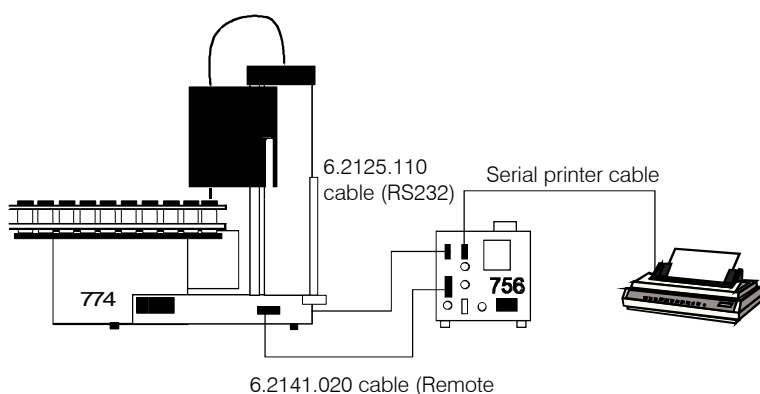
```

* If error messages which are unimportant and which are not to lead to an interruption in the sample series occur on the KF-Coulometer, polling of the error status can be prevented. Delete the corresponding command line with the <DELETE> key in order to do this.

3.1.2 Method '756Valve'

This method represents the simplest option for automating moisture determinations on the basis of the oven method with the aid of Metrohm 756 KF-Coulometer. An inert gas, such as nitrogen, can be used as the carrier gas. The gas supply is supplied at connection '**Air/N₂ in**' (M6 thread). The gas supply can be switched on and off via an internal solenoid valve (valve) which is designed for a maximum pressure of 1 bar. Use a corresponding reducing valve. Regulate the flow rate to approx. 70 ml/min.

The method can be used equally for conducting a blank value series and a sample series. It is advisable to conduct at least two blank value determinations prior to each sample series.



You will need:

- 774 Oven Sample Processor
- 756 KF-Coulometer with printer
- Coulometer cell
- Remote cable
- RS232 cable (optional)

The 756 KF-Coulometer is controlled via the control cables of the remote link.

The 756 KF-Coulometer can automatically poll the temperature values of the 774 Oven Sample Processor via the serial RS232 connection when creating a report and print out these temperature values with the determination report. If you do not wish to use this option, you must change entry '**oven: COM**' to '**oven: no**' in the KF-Coulometer method under <PARAM>, >preselections.

Please refer to the KF-Coulometer Instructions for Use for the order number for printer cable for your type of printer.

Blank value determinations

Conduct a series of blank value determinations with two to three empty, sealed sample vials. The mean value of the results should be stored in the KF-Coulometer as a Common Variable C39. Use KF-Coulometer method '**774-Bik**' for this purpose.

Sample determinations

Use KF-Coulometer method '**774-Det**' which automatically subtracts a resultant blank value (Common Variable C39) from the result for processing the sample series. Enter the sample data (sample size and IDs) beforehand in the drift register of the KF-Coulometer. Please consult the Instructions for Use for the 756 KF-Coulometer for this.

Method parameters

774 Oven Sample Proc. 0130/03 5. 774. 0010 parameters

