

KF Oven

768

Series 01...



The following parts around the heating tube of the KF Oven can become hot:
Heating tube, lateral shielding walls of the heating tube, guard grill of the heating tube, jacket of the outlet heating.
Caution: Never touch these parts and ensure they never come into contact with solvents!

Inhaltsverzeichnis

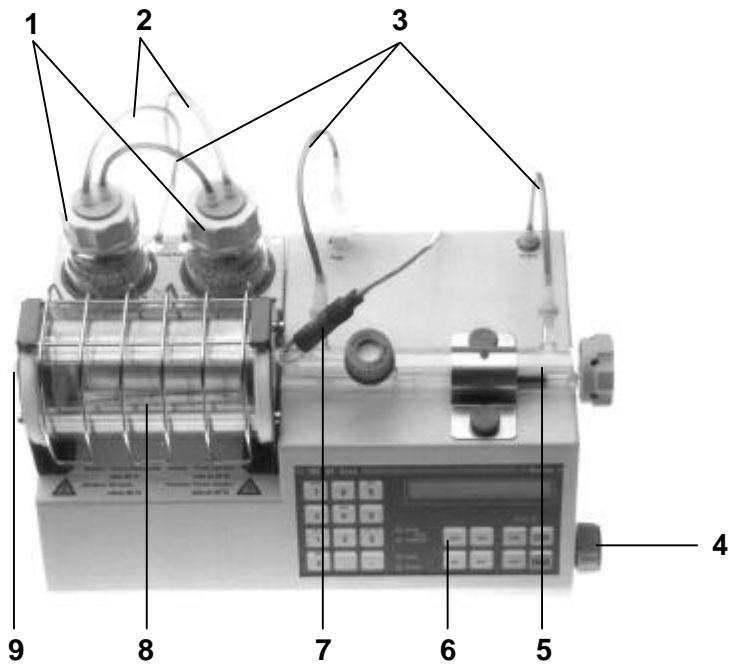
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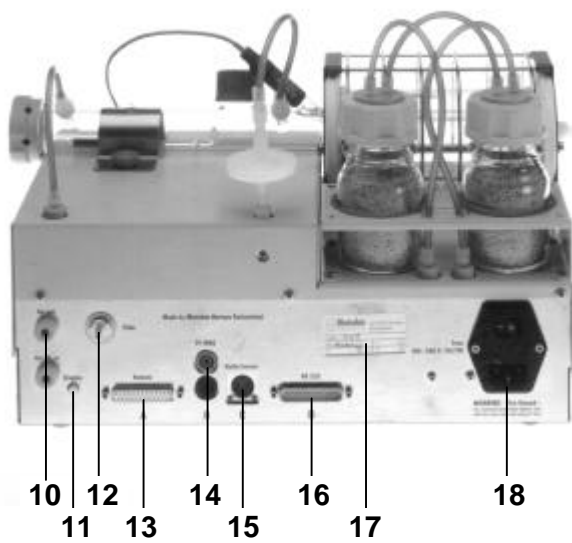
1. Introduction

1.1 Overview

Front



Rear



Front

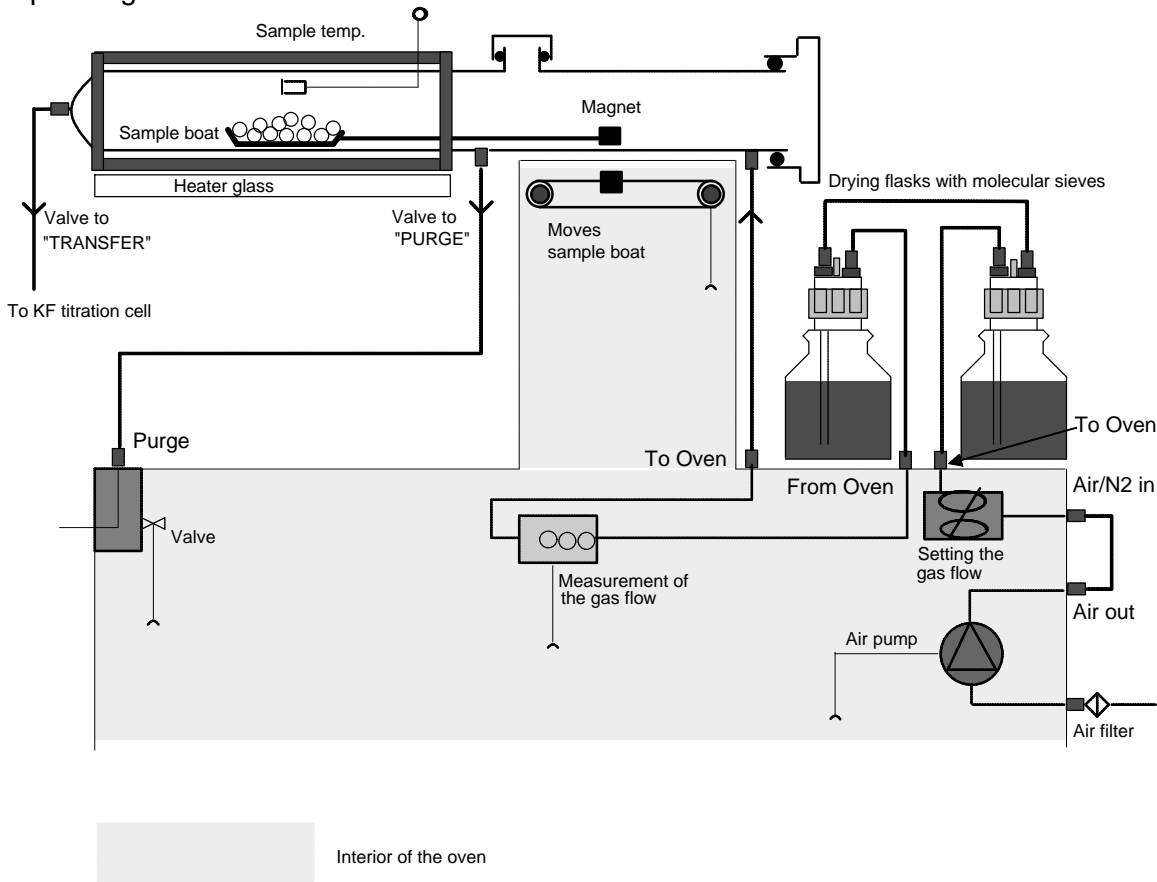
- 1** **Drying flasks**
filled with molecular sieves. For drying the carrier gas.
- 2** **Tubing connections**
with 6.1805.180 Tubing.
- 3** **Tubing connections**
with 6.1805.080 Tubing.
- 4** **Adjustment for gas flow**
- 5** **Oven insert tube**
contains sample boat with guide rod.
- 6** **Control panel**
with display, keypad and status lamps.
- 7** **Temperature sensor**
for measuring the sample temperature.
- 8** **Heating tube**
with lateral shielding walls and guard grill.
- 9** **Outlet tubing**
leads into titration vessel. 6.1805.070 Tubing or 6.1830.000
Heatable Outlet Tubing (option).

Rear

- 10** **Tubing connection**
with 6.1805.040 Tubing.
- 11** **Contrast adjustment for the display**
- 12** **Dust filter**
- 13** **Connection for titrators**
- 14** **Connection for temperature sensor**
plug the grey connector of the cable into the red socket of the KF Oven!
- 15** **Connection for outlet heating**
- 16** **RS232 interface**
for connection of a printer or computer.
- 17** **Model plate**
with manufacturing, serial and instrument number.
Display of the set mains voltage, the mains frequency and the power consumption. Before switching on for the first time, check that the set mains voltage matches the voltage of your power supply. If this is not the case, disconnect mains cable and change over voltage, see page 43.
- 18** **Power supply unit**
with mains switch and mains connection.
With power supplies in which powerful HF disturbances are superimposed on the mains voltage, the KF Oven should be operated with an additional mains filter, e.g. METROHM model 615.

1.2 Operating principle

Operating scheme:



Gas flow

If air is used as the carrier gas, work is carried out with the air pump built into the oven. The pump draws in the air through the air filter.

If a different gas is used as carrier gas, this is introduced via the connection "Air/N₂ in".

The gas flow is set with the valve on the side of the oven and the gas led through the drying flasks. The gas flow is measured immediately before entry into the insert tube.

If the valve is set to "PURGE", the gas flows out again through the opening "Purge". It is thus led through the cold, front part of the insert tube.

If the valve is set to "TRANSFER", the gas flows through the entire insert tube, i.e. also through the hot zone of the oven. The gas exits through the outlet at the end of the insert tube and is led to the titration cell where the moisture of the sample is determined by titration.

2. Operating conditions

2.1 Handling the sample boat

Sample boat and guide rod should always be handled using the 6.2056.000 Holding Clamp to ensure the measurement results are not falsified by skin moisture adhering to the glass.

Always dry sample boat and guide rod well (hair dryer, drying oven) after cleaning. Store sample boats in a desiccator. There is no need to clean the sample boat if the aluminum inserts (order number 6.2623.000) are used (recommended especially when the samples melt or decompose).



Inserting sample boat in the oven

Hold boat with clamp so that the eye of the boat fits in the opening of the clamp.

Place boat in insert tube. The eye should protrude from the tube.

Grip guide rod with the clamp. The two teeth of the clamp should be at the bottom.

Engage guide rod in the eye of the boat and slide into insert tube.

The boat can also be gripped with the guide rod and inserted in the oven as a unit "boat and guide rod".



Close insert tube with cover.

Start determination with <START>.

Removing sample boat from the oven

Open cover of the insert tube.

Grip guide rod with the clamp and withdraw until the end of the sample boat protrudes sufficiently out of the insert tube to be easily grasped by the clamp. Disengage guide rod from the eye of the boat and put aside, e.g. on the oven at the rear. Position so that the holding lug of the guide rod projects over the oven edge and can be easily gripped by the clamp.

Grip boat with clamp and take out.

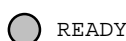
Boat and guide rod can also be withdrawn from the oven together.

2.2 Automatic sequence of a determination

The automatic sequence facilitates the work when a KF Titrator is attached. After the start, all steps necessary for the determination are performed at the KF Oven.



After being switching on, the oven heats up to the set temperature (when "auto preparation: on" is set in <CONFIG>). Until the set temperature is reached, the "READY" lamp flashes.



Once the set temperature is in the range of the starting temperature, the "READY" lamp is on continuously.

Set the desired gas flow (e.g. 100 mL/min). Set gas flow when oven is hot!