```

method                756Valve
number of samples:   rack
>start sequence
  1 CTL: Rm              INIT
  2 MOVE 1 :             spec.1
  3 CTL: Rm              START device1
  4 HEATER: INIT°C      min
  5 LIFT: 1 :           rinse mm
  6 FLOW valve :        ON
  7 WAIT                 300 s
  8 SCN: Rm :           Cond ok
>sample sequence
  1 MOVE 1 :             spec.1
  2 LIFT: 1 :           rinse mm
  3 FLOW valve :        ON
  4 WAIT                 30 s
  5 SCN: Rm :           Cond ok
  6 WAIT                 60 s
  7 SCN: Rm :           Cond ok
  8 FLOW valve :        OFF
  9 SCN: Rm :           no error
 10 CTL: Rm              START device1
 11 MOVE 1 :             sample
 12 LIFT: 1 :           work mm
 13 FLOW valve :        ON
 14 SCN: Rm :           End1
 15 FLOW valve :        OFF
 16 WAIT                 5 s
>final sequence
  1 RACK
>report
  report:                none
  rec. interval          10 s
>changer settings
  rack number           0
  lift rate 1            12 mm/s
  lift rate 2            12 mm/s
  shift rate             20
  shift direction:      auto.
  on beaker error:      MOVE
>timeout settings
  HEATER timeout:       20 min
  on HEATER timeout:    STOP
  SCAN timeout:         20 min
  on SCAN timeout:      error
>gas flow
  unit gas flow:        nL/min
  min. flow              50 nL/min
  max. flow              100 nL/min
  gas type:              N2
>dosing unit def.
>manual stop
  CTL Rnt:              *****
  CTL RS232:
  FLOW                  OFF
  HEATER:               INIT °C
  -----

```

- ← Report title with device number and program version
- ← Method name
- ← Sample series size, in this case entire rack
- **Start sequence**
- ← Initialise remote interface
- ← Approach conditioning vial
- ← Start conditioning
- ← Oven heater to initial temperature
- ← Puncture with needle
- ← Activate gas stream
- ← Wait for transfer time
- ← Wait for conditioning
- **Sample sequence**
- ← Approach conditioning vial
- ← Puncture with needle
- ← Activate gas stream
- ← Wait for transfer time
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- ← Deactivate gas stream
- ← Check KF-Coulometer status for error *
- ← Start determination on KF-Coulometer
- ← Approach sample vial
- ← Puncture with needle, move sample into oven
- ← Activate gas stream
- ← Wait for end of determination
- ← Deactivate gas stream
- ← Waiting time for data transfer of the oven data
- **Final sequence**
- ← Turn rack to initial position

Other settings

- ← Approach next sample if the sample vial is missing
- ← Stop sequence if required temperature is not reached after 20 minutes
- ← Display error message if determination on the KF-Coulometer is not yet complete after 20 minutes
- ← Limit values for flow rates; an error message is displayed if a limit is violated
- ← After you press the <STOP>key, the air stream is deactivated and the oven is set to the initial temperature

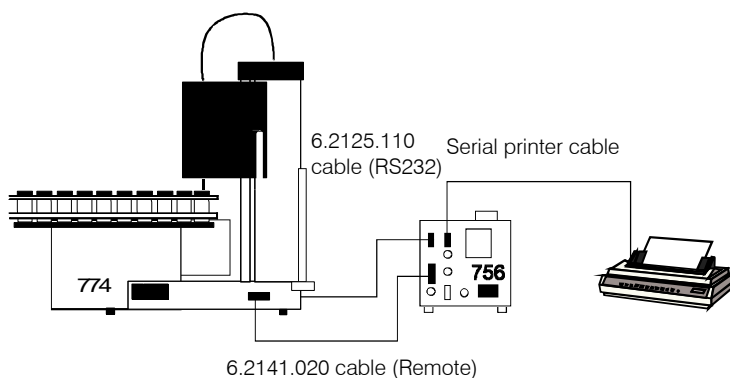
* If error messages which are unimportant and which are thus not to lead to an interruption in the sample series occur, polling of the fault status can be prevented. Delete the corresponding command line with the <DELETE> key in for this purpose.

3.1.3 Method '756Coulo'

This method represents a convenient option for fully automating moisture determinations on the basis of the oven method with the aid of the Metrohm 756 KF-Coulometer. Dried air which is pumped with the pump incorporated in the 774 Oven Sample Processor is used as the carrier gas. Regulate the flow rate to approx. 70 ml/min.

The method combines conducting a blank value series and a sample series in one operation. Three blank value determinations are performed in the start sequence. The effective sample determinations in the sample sequence.

The 774 Oven Sample Processor assumes full control of the 756 KF-Coulometer.



You will need:

- 774 Oven Sample Processor
- 756 KF-Coulometer with printer
- Coulometer cell
- Remote cable
- RS232 cable (absolutely necessary)

The 756 KF-Coulometer is actually controlled via the control cables of the remote link.

The required methods ('**774-Blk**' and '**774-Det**') are loaded in the KF-Coulometer via the serial RS232 link. The KF-Coulometer, in turn, automatically polls the temperature values of the 774 Oven Sample Processor when a report is created and prints these out with the determination report. Please refer to the Instructions for Use for the KF-Coulometer for the order number of the printer cable for your printer type.

Blank value determinations

Place three empty, sealed sample vials at the last rack positions for blank value determinations. These positions must be defined as special beakers 1 to 3 in the configuration of the 774 Oven Sample Processor under **<CONFIG>**, **>rack definitions**, **>>special positions**.

Method '**774-Blk**' is loaded automatically in the KF-Coulometer in the method sequence for the blank value determinations. The mean value of the blank value results is stored in the KF-Coulometer as Common Variable C39.

Sample determinations

Method '**774-Det**' in which the blank value (Common Variable C39) is offset for computing the result is loaded in the KF-Coulometer for processing the sample series.

Enter the sample data (sample size and IDs) beforehand in the drift register of the KF-Coulometer. Please consult the Instructions for Use for the 756 KF-Coulometer for this purpose.


```

13 FLOW pump : ON
14 SCN: Rm : End1
15 FLOW pump : OFF
16 WAIT 5 s
>final sequence
  1 RACK
>report
  report: none
  rec. interval 10 s
>changer settings
  rack number 0
  lift rate 1 12 mm/s
  lift rate 2 12 mm/s
  shift rate 20
  shift direction: auto.
  on beaker error: MOVE
>timeout settings
  HEATER timeout: 20 min
  on HEATER timeout: STOP
  SCAN timeout: 20 min
  on SCAN timeout: error
>gas flow
  unit gas flow: mL/min
  min. flow 50 mL/min
  max. flow 100 mL/min
  gas type: air
>dosing unit def.
>manual stop
  CTL Rmt: *****
  CTL RS232:
  FLOW OFF
  HEATER: INIT °C
  -----
    
```

```

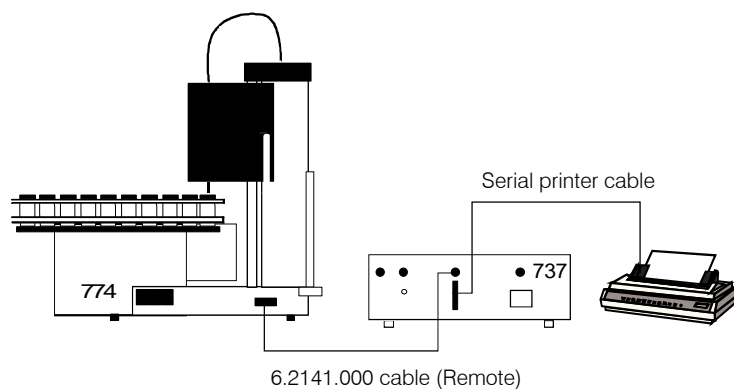
← Activate air stream
← Wait for end of determination
← Deactivate air stream
← Waiting time for data transfer of the oven data
    ----- Final sequence
← Turn rack to initial position
    -----
                                     Other settings
    -----
← Approach next sample if the sample vial is missing
← Stop sequence if required temperature is not reached
  after 20 minutes
← Display error message if determination on the KF-
  Coulometer is not complete after 20 minutes
← Flow rate limits; an error message is displayed if a limit
  is violated
← After you press the <STOP>key, the air stream is
  deactivated and the oven is set to the initial tempera-
  ture
    
```

* If error messages which are unimportant and which thus should not to lead to an interruption in the sample series occur on the KF-Coulometer, polling of the error status can be prevented. Delete the corresponding command line with the <DELETE> key for this purpose.

3.1.4 Method '737Coulo'

This method allows you to automate moisture determinations on the basis of the oven method with the aid of the Metrohm KF-Coulometer 737. Dried air which is pumped with the pump incorporated in the 774 Oven Sample Processor is used as the carrier gas. Regulate the flow rate to approx. 70 mL/min.

The method can be used equally for conducting a blank value series and a sample series. It is advisable to conduct at least two blank value determinations prior to each sample series.



You will need:

- 774 Oven Sample Processor
- Coulometer 737 with printer
- Coulometer cell
- Remote cable

The KF-Coulometer 737 is controlled via the control cables of the remote link.

Please refer to the Instructions for Use for the KF-Coulometer for the order number of the printer cable for your printer type.

Coulometer 737 must be started manually in order to condition the KF-Coulometer cell. Method 774 Oven Sample Processor should not be started until this point.

Enter an extraction time of at least 30 seconds on the KF-Coulometer (key <PARAM>).

Blank value determinations

Conduct a series of blank value determinations with two to three empty, sealed sample vials. The mean value of the results must be entered manually in the KF-Coulometer (key <CALC DATA>).

Sample determinations

The same sample size should be used for all samples since KF-Coulometer 737 does not feature a sample data drift register. Enter the sample size of the samples beforehand in the KF-Coulometer (key <SMPL DATA>). Any blank value entered beforehand is offset automatically.

Method parameters

774 Oven Sample Proc. 0130/03 5.774.0010 parameters