Position the sample boat and the guide rod in the cold part of the insert tube.



Start the sequence at the KF Oven with the <START> key.

purge time 13 s

If a purge time has been entered, this is allowed to elapse.



The valve switches from "PURGE" to "TRANSFER", i.e. the gas is now led to the titration vessel.

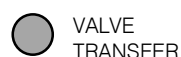
cond. time 5 s

If a conditioning time has been entered, this is allowed to elapse.

The attached titrator is tested to see whether the titration vessel is conditioned (if "start if cond ok: on" is set in <CONFIG>), the titrator is then started automatically and the sample boat moved to the hot part of the oven. The sample is heated, the evolved water led to the titration vessel with the carrier gas and there titrated.



On completion of the titration and if "valve control" is ON, the valve is automatically set to "PURGE" and the sample boat moved out of the hot part.



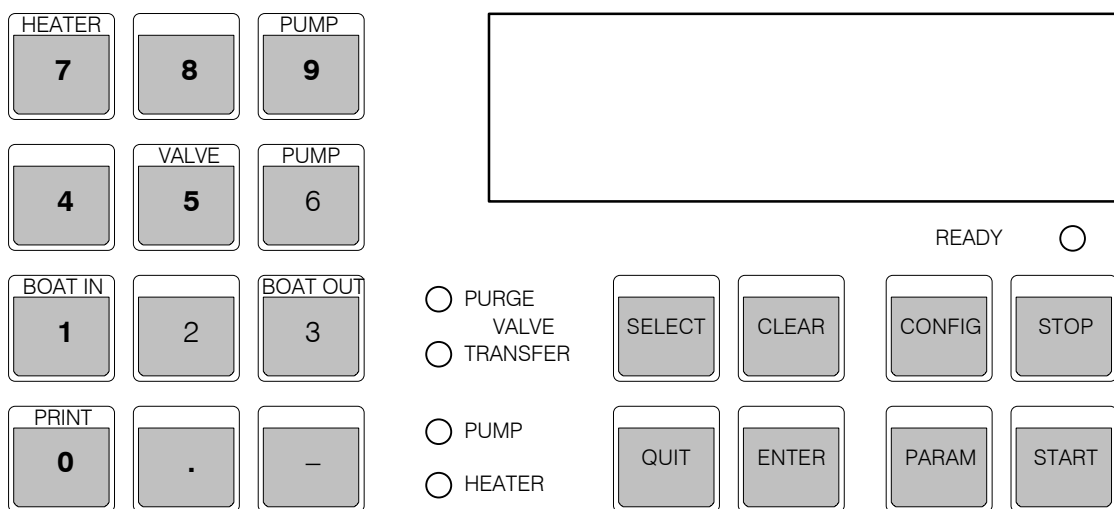
If "valve control" is OFF, the valve remains on "TRANSFER".



When the set temperature has been reached, "READY" lights up and the oven is ready for the next determination.

2.3 Settings on KF Oven

2.3.1 Keypad



Keys for individual manual functions

<HEATER> Switches heating off/on. The "HEATER" lamp lights up or flashes when the heating is switched on. (The lamp is on continuously when full heating power is used; it flashes with reduced heating power.)

Note:

If the heating is switched off and if the valve is on "TRANSFER", the solvent may be sucked back from the titration vessel.

<PUMP> Switches pump off/on. The "PUMP" lamp lights up when the pump is switched on.

<VALVE> Switches valve. The "VALVE, PURGE" and "VALVE, TRANSFER" lamps show the position of the valve. For safety reasons, the valve is always set to "PURGE" at the end of an automatic determination as well as on switching off the Oven (suck-back of solution from the titration vessel!)

<BOAT IN> Inserts the sample boat in the hot part of the oven. The boat continues to move until the key is pressed again or until the boat reaches the inner stop.

<BOAT OUT> Withdraws the sample boat from the hot part of the oven. The boat continues to move until the key is pressed again or the boat reaches the outer stop.

<PRINT> Triggers report printout
 Key sequence:
 <PRINT><SELECT><ENTER>; press <SELECT> repeatedly until the desired report appears in the display
 or
 <PRINT><Key X><ENTER>; Key X = PARAM or CONFIG

Input and determination control keys

<SELECT>	Used to select different input quantities. The ":" character following the dialog text means that <SELECT> is used for selection of the input quantities. <SELECT> can also be used to select the contents of the 2nd display line: Switching from display of the gas flow to messages, to display of the oven temperature.
<CLEAR>	<ul style="list-style-type: none">- Clearing of input values- Sets special values, e.g. "off"
<QUIT>	<ul style="list-style-type: none">- Exits inquiries- Aborts wait times- Aborts report outputs- Exits error messages
<ENTER>	<ul style="list-style-type: none">- Acceptance of input values- Conclusion of command sequences

Keys with rolling inquiries

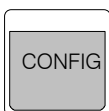
Repeat pressing of these keys leads to next inquiry (group).

<CONFIG>	Configuration data, see page 9. The inquiries are divided into groups. The titles of the inquiry groups are marked with the ">" character. Entry into the inquiry groups with <ENTER>.
<PARAM>	Parameters for the automatic determination, see page 11.

Keys for the automatic determination

<STOP>	Stops the automatic determination.
<START>	Starts the automatic determination. The start is possible only when the "READY" lamp is continuously lit up, i.e. the current temperature lies in the range of the starting temperature.

2.3.2 <CONFIG> key



The inquiries are divided into groups. The titles of the inquiry groups are marked with the ">" character. Entry into the inquiry group with <ENTER>.

>oven settings

Inquiry group: General oven settings

auto preparation: OFF

Automatic preparation after switching on (ON, OFF)
"ON " means: Automatic heating to the sample temperature.

valve control: ON

Valve control (ON, OFF)
"ON" means automatic switching of the valve from "PURGE" to "TRANSFER" at the end of the determination. With "OFF", the valve remains on "TRANSFER".

start if cond.ok: OFF

Start possible only when the attached titrator is conditioned (ON, OFF)
"ON" means: The sample boat is not moved to the hot part of the oven until the attached titrator is conditioned. If no titrator is attached, "OFF" must be set.

start temp.range 5 °C

Temperature range for starting (1...100 °C)
Starting the determination is only possible if the current temperature is in the range of ±X °C from the sample temperature.

temp.correcture 0 °C

Temperature correction (0...±99.9 °C)
Correction for sample temperature, see page 55.

send to: IBM

Selection of the printer type/character set (Epson, Seiko, Citizen, HP, IBM)
"Epson" for Epson Mode
"Seiko", e.g. for DPU-414
"Citizen", e.g. for i560 RS
"HP" for HP mode
"IBM" for all printers with IBM character set table 437, as well as for data transmission to a computer or a data system.

report: OFF

Report output at the end of the automatic determination (OFF, ON)

Report example:

```
'fr
768 KF Oven          OD1/108  768.0010
  run number          1
  purge time          10 s
  cond.time           5 s
  smp1 heating time   587 s
  sample temp.        150 °C          Set temperature
  lowest temp.        147 °C          During sample heating
  highest temp.       150 °C          During sample heating
  gas type:           air
  gas flow            87 mL/min       Mean gas flow
=====
```

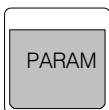
>auxiliaries**Inquiry group: Auxiliaries**

dialog:	english	<i>Selection of the dialog language (english, deutsch, francais, español)</i>
run number	0	<i>Current run number (0...9999) The run number is set to 0 when the oven is switched on.</i>
auto start	OFF	<i>Automatic, internal apparatus start (1...9999, OFF) Number of automatic starts.</i>
start delay	0 s	<i>Start delay (0...9999 s) Delay time following the start before the automatic determination begins. The wait time can be aborted with <QUIT>.</i>
beeper	1	<i>Audio signal (1...9, OFF) Number of beeps when the oven is ready.</i>
device label		<i>Device label for the individual identification of devices in the device network (up to 8 ASCII characters)</i>
program	768.0012	<i>Display of the program version</i>

>RS232 settings**Inquiry group: RS settings**

baud rate:	9600	<i>Baud rate (300, 600, 1200, 2400, 4800, 9600)</i>
data bit:	8	<i>Data bits (7, 8)</i>
stop bit:	1	<i>Stop bits (1, 2)</i>
parity:	none	<i>Parity (even, odd, none)</i>
handshake:	Hws	<i>Handshake (HWs, HWf, SWline, SWchar, none) see also page 31 ff.</i>
RS control:	ON	<i>Control via RS232 interface (OFF, ON) "OFF" means the receipt of commands and data via the RS232 interface is blocked. Data <u>output</u> is possible.</i>

2.3.3 <PARAM> key



Contains the parameters for the automatic determination. *live means: These parameters can be edited during the automatic determination.

temperature 50 °C

Sample temperature (50...300°C)
Temperature to which the sample is heated.

unit gas flow: mL/min

Unit for display of the gas flow (mL/min, L/h)
All displays and entries for the gas flow depend on the selected unit.

min. gas flow 5 mL/min

Minimum gas flow (0...999 mL/h or 0...59.9 L/h)
The automatic determination can be started only when the set minimum gas flow has been reached.

gas type: air

Selection of the carrier gas type (air, N2, other) or selection of the gas for moisture determinations in gas
If "other" is selected, the factor for the gas flow measurement must also be entered. The following values can be used as a basis for the factor:

Ar	1.456	Air	1.000
CH ₄	0.717	N ₂	0.999
CO ₂	0.738	N ₂ O	0.666
Natural gas	0.681	O ₂	0.992
He	1.456	Propane	0.357

purge time 0 s
*live

Purge time (0...99 999 s)
Wait time before the heating time, i.e. before the boat is slid into the oven. The valve remains on "PURGE".
The wait time can be aborted with <QUIT>.
The purge time should be used only when the cold sample evolves moisture with difficulty.

cond. time 0 s
*live

Conditioning time (0...99 999 s)
Wait time before the sample heating, i.e. before the boat is slid into the oven. The valve is switched to "TRANSFER".
The wait time can be aborted with <QUIT>.
The conditioning time should be used only when the cold sample evolves moisture with difficulty.

2.3.4 Special settings



+Switching ON

Switch the Oven OFF. Press key <CONFIG>, keep key pressed and switch the Oven ON again.