```

method                737Coulometer
number of samples:    rack
>start sequence
  1 CTL: Rm              INIT
  2 MOVE 1 :             spec. 1
  3 HEATER: INIT °C      min
  4 LIFT: 1 :            rinse mm
  5 FLOW pump :          ON
  6 SCN: Rm :            Cond 737
  7 WAIT                 60 s
  8 SCN: Rm :            Cond 737
>sample sequence
  1 CTL: Rm              START 737
  2 FLOW pump :          OFF
  3 MOVE 1 :             sample
  4 LIFT: 1 :            work mm
  5 FLOW pump :          ON
  6 SCN: Rm :            Cond 737
  7 FLOW pump :          OFF
  8 MOVE 1 :             spec. 1
  9 LIFT: 1 :            rinse mm
 10 FLOW pump :          ON
 11 SCN: Rm :            Cond 737
 12 WAIT                 30 s
 13 SCN: Rm :            Cond 737
>final sequence
  1 FLOW pump :          OFF
  2 RACK
>report
  report:                none
  rec. interval          10 s
>changer settings
  rack number            0
  lift rate 1            12 mm/s
  lift rate 2            12 mm/s
  shift rate             20
  shift direction:       auto.
  on beaker error:       MOVE
>timeout settings
  HEATER timeout:        20 min
  on HEATER timeout:     STOP
  SCAN timeout:          20 min
  on SCAN timeout:       error
>gas flow
  unit gas flow:         nL/min
  min. flow              50 nL/min
  max. flow              100 nL/min
  gas type:              air
>dosing unit def.
>manual stop
  CTL Rnt:               *****
  CTL RS232:
  FLOW                   OFF
  HEATER:                 INIT °C
  -----

```

- ← Report title with device number and program version
- ← Method name
- ← Sample series size, in this case entire rack
- **Start sequence**
- ← Initialise remote interface
- ← Approach conditioning vial
- ← Oven heater to initial temperature
- ← Puncture with needle
- ← Activate air stream
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- **Sample sequence**
- ← Start determination on KF-Coulometer
- ← Deactivate air stream
- ← Approach sample vial
- ← Puncture with needle
- ← Activate air stream
- ← Wait for end of determination
- ← Deactivate air stream
- ← Approach conditioning vial
- ← Puncture with needle
- ← Activate air stream
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- **Final sequence**
- ← Deactivate air stream
- ← Turn rack to initial position

Other settings

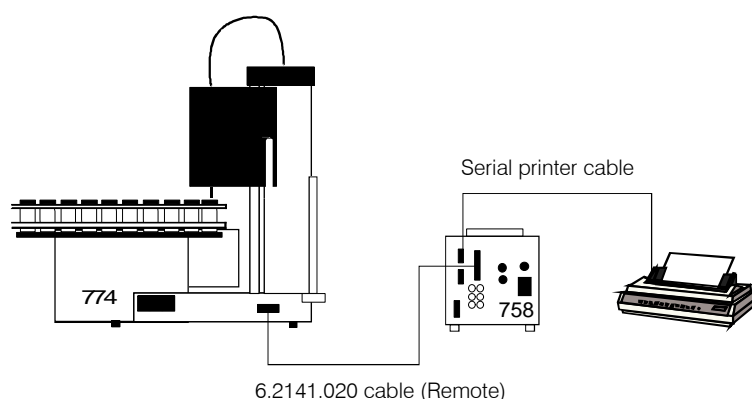
- ← Approach next sample if the sample vial is missing
- ← Stop sequence if required temperature is not reached after 20 minutes
- ← Display error message if determination on the KF-Coulometer is not complete after 20 minutes
- ← Flow rate limits; an error message is displayed if a limit is violated
- ← After you press the <STOP>key, the air stream is deactivated and the oven is set to the initial temperature

3.2 Titrino methods

3.2.1 Method 'Titrino'

This method allows you to automate moisture determinations on the basis of the oven method with the aid of Metrohm KF Titrino (models 758, ...). Dried air which is pumped by the pump incorporated in the 774 Oven Sample Processor is used as the carrier gas. Regulate the flow rate to approx. 70 mL/min.

The method can be used equally for conducting a blank value series and a sample series. It is advisable to conduct at least two blank value determinations prior to each sample series.



You will need:

- 774 Oven Sample Processor
- KF Titrino with printer
- KF titration cell
- Remote cable

The Titrino is controlled fully via the control cables of the remote link. Please refer to the Instructions for Use for the Titrino for the order of the printer cable for your printer type.

Blank value determinations

Conduct a series of blank value determinations with two to three empty, sealed sample vials. The mean value of the results should be saved in the Titrino as a Common Variable C38. Use Titrino method '**Blank_KF**' for this purpose.

Sample determinations

Use Titrino method '**KF-Blank**' in which a resultant blank value (Common Variable C38) is automatically subtracted from the result for processing the sample series. Enter the sample data (sample size and IDs) beforehand in the drift register of the Titrino. Please consult the Instructions for Use for the Titrino for this.

It is absolutely essential that you modify setting '**req. snpl size: all**' to '**req. snpl size: value**' under <parameters>, >preselections in the Titrino method.

Method parameters

774 Oven Sample Proc. 0130/03 5.774.0010
parameters

```

method                               Titrino
number of samples:                   rack
>start sequence
  1 CTL: Rm                               INIT
  2 CTL: Rm          START device1
  3 MOVE 1           :                   spec. 1
  4 HEATER: INIT °C                               nin
  5 LIFT: 1           :                   rinse mm
  6 FLOW  pump       :                   ON
  7 SCN: Rm          :                   Cond ok
  8 WAIT                               60 s
  9 SCN: Rm          :                   Cond ok
>sample sequence
  1 SCN: Rm          :                   no error
  2 CTL: Rm          START device1
  3 FLOW  pump       :                   OFF
  4 MOVE 1           :                   sample
  5 LIFT: 1           :                   work mm
  6 FLOW  pump       :                   ON
  7 WAIT                               30 s
  8 CTL: Rm          ENTER
  9 SCN: Rm          :                   End1
 10 FLOW  pump       :                   OFF
 11 MOVE 1           :                   spec. 1
 12 LIFT: 1           :                   rinse mm
 13 FLOW  pump       :                   ON
 14 SCN: Rm          :                   Cond ok
 15 WAIT                               30 s
 16 SCN: Rm          :                   Cond ok
>final sequence
  1 FLOW  pump       :                   OFF
  2 RACK
>report
report:                               none
rec. interval                           10 s
>changer settings
rack number                               0
lift rate 1                               12 mm/s
lift rate 2                               12 mm/s
shift rate                               20
shift direction:                         auto.
on beaker error:                         MVE
>timeout settings
HEATER timeout:                         20 nin
on HEATER timeout:                       STOP
SCAN timeout:                           20 nin
on SCAN timeout:                         error
>gas flow
unit gas flow:                           nL/nin
min. flow                               50 nL/nin
max. flow                               100 nL/nin
gas type:                               air
>dosing unit def.
>manual stop
CTL Rmt:                               *****
CTL RS232:
FLOW                                     OFF
HEATER:                               INIT °C
  -----
  
```

- ← Report title with device number and program version
- ← Method name
- ← Sample series size, in this case entire rack
- **Start sequence**
- ← Initialise remote interface
- ← Start conditioning
- ← Approach conditioning vial
- ← Oven heater to initial temperature
- ← Puncture with needle
- ← Activate air stream
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- **Sample sequence**
- ← Check Titrino status for errors *
- ← Start determination on Titrino
- ← Deactivate air stream
- ← Approach sample vial
- ← Puncture with needle, move sample into oven
- ← Activate air stream
- ← Wait for transfer time
- ← Confirm sample transfer
- ← Wait for end of determination
- ← Deactivate air stream
- ← Approach conditioning vial
- ← Puncture with needle
- ← Activate air stream
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- **Final sequence**