>lock

Locking keys

<configuration>	OFF	Key <CONFIG> (ON, OFF)
<parameters>	OFF	Key <PARAM> (ON, OFF)
<heater>	OFF	Key <HEATER> (ON, OFF)
<pump>	OFF	Key <PUMP> (ON, OFF)
<valve>	OFF	Key <VALVE> (ON, OFF)
<boat>	OFF	Key <BOAT IN> and <BOAT OUT> (ON, OFF)

>T controller

Factors for T controller of Oven

The controller is optimized, therefore it normally isn't necessary to change the following factors.

init.heat.factor	100 %	<p><i>Initial heating factor (0...200 %)</i></p> <p>Operative after the sample has been moved into the Oven. Set a lower value if the temperature is below the nominal temperature, and much above afterwards.</p>
add.heat.factor	100 %	<p><i>Additional heating factor (0...200 %)</i></p> <p>After the initial heating, the heating is controlled by measurements. Set a greater value if the temperature is not reached during too long a time. In this case, a higher "init.heat.factor" may also help.</p>

2.4 Practical tips

Sample introduction via top opening of the insert tube

This possibility can be used if several samples can be heated in succession in the same sample boat. Add samples to sample boat with a syringe or open screw cover.

Selection of the carrier gas

N₂ should always be used as the carrier gas when the hot sample is sensitive to air or oxygen and evolves substances which interfere with the KF reaction.

Temperature setting

Select temperature as high as the sample allows (high temperature = shorter analysis time): The sample must evolve no oxidizable substances except water.

Extraction time

An extraction time of ca. 2 min should be set on the attached titrator to prevent the titration being aborted before the sample evolves water.

Conditioning system

To condition the entire system (without sample boat and without sample) before the start, the valve can be set to "TRANSFER" at the KF Oven.

References

- Hydranal ® Practical Course, Riedel-deHaën, 1987
- G. Wieland, Karl Fischer Titration, GIT Verlag, Darmstadt, 1985
- Following Metrohm Application Bulletins (available free of charge):
 - No. 109 KF water determination with the KF Drying Oven
 - No. 145 Determination of low water contents in plastics
 - No. 217 KF water determinations in pharmaceutical preparations by the KF oven method.

3. Operation via RS232 interface

3.1 General rules

The 768 KF Oven has an extensive remote control facility that allows full control via the RS232 interface, i.e. the instrument can receive data from an external controller or it can send data to an external controller. C_R and L_F are used as terminators for the data transfer. The 768 KF Oven sends $2xC_R$ and L_F as termination of a data block, to differentiate between a data line which has C_R and L_F as terminator. The controller terminates its commands with C_R and L_F . If the controller sends more than one command per line, the character ';' is used as separator between the commands.

The commands are grouped logically and are simple to understand. Thus, e.g. for the selection of the dialog language the command

&Config.Aux.Language "english"

must be sent, but only the boldface characters need be inputted, thus

&C.A.L "english" .

The data groups of this order are:

Config	Entries for the configuration
Aux	Auxiliaries, various subjects
Language	Dialog language

The commands have a hierarchial structure (tree structure). The quantities that appear in this tree are called **objects** in what follows. The dialog language is an object that is called up with the command

&Config.Aux.Language "english"

If one is at the desired location in the tree, the value of the appropriate object can be queried:

&Config.Aux.Language "english" \$Q Q for Query

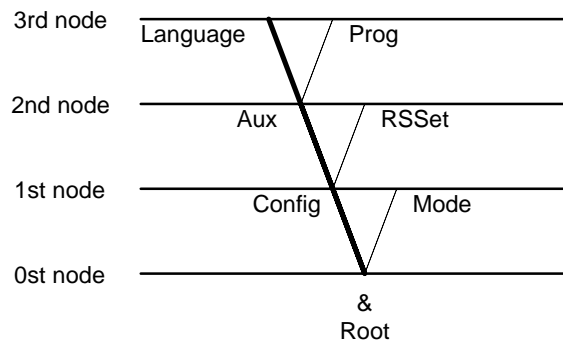
\$Q triggers the output of the value from the 768 KF Oven. Entries that are introduced with the character dollar (\$) trigger something. They are thus called **triggers** in what follows.

Values of objects can not only be requested, however, they can also be modified. Values are always entered in quotation marks ("), e.g.

&Config.Aux.Language "english"

3.1.1 Call up of objects

All objects are grouped hierarchically. They have a tree structure. A section of this tree is shown below:



Rules	Example
The root of the tree is designated with &.	
For the call up of an object the nodes (levels) of the tree are marked with a point (.).	
The call up of the objects requires as many letters as necessary to ensure unequivocal the object. If the call is not unequivocal, the first object in the series is recognized.	Call up of dialog language: &Config.Aux.Language or &C.A.L
Upper or lowercase letters can be used.	&C.A.L or &c.a.l
An object can be assigned a value. Each value is marked at the beginning and end with quotation marks ("). A value can contain up to 24 characters. Numeric values can include up to 6 digits, a negative sign and a decimal point. Numbers with more than 6 digits will not be accepted; more than 4 decimal places are rounded off. With numbers <1, it is necessary to enter leading zeros.	Input of dialog language: &C.A.L "english" Correct entry of a number: "0.1" Incorrect entry: "1,5" or "+3" or ".1"
If a new object is not called up, the old object remains current.	Input of a different dialog language: "deutsch"
New objects can also be addressed relative to old objects: A preceding point moves one node forwards in the tree.	From the root to node 'Aux': &C.A From node 'Aux' to 'Prog': .P
More than one preceding point moves one node backwards in the tree. n nodes backwards require n + 1 preceding points.	Jump from node 'Prog' to node 'Aux' and selection of a new object at this node: ..L
If a jump is to be made back to the root, a preceding & is entered.	Jump from node 'Language' via root to the node 'Mode': &M

3.1.2 Triggers

Triggers initiate an action at the KF Oven, e.g. starting of a mode or sending of data. Triggers are marked with the introducer: \$

The following triggers are possible:

\$G	Go:	Starts operations, e.g. start of the automatic determination or setting of the RS232 interface parameters
\$S	Stop:	Stops operations
\$Q	Query:	Used for inquiry of all information from the current node in the tree upwards up to and including the values
\$Q.P	Path:	Used for inquiry of the path from the root of the tree up to the current node
\$Q.H	Highest index:	Used for inquiry of the number of son nodes of the current node
\$Q.N ⁱ	Name:	Used for inquiry of the name of the son node with index i, i = 1...n
\$D	Detailed Info:	Used for inquiry of the detailed status
\$U	qUit:	Used to abort the data flow of the 768 KF Oven, e.g. after \$Q

The triggers \$ G and \$S are linked to objects, see overview table, pages 20ff.

The other triggers, however, can be used at any time and at all locations on the object tree.

Examples:

Inquiry of baud rate: **&Config.RSSet.Baud \$Q**

Inquiry of all values of the node RSSet: **&Config.RSSet \$Q**

Inquiry of the path of node RSSet: **&Config.RSSet \$Q.P**

Starting a mode: **&Mode \$G**

Inquiry of the detailed status: **\$D**

3.1.3 Status and error messages

Detailed status conditions

Status conditions of the global \$G:

\$G.Mode .Inac	Waiting during start delay
.PurgeTime	Waiting during purge time
.CondTime	Waiting during cond.time
.HeatSmpl	Heating the sample
.Terminate	Carrying out the terminating steps
\$G.Assembly .Prep.Wait	Heating the oven to the set temperature
.Boat	The sample boat has been manually moved

Status conditions of the global \$R:

\$R.Mode .Ready	Inactive: Ready to start an automatic determination
\$R.Assembly.Ready	An Assembly step has been carried out. Ready to carry out another Assembly step (&Mode \$G will trigger error message E31).

Status conditions of the global \$S:

The instrument gives the status from which it has been stopped. The detailed status information is therefore identical as for the global status \$G.

Error messages

RS receive errors:

E36	Parity error Exit: <QUIT> and set parity at both devices the same.
E37	Stop Bit Exit: <QUIT> and set stop bit at both devices the same.
E38	Overrun error. At least 1 character could not be read. Exit: <QUIT>.
E39	The internal receive buffer is full (>82 characters). Exit: <QUIT>.

RS send errors:	
E40	DSR=OFF. No proper handshake for more than 1 s. Exit: <QUIT>. Is the receiver switched on and ready to receive?
E41	DCD=ON. No proper handshake for more than 1 s. Exit: <QUIT>. Is the receiver switched on and ready to receive?
E42	CTS=OFF. No proper handshake for more than 1 s. Exit: <QUIT>. Is the receiver switched on and ready to receive?
E43	The transmission has been interrupted with XOFF for at least 3 s. Exit: Send XON or <QUIT>.
E44	The RS parameters are no longer the same for both devices. Reset.
E45	The receive buffer contains an incomplete command (L _F missing). Sending from the instrument is therefore blocked. Exit: Send L _F or <QUIT>.

Device-specific errors:	
E26	Manual stop. Exit: The error message disappears on the next start.
E135	Check temperature sensor of sample temperature. Exit: Rectify fault.
E154	Sample temperature not OK. Exit: The error message disappears when the fault is rectified or &M \$\$.
E163	Gas flow too low. Exit: The error message disappears when the fault is rectified or &M \$\$.
E164	The attached titrator is not conditioned. Exit: The error message disappears when the fault is rectified or &M \$\$.
E165	The oven temperature is higher than 360 °C. Exit: The error message disappears when the fault is rectified.
E168	The temperature sensor for the oven temperature is not OK. Exit: Rectify fault.
E169	The gas flow sensor is not OK (flow >500 mL/min). Exit: Rectify fault. Continuation is possible only when the minimum gas flow is set to 0 mL/min.