- ← Deactivate air stream
- ← Turn rack to initial position

Other settings

- ← Approach next sample if the sample vial is missing
- ← Stop sequence if required temperature is not reached after 20 minutes
- ← Display error message if determination on Titrino is not complete after 20 minutes
- ← Flow rate limits; an error message is displayed if a limit is violated
- ← After you press the <STOP> key, the air stream is deactivated and the oven is set to the initial temperature

* If error messages which are unimportant and which thus should not lead to an interruption in the sample series occur, polling of the error status can be prevented. Delete the corresponding command line with the <DELETE> key for this purpose.

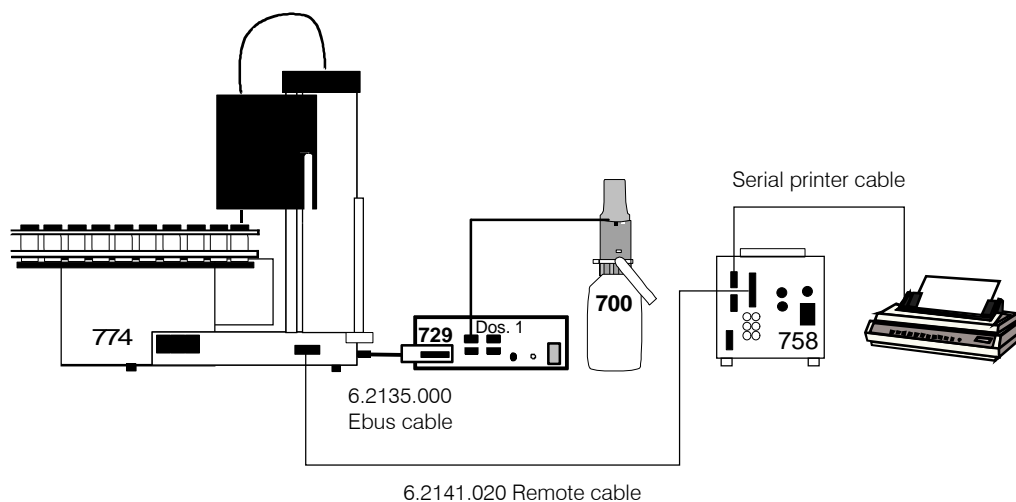
3.2.2 Method 'KF+Exch'

This method allows you to automate moisture determinations in accordance with the oven method with the aid of a Metrohm KF Titrino (models 758, ...). It foresees extracting the solvent recipient at the start of a sample series, i.e. spent titration method and replacing it with fresh methanol. Extraction and apportioning are performed by a Metrohm 700 Dosino, which is connected to the 774 Oven Sample Processor with the aid of a Dosimat Interface 729. Dried air which is pumped with the pump incorporated in the 774 Oven Sample Processor is used as the carrier gas. Regulate the flow rate to approx. 70 mL/min.

The method can be used equally for conducting a blank value series and a sample series. It is advisable to conduct at least two blank value determinations prior to each sample series.

You will need:

- 774 Oven Sample Processor
- KF Titrino with printer (see Instructions for Use for the Titrino for the printer cable)
- KF titration cell
- Remote cable
- 700 Dosino with dosing unit 50 ml (Dos. 1)
- Dosimat Interface 729 (Set Ebus address 1)
- Ebus cable



The Titrino is controlled fully via the control cables of the remote link.

Setting up the Dosino

Connect a riser tube to the M6 threaded connection (Port 2) on the underside of the dosing unit and fit this with the Dosino onto a storage bottle containing methanol. Connect a dosing hose routed into the KF cell to Port 1 (M6 thread). The Dosino Port 3 is used as an outlet for discharging the spent titration medium. Connect a hose which leads into a waste container to this point.

Blank value determinations

Conduct a series of blank value determinations with two to three empty, sealed sample vials. The mean value of the results should be stored in the Titrino as a Common Variable C38. Use Titrino method '**Blank_KF**' for this purpose.

Sample determinations

Use Titrimo method '**KF-Blank**' in which a resultant blank value (Common Variable C38) is automatically subtracted from the result for processing the sample series. Enter the sample data (sample size and IDs) beforehand in the drift register of the Titrimo. Consult the Instructions for Use for the Titrimo for this.

It is absolutely essential that you change setting '**req. snpl size: all**' to '**req. snpl size: value**' <parameters>, >**preselection** in the Titrimo method.

Method parameters

774 Oven Sample Proc. 0130/03 5.774.0010

parameters