3.2 Remote control commands

3.2.1 Overview

&	Root		
Mode	Mode	\$G, \$S	3.2.2.1
.Temp	Sample temperature	50...300	3.2.2.2
.Gas	Gas flow		
.UnitFlow	Unit for display	mL/min, L/h	3.2.2.3
.MinFlow	Minimum gas flow	0...999	3.2.2.3
.Type			
.Select	Selection of the gas type	air, N2, other	3.2.2.4
.OtherFac	Factor for "other" gas	0.001...9.999	3.2.2.4
.PurgeTime	Purge time	0...99999	3.2.2.5
.CondTime	Conditioning time	0...99999	3.2.2.5
Config	Configuration		
.OvenSet	Oven settings		
.AutoPrep	Automatic preparation	ON, OFF	3.2.2.6
.ValveControl	Valve control	ON, OFF	3.2.2.7
.StartCond	Start allowed only if cond.ok	ON, OFF	3.2.2.7
.TempLimit	Starting temperature range	1...100	3.2.2.7
.TempCorr	Correction of sample temperature	0...±99.9	3.2.2.7
.CharSet	Selection of the character set	Epson, Seiko, Citizen, HP, IBM	3.2.2.8
.Report	Report output at end	ON, OFF	3.2.2.9
.Aux	Setting of various auxiliary functions		
.Language	Selection of the dialog language	english, deutsch, francais, espanol	3.2.2.10
.RunNo	Current run number	0...9999	3.2.2.11
.AutoStart	Internal automatic start	1...9999,OFF	3.2.2.12
.StartDelay	Start delay	0...9999	3.2.2.12
.Beeper	Beep	1...9, OFF	3.2.2.13
.DevName	Device name	8 ASCII	3.2.2.13
.Prog	Program version	read only	3.2.2.14
.RSSet	Settings for RS232	\$G	3.2.2.15
.Baud	Baud rate	(300...9600)	3.2.2.16
.DataBit	Data bits	7, 8	3.2.2.16
.StopBit	Stop bits	1, 2	3.2.2.16
.Parity	Parity	even, odd, none	3.2.2.16
.Handsh	Handshake	HWs, HWf, SWchar, SWline, none	3.2.2.16

&	Root		
Info	Information		
.Report	Sending of formatted reports	\$G	3.2.2.17
.Select	Selection of the report	configuration, parameters, result	3.2.2.18
.Results	Results of the determination		
.PurgeTime	Purge time	read only	3.2.2.19
.CondTime	Conditioning time	read only	3.2.2.19
.SmplHeatTime	Sample heating time	read only	3.2.2.19
.LowTemp	Lowest temp. during heating	read only	3.2.2.19
.HighTemp	Highest temp. during heating	read only	3.2.2.19
.GasFlow	Mean gas flow	read only	3.2.2.19
.LowFlow	Lowest flow during heating	read only	3.2.2.19
.HighFlow	Highest flow during heating	read only	3.2.2.19
.ActualInfo	Current information		
.Inputs	I/O lines, inputs		
.Status	Status of the lines	read only	3.2.2.20
.Change	Change in the status of the lines	read only	3.2.2.20
.Clear	Clears the change byte	read only	3.2.2.20
.Outputs	I/O lines, outputs		
.Status	Status of the lines	read only	3.2.2.20
.Change	Changing the status of the lines	read only	3.2.2.20
.Clear	Clears the change byte	read only	3.2.2.20
.Meas	Measured values		
.CyclNo	Cycle number	read only	3.2.2.21
.SampleTemp	Sample temperature	read only	3.2.2.21
.OvenTemp	Oven temperature	read only	3.2.2.21
.GasFlow	Gas flow	read only	3.2.2.21
.Status	Status of the assemblies		
.BoatPos	Position of the sample boat	read only	3.2.2.22
.Valve	Valve position	read only	3.2.2.22
.Pump	Pump	read only	3.2.2.22
.Heating	Heating power level	read only	3.2.2.22
.Display	Display		
.L1	1st line	24 ASCII	3.2.2.23
.L2	2nd line	24 ASCII	3.2.2.23
.Assembly	Assembly		
.CycleTime	Cycle time	read only	3.2.2.24
Assembly	Basic components of the assembly		
.Prep	Perform preparations	\$G, \$\$	3.2.2.25
.Heat	Heating on	\$G	3.2.2.26
.Value	Heating power level	0...50	3.2.2.26
.Valve	Set valve position	\$G	3.2.2.27
.Pos	Preselect position	purge, transfer	3.2.2.27
.Boat	Move sample boat	\$G, \$\$	3.2.2.28
.Rate	Moving rate	0.1...10	3.2.2.28
.Pos	Go to position	0...130.0	3.2.2.28
.SetPos	Set stop points		
.InPos	Inner stop	0...130.0	3.2.2.28
.OutPos	Outer stop	0...130.0v	3.2.2.28
.Pump	Switch pump on/off	\$G, \$\$	3.2.2.29
.Outputs	I/O lines, outputs		
.SetLines	Set lines	\$G	3.2.2.30
.L1	Line 1	active, inactive pulse, OFF	3.2.2.30
.			
.L8	All lines as L1		
.ResetLines	Set all lines inactive	\$G	3.2.2.30

&	Root		
Setup	Setting the operating mode		
.IdReport	Output report identification	ON, OFF	3.2.2.31
.KeyCode	Key code of pressed keys	ON, OFF	3.2.2.32
.Tree	Definition of response to \$Q		
.Short	Send short path name	ON, OFF	3.2.2.33
.ChangedOnly	Only paths with changed values	ON, OFF	3.2.2.33
.Trace	Message when values change	ON, OFF	3.2.2.34
.Lock	Lock functions		
.Keyboard	Lock all keys	ON, OFF	3.2.2.35
.Config	Lock <CONFIG> key	ON, OFF	3.2.2.35
.Parameter	Lock <PARAM> key	ON, OFF	3.2.2.35
.Heater	Lock <HEATER> key	ON, OFF	3.2.2.35
.Pump	Lock <PUMP> key	ON, OFF	3.2.2.35
.Valve	Lock <VALVE> key	ON, OFF	3.2.2.35
.Boat	Lock <BOAT IN/OUT> keys	ON, OFF	3.2.2.35
.Display	Lock display operation of 768	ON, OFF	3.2.2.35
.TController	Factors for temperature controller		
.InitHeatFactor	Initial heating factor	0...200	3.2.2.36
.AddHeatFactor	Heating after initial phase	0...200	3.2.2.36
.SendMeas	Automatic transmission of measurement data		
.SendStatus	On/off switching of transmission	ON, OFF	3.2.2.37
.Interval	Time interval for transmission	1...16200	3.2.2.37
.Meas	Measured values for transmission		
.CyclNo	Cycle number	ON, OFF	3.2.2.37
.SampleTemp	Sample temperature	ON, OFF	3.2.2.37
.OvenTemp	Oven temperature	ON, OFF	3.2.2.37
.GasFlow	Gas flow	ON, OFF	3.2.2.37
.AutoInfo	Automatic message on changes		
.Status	On/off of all set messages	ON, OFF	3.2.2.38
.P	When power is switched on	ON, OFF	3.2.2.38
.T	Messages of automatic determination		
.G	Status becomes "Go"	ON, OFF	3.2.2.38
.R	Status becomes "Ready"	ON, OFF	3.2.2.38
.S	Status becomes "Stop"	ON, OFF	3.2.2.38
.B	Beginning of sample heating	ON, OFF	3.2.2.38
.F	Finish of sample heating	ON, OFF	3.2.2.38
.E	Error message	ON, OFF	3.2.2.38
.I	Change of an I/O input	ON, OFF	3.2.2.38
.O	Change of an I/O output	ON, OFF	3.2.2.38
.PowerOn	Simulation "Power on"	\$G	3.2.2.39
.Initialise	Set values to default	\$G	3.2.2.40
.Select	Selection	Mode,Config,All Setup,Assembly	3.2.2.40
.RamInit	Initialisation	\$G	3.2.2.41
.InstrNo	Set instrument identification	\$G	3.2.2.42
.Value	Enter instrument identification	8 ASCII	3.2.2.42
.Save	Store in EEPROM	\$G	3.2.2.43

3.2.2 Description of the remote control commands

3.2.2.1	Mode	\$G, \$S
Start and stop (\$G, \$S) of the automatic determination.		
3.2.2.2	Mode.Temp	50...300
Entry of the sample temperature in °C.		
3.2.2.3	Mode.Gas.UnitFlow Mode.Gas.MinFlow	mL/min, L/h 0...5...999
.UnitFlow: Selection of the unit for display of the gas flow.		
.MinFlow: Setting of the minimum gas flow in the unit selected above. If the flow is less than the r		
3.2.2.4	Mode.Gas.Type.Select Mode.Gas.Type.OtherFac	air, N2, other 0.001...1...9999
.Select: Selection of the gas.		
.Factor: If "other" has been selected above, setting of the factor for measurement of the gas flow, factors see page 11.		
3.2.2.5	Mode.Gas.PurgeTime Mode.Gas.CondTime	0...99999 0...99999
.PurgeTime: Purge time with valve to "Purge". Entry in s.		
.CondTime: Conditioning time with valve to "Transfer". Entry in s.		
3.2.2.6	Config.OvenSet.AutoPrep	ON, OFF
ON means: Automatic heating and preparation of the oven after switching on.		
3.2.2.7	Config.OvenSet.ValveControl Config.OvenSet.StartCond Config.OvenSet.TempLimit Config.OvenSet.TempCorr	ON, OFF ON, OFF 1...5...100 0...±99.9
<ul style="list-style-type: none"> • ValveControl: ON means automatic switching of the valve from PURGE to TRANSFER at the end of the determination. • StartCond: ON means: Insert sample boat during automatic determination only if the connected device is conditioned (input line pin 12 of the socket "Remote" active). • TempLimit: Starting a determination is possible only if the current temperature is in the range of ±X °C from the sample temperature. • TempCorr: Correction of the sample temperature according to individual sample and Oven requirements. 		

- 3.2.2.8 **Config.OvenSet.CharSet** Epson, Seiko, Citizen,
HP, **IBM**
- Selection of the character set.
IBM means IBM character set according to character set table 437. Select "IBM" for work with the computer.
- 3.2.2.9 **Config.OvenSet.Report** ON, **OFF**
- ON means: Output of a report at the end of the automatic determination.
- 3.2.2.10 **Config.Aux.Language** **english**, deutsch, francais, español
- Selection of the dialog language.
- 3.2.2.11 **Config.Aux.RunNo** 0...9999
- Current run number.
Is set to 0 on power on and on initialisation. Counting starts again at 1 after 9999 has been reached.
- 3.2.2.12 **Config.Aux.AutoStart** 1...9999, **OFF**
Config.Aux.StartDelay 0...9999
- .AutoStart: Number of automatic, internal starts for automatic determinations.
.StartDelay: Start delay time in s. During this time, the data of the preceding determination are retained.
- 3.2.2.13 **Config.Aux.Beeper** 1...9, OFF
Config.Aux.DevName up to 8 ASCII characters
- Number of beeps if the Oven is ready and after the determinations.
Name of the device for interconnections with several devices. It is advisable to use only the characters A...Z (ASCII No. 65...90), a...z (ASCII No. 97...122) and 0...9 (ASCII No. 48...57) if the Setup.AutoInfo function (see 3.2.2.38) has been activated at the same time.
- 3.2.2.14 **Config.Aux.Prog** read only
- Output of the program version.
In response to \$Q, the KF Oven sends: "5.768.0010".
- 3.2.2.15 **Config.RSSet** \$G
- \$G sets all RS settings. After setting the interface parameters, wait at least 2 s to allow the components to equilibrate.
- 3.2.2.16 **Config.RSSet.Baud** 300, 600, 1200, 2400, 4800, **9600**
Config.RSSet.DataBit 7, **8**
Config.RSSet.StopBit 1, **2**
Config.RSSet.Parity even, odd, **none**
Config.RSSet.Handsh **HWs**, HWf, SWchar, SWline, none
- Setting of the RS interface parameters: Baud rate, data bits, stop bits, parity and type of handshake, see also page 31.
Setting of the values must be initiated immediately following the entry with &Config.RSSet \$G, see 3.2.2.15.

3.2.2.17 **Info.Report** \$G

Output of the selected report.

3.2.2.18 **Info.Report.Select** configuration, parameters, result

Selection of the report.

configuration: Configuration report. Not accessible when a determination is running.

parameters: Parameter report. Only "live" parameters when a determination is running.

result: Result report of the last completed determination.

The report output must be triggered with &Info.Report \$G, see 3.2.2.17.

Reports which are sent automatically by the KF Oven start with a space (ASCII 32) and '.

This is followed by the individual identification for each report. Reports which are requested via RS232 (\$G) have the same individual identification of the report blocks, but are started with ' only (no preceding space).

3.2.2.19	Info.Results.PurgeTime Info.Results.CondTime Info.Results.SampleHeatTime	read only read only
	Info.Results.LowTemp Info.Results.HighTemp Info.Results.GasFlow Info.Results.LowFlow Info.Results.HighFlow	read only read only read only read only read only

Inquiry of the current results.

.PurgeTime: Purge time.

.CondTime: Conditioning time.

.SampleHeatTime: Time during which the sample has been heated.

.LowTemp: Lowest temperature during the sample heating.

.HighTemp: Highest temperature during the sample heating.

.GasFlow: Mean gas flow during the sample heating.

.LowFlow: Lowest gas flow during the sample heating.

.HighFlow: Highest gas flow during the sample heating.

3.2.2.20	Info.ActualInfo.Inputs.Status Info.ActualInfo.Inputs.Change Info.ActualInfo.Inputs.Clear Info.ActualInfo.Outputs.Status Info.ActualInfo.Outputs.Change Info.ActualInfo.Outputs.Clear	read only read only \$G read only read only \$G
----------	---	--

Status sends the current status of the I/O lines. Change sends information regarding whether a change in the status of a line has taken place since it was last cleared, Clear clears the byte of Change.

For the output, the byte is converted to binary, e.g.

Line No.	0 0 0 0 1 0 1 0	Output: $2^1 + 2^3 = "10"$
	7 6 5 4 3 2 1 0	

1 means ON or change; 0 means OFF or no change.

The lines are assigned as follows (see also pages 53, 54):

Inputs:

0 Start (Pin 21)

1 Stop (Pin 9)

2 Terminate (Pin 22)

3 Pin 10

4 Pin 23

5 Pin 11

6 Pin 24

7 Cond.ok (Pin 12)

Outputs:

0 Ready (Pin 5)

1 Start (Pin 18)

2 Stop (Pin 4)

3 HeatSmpl (Pin 17)

4 Terminate (Pin 3)

5 Error (Pin 16)

6 Pin 1

7 Pin 2

3.2.2.21	Info.ActualInfo.Meas.CyclNo Info.ActualInfo.Meas.SampleTemp Info.ActualInfo.Meas.OvenTemp read only Info.ActualInfo.Meas.GasFlow read only	read only read only
----------	---	------------------------

Inquiry of the current values.

NV: Not Valid.

If the measured value is exceeded, OV (overrange) is sent.

A time frame can be generated from the cycle number and the cycle time (see 3.2.2.24).
The cycle number is always zeroed on start and on termination of an automatic determination.

3.2.2.22	Info.ActualInfo.Status.BoatPos read only Info.ActualInfo.Status.Valve read only Info.ActualInfo.Status.Pump read only Info.ActualInfo.Status.Heating read only
----------	---

Status inquiry of the individual assemblies in the following format (examples):

.BoatPos	Position of the sample boat	23 mm
.Valve	Position of the valve	"purge" or "transfer"
.Pump	Status of the pump	"ON" or "OFF"
.Heating	Heating level	20

3.2.2.23	Info.ActualInfo.Display.L1 Info.ActualInfo.Display.L2	up to 24 ASCII characters up to 24 ASCII characters
----------	--	--

1st and 2nd line of the display. The display can be written to.

The display is not operated by the KF oven if &Setup.Lock.Display is set to ON, see

3.2.2.35.

\$Q sends the contents of the corresponding display line.

3.2.2.24	Info.Assembly.CycleTime	read only
----------	--------------------------------	-----------

Inquiry of the cycle time in s.

3.2.2.25	Assembly.Prep	\$G, \$\$
----------	----------------------	-----------

Switch heating to the sample temperature on/off.

3.2.2.26	Assembly.Heat Assembly.Heat.Value	\$G 0...50
----------	--	---------------

Control heating. The set heating power level is started with &Assembly.Heat \$G.

0 means switch off heating.

3.2.2.27	Assembly.Valve Assembly.Valve.Pos	\$G purge, transfer
----------	--	------------------------

Set valve. The selected position is set with &Assembly.Valve \$G.

3.2.2.28	Assembly.Boat Assembly.Boat.Rate Assembly.Boat.Pos Assembly.Boat.SetPos.InPos Assembly.Boat.SetPos.OutPos	\$G, \$\$ 0.1...10 0...130.0 0...130.0 0...130.0
----------	--	--

The movements of the sample boat are initiated with &Assembly.Boat \$G.

.Rate: Rate in mm/s
 .Pos: Position moved to with &Assembly.Boat \$G, in mm. The inputted position is moved to irrespective of the limits set in &Assembly.Boat.SetPos.
 .SetPos: Limits for the movement of the boat in automatic determinations and for manual operation.
 .InPos: Inner stop in mm.
 .OutPos: Outer stop in mm.

3.2.2.29 **Assembly.Pump** \$G, \$\$
 Switch pump on/off.

3.2.2.30 **Assembly.Outputs.SetLines** \$G
Assembly.Outputs.SetLines.L1 active, inactive, pulse, **OFF**
 up to .L8
Assembly.Outputs.ResetLines \$G

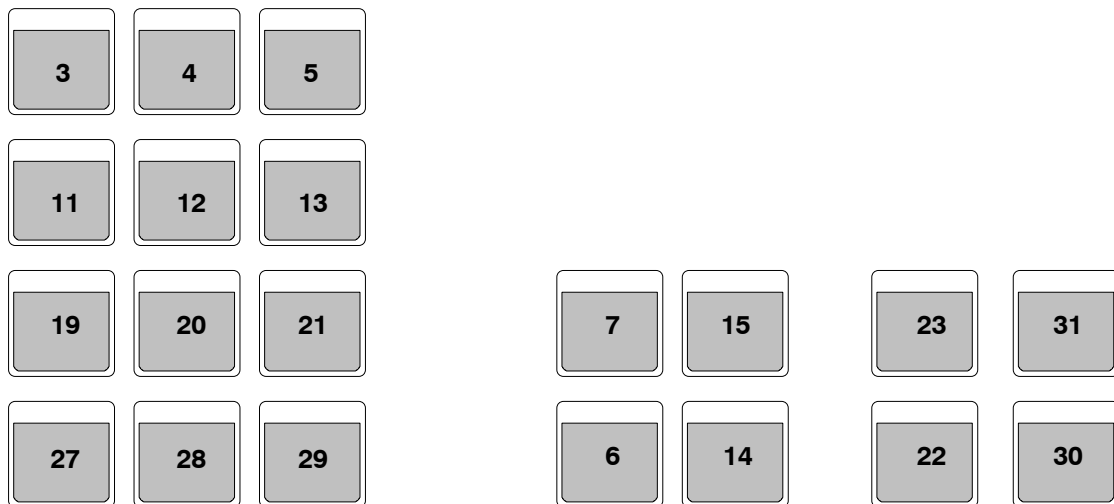
Setting of the output lines of the "Remote" socket.

.SetLines: All lines are set with \$G.
 .SetLines.L1: Setting of line 1. "active" sets a static signal (0 V), "inactive" resets the signal (+5 V), "pulse" means a pulse of length of ca. 150 ms and with "OFF" the corresponding line is not controlled.
 Assignment of the lines, see 3.2.2.20.
 up to .L8
 .ResetLines: Lines L1...L8 are set to the inactive condition (+5 V).

3.2.2.31 **Setup.IdReport** **ON, OFF**
 Switch output of the report identification on/off.

3.2.2.32 **Setup.Keycode** **ON, OFF**

With ON the key code of a key pressed on the KF Oven is outputted. The key code comprises 2 ASCII characters see below. Space (ASCII 32) and # are sent as introducers. Example : #11



3.2.2.33 **Setup.Tree.Short** **ON, OFF**
Setup.Tree.ChangedOnly **ON, OFF**

Definition of the response to an inquiry with \$Q.

.Short: With ON all path names are sent, but only with the requisite number of characters. Requisite number of characters means the path is unequivocally characterised (characters printed in boldface in the instructions for use).

.ChangedOnly: Sends only those paths and their values which have once been edited. All path names are sent in absolute terms, i.e. from the root.

3.2.2.34 **Setup.Trace** ON, OFF

The KF Oven reports when a value has been confirmed with <ENTER> at the KF Oven.

Space (ASCII 32) and & are sent as introducers.

Example: &Mode.Temp"100"

3.2.2.35	Setup.Lock.Keyboard	ON, OFF
	Setup.Lock.Config	ON, OFF
	Setup.Lock.Parameter	ON, OFF
	Setup.Lock.Heater	ON, OFF
	Setup.Lock.Pump	ON, OFF
	Setup.Lock.Valve	ON, OFF
	Setup.Lock.Boat	ON, OFF
	Setup.Lock.Display	ON, OFF

ON means locking of the corresponding function:

.Keyboard: Locking all keys at the KF Oven.

.Config: Locking the <CONFIG> key.

.Parameter: Locking the <PARAM> key.

.Heater: Locking the <HEATER> key.

.Pump: Locking the <PUMP> key.

.Valve: Locking the <VALVE> key.

.Boat: Locking the <BOAT IN> and <BOAT OUT> keys.

.Display: Locking the display, it is not operated by the device program of the KF Oven and can be written to by the computer.