```

method                KF+Exch
number of samples:   rack
>start sequence
  1 CTL: Rm             INIT
  2 MOVE 1 :           spec. 1
  3 DRIVE. PORT 1. 3: dos.
  4 DOS: 1 :           eject nL
  5 DRIVE. PORT 1. 1: fill
  6 DOS: 1 :           fill nL
  7 DOS: 1 :           eject nL
  8 DRIVE. PORT 1. 2: dos.
  9 DOS: 1 :           - 10 nL
 10 DRIVE. PORT 1. 1: dos.
 11 DOS: 1 :           10 nL
 12 CTL: Rm           START device1
 13 HEATER: INIT°C   min
 14 LIFT: 1 :         rinse mm
 15 FLOW pump :       ON
 16 SCN: Rm :         Cond ok
 17 WAIT              60 s
 18 SCN: Rm :         Cond ok
>sample sequence
  1 SCN: Rm :         no error
  2 CTL: Rm           START device1
  3 FLOW pump :       OFF
  4 MOVE 1 :         sample
  5 LIFT: 1 :         work mm
  6 FLOW pump :       ON
  7 WAIT              30 s
  8 CTL: Rm           ENTER
  9 SCN: Rm :         End1
 10 FLOW pump :       OFF
 11 MOVE 1 :         spec. 1
 12 LIFT: 1 :         rinse mm
 13 FLOW pump :       ON
 14 SCN: Rm :         Cond ok
 15 WAIT              30 s
 16 SCN: Rm :         Cond ok
>final sequence
  1 FLOW pump :       OFF
  2 DRIVE. PORT 1. 4: fill
  3 DOS: 1 :         fill nL
  4 RACK
>report
report:             none
rec. interval       10 s
>changer settings
rack number         0
lift rate 1         12 mm/s
lift rate 2         12 mm/s
shift rate          20
shift direction:   auto.
on beaker error:   MDVE

```

- ← Report title with device number and program version
- ← Method name
- ← Sample series size, in this case entire rack
- **Start sequence**
- ← Initialise remote interface
- ← Approach conditioning vial
- ← Define dosing output of Dosino (waste bottle)
- ← Eject dosing cylinder
- ← Redefine fill tubing of Dosino (from KF cell)
- ← Extract from KF cell (fill dosing cylinder)
- ← Eject dosing cylinder to waste
- ← Redefine dosing output (storage bottle)
- ← Induct 10 ml of methanol from storage bottle
- ← Redefine dosing output (KF cell)
- ← Dose 10 ml of methanol into KF cell
- ← Activate conditioning
- ← Oven heater to initial temperature
- ← Puncture with needle
- ← Activate air stream
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- **Sample sequence**
- ← Check Titrimo status for errors *
- ← Start determination on Titrimo
- ← Deactivate air stream
- ← Approach sample vial
- ← Puncture with needle, move sample into oven
- ← Activate air stream
- ← Wait for transfer time
- ← Confirm sample transfer
- ← Wait for end of determination
- ← Deactivate air stream
- ← Approach conditioning vial
- ← Puncture with needle
- ← Activate air stream
- ← Wait for conditioning
- ← Pause time for stabilising conditioning
- ← Wait for reconditioning
- **Final sequence**
- ← Deactivate air stream
- ← Redefine filler hose (to Port 4)
- ← Reset Dosino / fill cylinder with air
- ← Turn rack to initial position

Other settings

- ← Approach next sample if the sample vial is missing

<pre> >timeout settings HEATER timeout: 20 min on HEATER timeout: STOP SCAN timeout: 20 min on SCAN timeout: error >gas flow unit gas flow mL/min min. flow 50 mL/min max. flow 100 mL/min gas type: air >dosing unit def. >manual stop CTL Rmt: ***** CTL RS232: FLOW OFF HEATER: INIT °C ----- </pre>	<pre> ← Stop sequence if required temperature is not reached after 20 minutes ← Display error message if determination on the Titrino is not complete after 20 minutes ← Flow rate limits; an error message is displayed if a limit is violated ← After you press the <STOP>key, the air stream is deactivated and the oven is set to the initial tempera- ture </pre>
---	--

* If error messages which are unimportant and which thus should not lead to an interruption in the sample series occur on the Titrino, polling of the error status can be prevented. Delete the corresponding command line with the <DELETE> key for this purpose.

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Tasten

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