3.2.2.36	Setup.TController.InitHeatFactor	0... 100 ...200
	Setup.TController.AddHeatFactor	0... 100 ...200

Factors for the temperature controller, see page 12.

3.2.2.37	Setup.SendMeas.SendStatus	ON, OFF
	Setup.SendMeas.Interval	1... 4 ...16200
	Setup.SendMeas.Meas.CyclNo	ON, OFF
	Setup.SendMeas.Meas.SampleTemp	ON, OFF
	Setup.SendMeas.Meas.OvenTemp	ON, OFF
	Setup.SendMeas.Meas.GasFlow	ON, OFF

.SendStatus: ON means automatic transmission of measured values (see below) at the inputted time interval.

.Interval: Time interval for the transmission of associated measured values defined below.

Selection of the values which are transmitted at the set time interval.

.CyclNo: Cycle number. Together with the cycle time (3.2.2.24), a time frame can be generated. The other data are part of the corresponding cycle number. The cycle number is always zeroed at the start and termination of the automatic determination.

.SampleTemp: Associated sample temperature.

.OvenTemp: Associated oven temperature.

.GasFlow: Associated gas flow.

Format of the transmitted values (examples):

.CyclNo	Cycle number	127
.SampleTemp	Sample temperature in °C	150.0
.OvenTemp	Oven temperature in °C	170.0
.GasFlow	Gas flow in mL/min or L/h	100.5

NV: Not Valid.

If the measured value is exceeded, OV (overrange) is sent.

The associated values are sent on 1 line separated by a space (ASCII 32).

3.2.2.38	Setup.AutoInfo.Status Setup.AutoInfo.P Setup.AutoInfo.T.G Setup.AutoInfo.T.R Setup.AutoInfo.T.S Setup.AutoInfo.T.B Setup.AutoInfo.T.F Setup.AutoInfo.T.E Setup.AutoInfo.I Setup.AutoInfo.O	ON, OFF ON, OFF ON, OFF ON, OFF ON, OFF ON, OFF ON, OFF ON, OFF ON, OFF ON, OFF
----------	---	--

Automatic message as soon as a change appears.

.Status: Switches all set AutoInfos on/off.

.P: PowerOn: Simulation PowerOn has been performed (3.2.2.39). No message on power on.

.T.G: Go: Automatic determination has been started.

.T.R: Ready: Automatic determination has been ended.

.T.S: Stop: An automatic determination has been stopped.

.T.B: Begin: In the automatic determination, the sample heating begins.

.T.F: Final: End of the sample heating in the automatic determination.

.T.E: Error: Message together with error number.

.I: Change in an input line of the "Remote" socket.

.O: Change in an output line of the "Remote" socket.

Each message is sent with space (ASCII 32) and ! as introducers. The name of the device is then sent (3.2.2.13). Special ASCII characters in the device name are ignored. If no device name has been entered, only ! is sent.

This is followed by information regarding the node which initiated the message. In the case of errors, the error number is sent.

Examples:

!Otto".T.G" Device Otto has been started.

!".T.E;E26" Device without a name has error E26.

3.2.2.39 **Setup.PowerOn** \$G

Simulation of power on. The device has the same status as after power on: The boat is in position 0 and the sample number on 0.

3.2.2.40 **Setup.Initialise** \$G
 Setup.Initialise.Select **Mode, Config, All, Setup, Assembly**

Sets default values for the following areas:

Mode: Branch Mode.

Config: Branch Config.

All: Values of the entire tree.

Setup: Branch Setup.

Assembly: Branch Assembly.

The action is initiated with &Setup.Initialise \$G.

3.2.2.41 **Setup.RamInit** \$G

Initialises the device as in the diagnostic test, see page 42: All parameters are set to the default value and error messages are cleared.

3.2.2.42 **Setup.InstrNo** \$G
Setup.InstrNo.Value up to 8 ASCII

Device identification outputted in the report. The serial number and manufacturing number are entered here in the factory as an unequivocal identification.

3.2.2.43 **Setup.Save** \$G

All entries made via RS232 must be saved with &Setup.Save \$G before the instrument is switched off to avoid losses.

3.3 Characteristics of the RS232 interface

3.3.1 Data transfer protocol

The KF Oven is configured as DTE (Data Terminal Equipment).

The RS232 interface has the following technical specifications:

Data interface in accordance with the RS232C standard, with selectable parameters.

Max. line length: 80 characters + C_R + L_F

Control characters: C_R (ASCII DEC 13)
 L_F (ASCII DEC 10)
 XON (ASCII DEC 17)
 XOFF (ASCII DEC 19)

Cable length: max. ca. 15 m

Start	7 or 8 data bits	Parit.bit	1 or 2 stop bit(s)
-------	------------------	-----------	--------------------

For interconnections of the 768 KF Oven with non-Metrohm units, only a shielded data cable (e.g. METROHM D.104.0201) may be used. The cable shielding must be faultlessly earthed at both units (pay attention to current loops; always use star-head earthing). Only connectors with adequate shielding may be used (e.g. METROHM K.210.0001 with K.210.9004).

3.3.2 Handshake

3.3.2.1 Software handshake, SWChar

Handshake inputs at the Oven (CTS, DSR, DCD) are not checked.

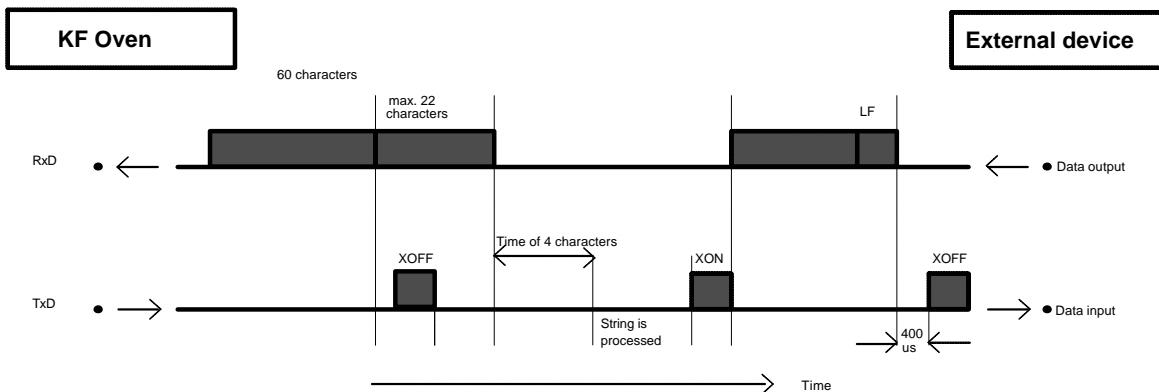
Handshake outputs (DTR, RTS) are set by the Oven.

As soon as a L_F is recognized, the Oven sends XOFF. It can then receive 6 extra characters and store them.

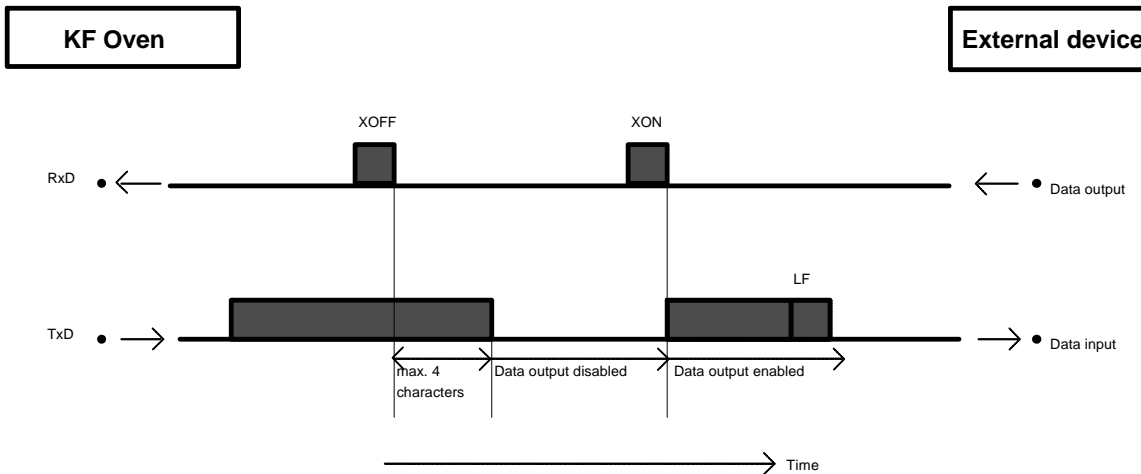
However, the Oven also sends XOFF, if its input buffer contains 60 characters. After this, it can receive maximum 22 extra characters (incl. L_F).

If the transmission is interrupted for the time of 4 characters after the Oven has sent XOFF, the string received earlier is processed even if no L_F has been sent.

Oven as **receiver**:



KF Oven as **sender**:



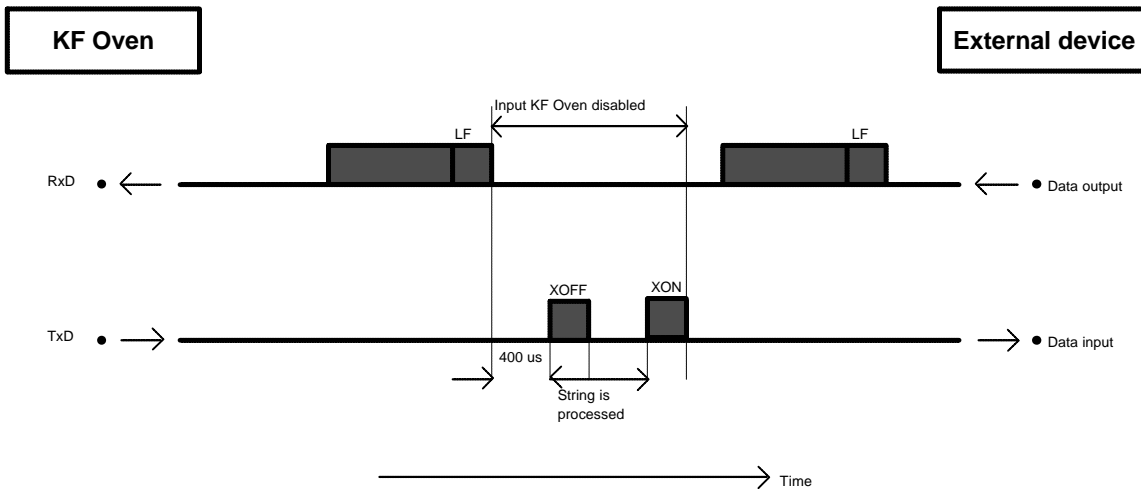
3.3.2.2 Software Handshake, SWline

Handshake inputs at the KF Oven (CTS, DSR, DCD) are not checked.

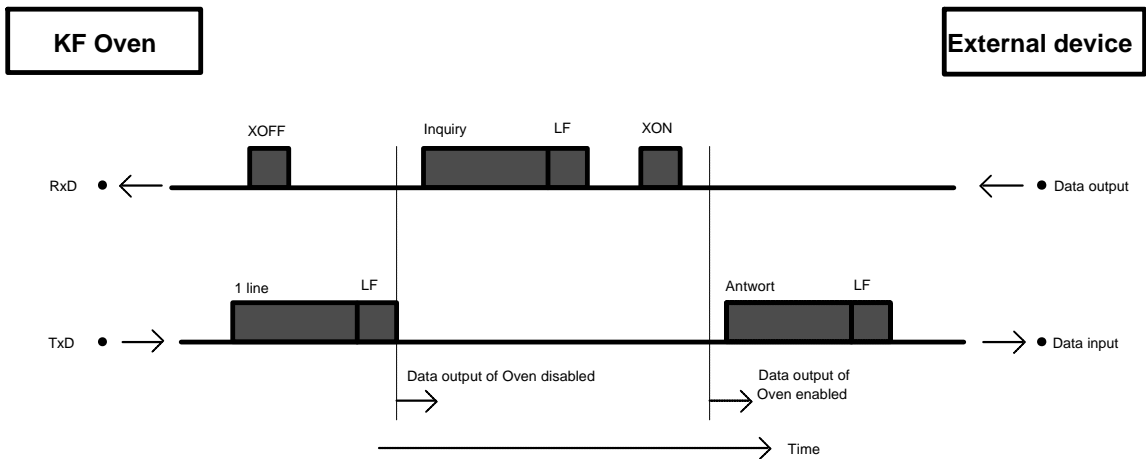
Handshake outputs (DTR, RTS) are set by the Oven.

The Oven is equipped with an input buffer that can accommodate a string of up to 80 characters + C_R LF. As soon as an LF is recognized, the Oven sends XOFF. After this, it can receive maximum 6 extra characters and store them. The string sent previously is now processed by the Oven. Afterwards, the Oven sends XON and is again ready to receive.

KF Oven as **receiver**:



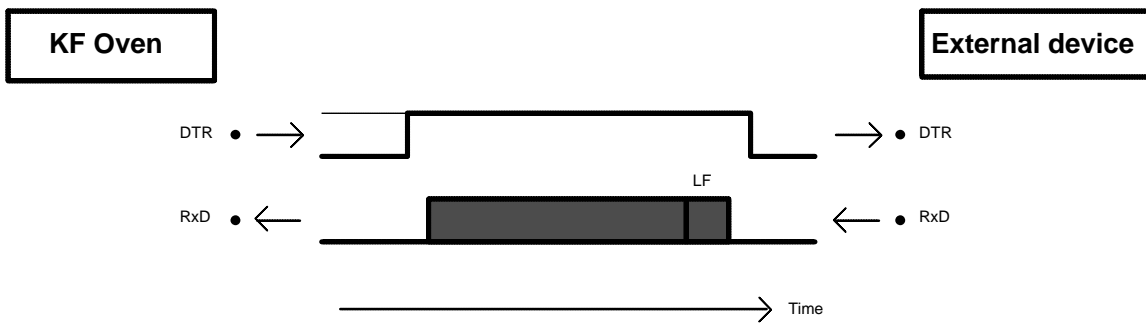
KF Oven as **sender**:



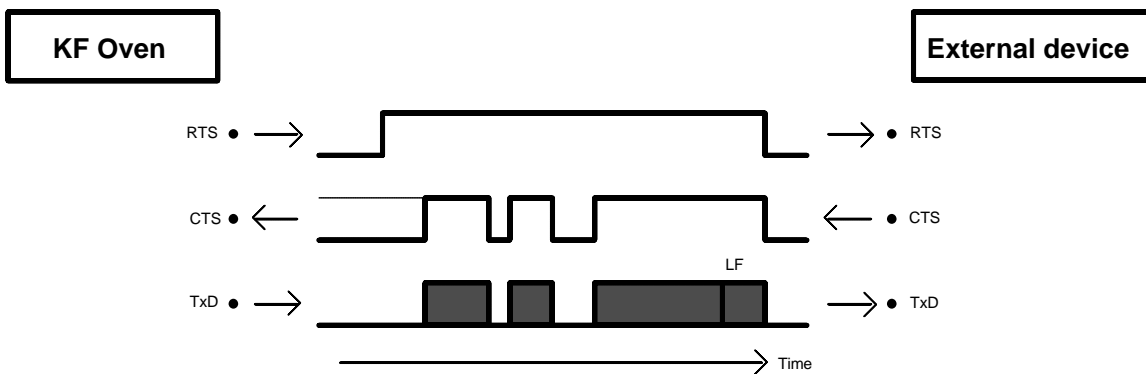
The transmission of the Oven can be stopped by the external device with XOFF. After receipt of XOFF, the Oven completes transmission of the line already started. If the data output is disabled for more than 3 s by XOFF, E43 appears in the display.

3.3.2.3 Hardware handshake, HWs

KF Oven as **receiver**:



KF Oven as **sender**:

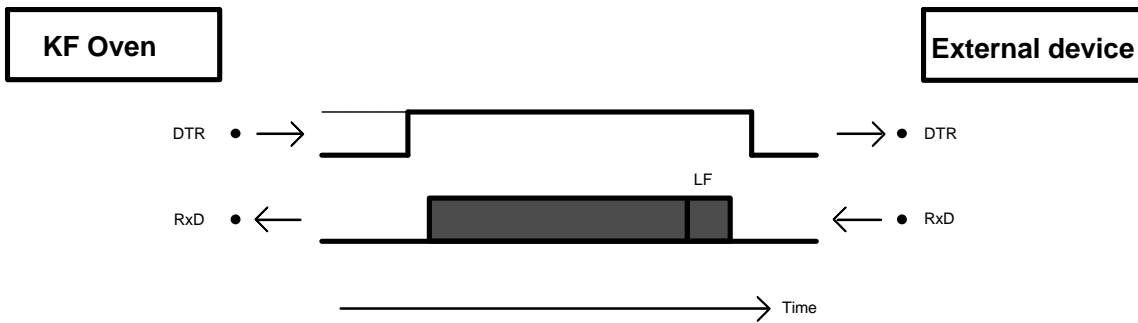


The data flow can be interrupted by deactivation of the CTS line.

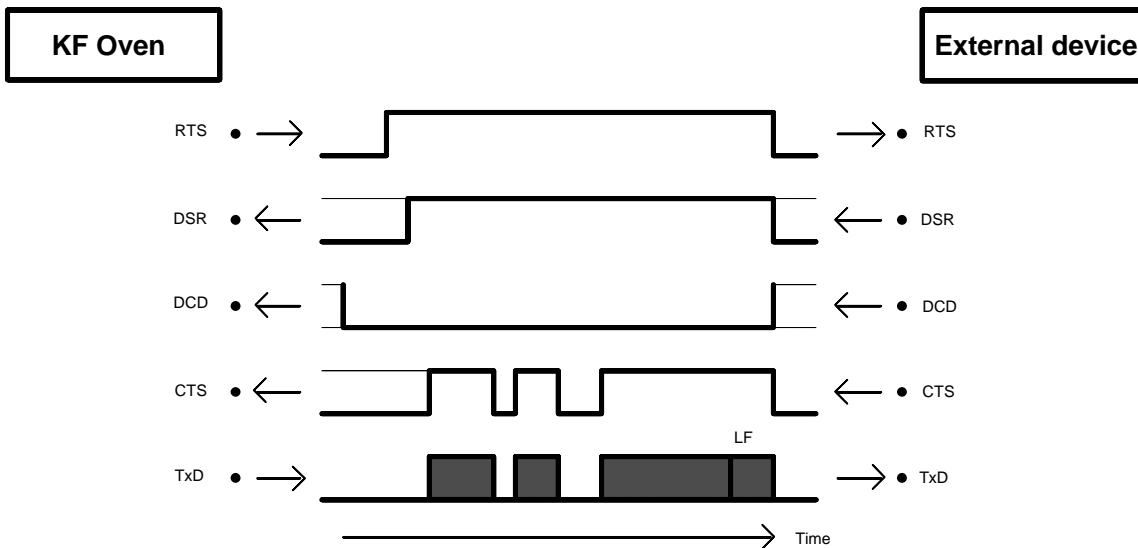
3.3.2.4 Hardware handshake, HWf

All handshake inputs are checked at the Oven, handshake outputs are set.

KF Oven as **receiver**:

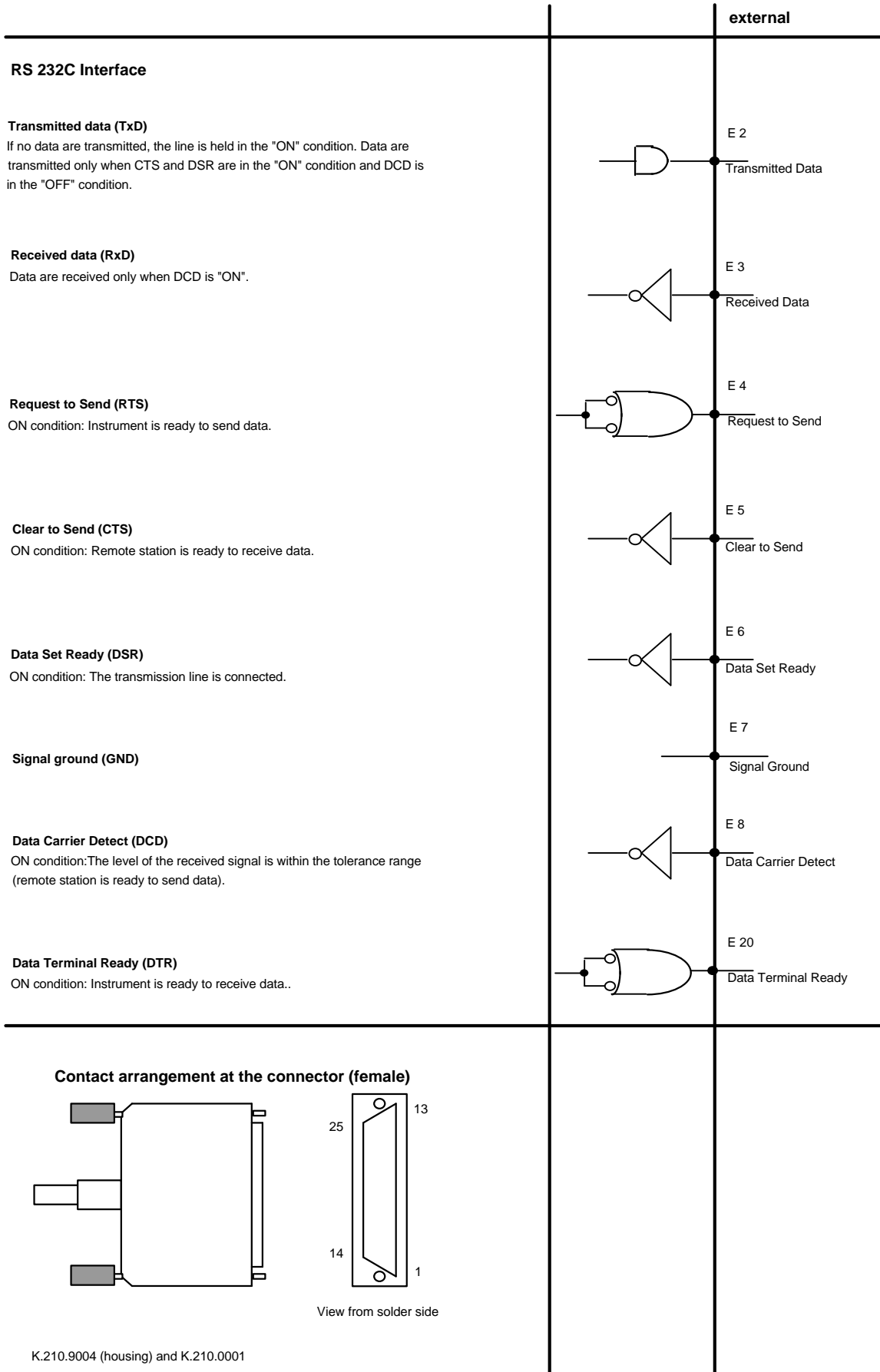


KF Oven as **sender**:



The data flow can be interrupted by deactivation of the CTS line.

3.3.3 Pin assignment



Protective earth

Direct connection from cable connector to protective earth of instrument.

Polarity allocation of the signals

- Data lines (TxD, RxD)
 - Voltage negative (<-3 V): Signal status "ONE"
 - Voltage positive (>+3 V): Signal status "ZERO"
- Control or message lines (CTS, DSR, DCD, RTS, DTR)
 - Voltage negative (<-3 V): OFF status
 - Voltage positive (>+3 V): ON status

In the transition region from +3 V to -3 V the signal status is undefined.

14C88 Driver, 14C89 Receiver, in compliance with EIA RS232C specifications.

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

4. Troubleshooting, rectification of malfunctions

4.1 Troubleshooting

Problem	Remedial action
Large scatter in the titration results.	<ul style="list-style-type: none"> • Do not touch sample boat and guide rod with your fingers. Use holding clamp or fit cut rubber tubing over your fingers. • Dry sample boat well before use and store it in a desiccator. • Are the molecular sieves of the drying flasks exhausted? (If the molecular sieves in the flask to the right are still OK, this can be used as the left flask. The "freshest molecular sieves" belong in the right flask.) • Condensate in the outlet tubing. Increase gas flow or use 6.1830.000 Heatable Outlet Tubing. • Gas flow too high so that titrant solution is sprayed onto the walls of the titration vessel? • Grind sample before weighing and spread over sample boat as evenly as possible. • Has the sample given off all its moisture? Set "stricter" shut-off conditions on the titrator: Lower stop drift, higher shut-off delay time. • Check if all tubing connections are tight.
Drift too high.	<ul style="list-style-type: none"> • Are the molecular sieves of the drying flasks exhausted? (If the molecular sieves in the flask to the right are still OK, this can be used as the left flask. The "freshest molecular sieves" belong in the right flask.) • Are the O-rings of the titration cell still OK? • Is the septum in the screw cap still OK? • Do not touch sample boat and guide rod with your fingers. Use holding clamp or fit cut-off rubber tubing over your finger. • When working with the oven, reclose cover of the insert tube as quickly as possible.
Titration times too long.	<ul style="list-style-type: none"> • Use 6.1830.000 Heatable Outlet Tubing. • Grind sample before weighing and spread over sample boat as evenly as possible. • Increase sample temperature. • Increase gas flow.

Problem	Remedial action
Titration times differ widely.	<ul style="list-style-type: none"> • Grind sample before weighing and spread over sample boat as evenly as possible. • Position the Oven at a location where it is protected against draughts and direct sunlight.
The titrator does not switch off.	<ul style="list-style-type: none"> • Grind sample before weighing and spread over sample boat as evenly as possible. • The sample decomposes and evolves oxidizable substances: Lower temperature, possibly use N₂ as carrier gas.
Gas does not reach titration vessel.	<ul style="list-style-type: none"> • Tube blocked by molecular sieve? • Inlet of a drying flask blocked by molecular sieve? • Switch valve to "TRANSFER" and possibly increase gas flow. • Are the cover of the insert tube and the sample inlet at the top closed properly? • Are all tubing connections tight?
No gas flow although the pump is adjusted or another gas is connected.	<ul style="list-style-type: none"> • Tube blocked by molecular sieve? • Inlet of a drying flask blocked by molecular sieve? • Firmly tighten all tubing connections. • Has the tubing been connected at the rear of the oven?
Error message "conditioning not ok" although the attached titrator is conditioned.	<ul style="list-style-type: none"> • Is the connecting cable to the titrator plugged in properly? On interconnection with Titrinos, check that the cable ends have not been mixed up!

4.2 Error messages

check T-sensor	The temperature sensor for the sample temperature is not plugged in or is faulty or the cable is faulty. Remedial action: Rectify fault.
conditioning not ok	The connected titrator is not conditioned. The fault disappears when the conditioning message of the titrator appears (pin 12 of the "Remote" socket is active) and the determination is automatically continued. If no Metrohm titrator is connected, work should be performed with "start if cond ok: off" (<CONFIG> key, >oven settings). In the case of interconnections with Titrimos, check that the cable ends are plugged in properly.
gas flow sensor	The gas flow sensor is not OK (flow > 500 mL/min). The display shows OV (overrange) instead of the gas flow. Remedial action: Call Metrohm service. Work can be continued for a short period: Set min. gas flow to 0 mL/min (<PARAM> key).
gas flow too low	The gas flow is lower than the set minimum. Exit: <STOP>, switch on pump or open or change gas cylinder of the carrier gas. Set gas flow when the Oven is hot.
manual stop	The automatic determination has been interrupted manually with <STOP>. Exit: <QUIT>
Oven T-sensor	The oven temperature sensor is not OK. Remedial action: Call Metrohm service.
system error 3	The instrument adjustment data have been overwritten. Exit: <CLEAR>. Default adjustment data are set. The error message appears each time the instrument is switched on until it has been readjusted (Metrohm service).
temp.above 360 °C	The oven temperature is higher than 360 °C. The heating is switched off automatically as the heating tube could be damaged. The heating is switched on automatically when the oven temperature is again <360 °C.
temperature not ok	The current temperature is outside of the starting range. Exit: <STOP> or wait until the temperature is attained. The automatic determination can be started when the "READY" lamp is on continuously. If, despite this, you wish to proceed with sample heating, work can be performed manually: Set valve to "TRANSFER", move boat into the oven with the <BOAT IN> key and start the titration.

4.3 Troubles with a connected printer

Problem	Questions for remedial action
No characters can be received on a connected printer.	<ul style="list-style-type: none"> • Are the instruments switched on and the connection cables plugged in properly? • Is the printer set to "on-line" and (if necessary) to "serial"? • Is the handshake set properly? <p>If everything appears to be in order, try to print out a report with the key sequence <PRINT><PARAM><ENTER>. If this report is printed out correctly, check whether under the key <CONFIG>, >Oven settings, a report is preselected.</p>
No data transmission occurs and the display of the Oven shows an error message.	<ul style="list-style-type: none"> • E40-42: Transmission error. Is the cable properly wired and connected? Is the printer switched on and set to "on-line"? • E43: Data output of the Oven disabled for longer than 3 s by XOFF.
The received characters are garbled.	<ul style="list-style-type: none"> • Are the data bit and parity settings the same for both devices? • Is the baud rate setting the same for both devices? • Has the correct printer been selected?

4.4 Flow test

1. Switch pump ON, key <PUMP>.
2. Turn gas flow control anticlockwise (setting of max. flow). You should have a flow of at least 400 mL/min or 24.0 L/h, resp.
3. Screw off the short tubing at the rear of the Oven (outlet "Air out") and seal the outlet with your finger. The display should read 0 mL/min or 0 L/h, resp.
4. Screw the tubing onto the outlet again and set the gas flow as for your applications.

4.5 Check of valve functions

The following test shows if the valve switches correctly:

1. Switch pump ON, key <PUMP>, and adjust a flow of app. 200 mL/min.
2. Set the valve to "TRANSFER", key <VALVE>. LED "TRANSFER" is ON.
3. Check the air flow at the end of the insert tube. The feeble air flow should be perceivable on the moistened back of your hand.
4. Switch the valve to "PURGE", key <VALVE>. LED "PURGE" is ON.
5. Check the air flow at the outlet with the dust filter at the rear of the Oven.

4.6 Initializing the RAM

On the odd case, the RAM of the Oven has to be initialized. After the RAM initialization, all values are reset to their standard values. You should therefore document your settings if possible. Print the following reports:

Parameters <PRINT><PARAM><ENTER>

Configuration <PRINT><CONFIG><ENTER>

RAM initialization

1. Switch off Oven.
2. Switch Oven on again and press key <9> at the same time. The display shows:


```
diagnose
>RAM Initialization
```
3. Press key <ENTER>. The display shows:


```
>RAM Initialization
Select:      MODE
```

Select the part that should be initialized. Try first to initialize the part "Setup" only. If this doesn't help, reenter into the diagnose (steps 1-3) and select "All".

The selections mean:

Mode	Sets default values in key <PARAM>
Config	Sets default values in key <CONFIG>
Setup	Sets default values in branch "Setup", see page 22.
Assembly	Sets default values in branch "Assembly", see page 21.
All	Sets default values for all device settings.
4. Press key <ENTER>. The initialization will be carried out. Afterwards the display shows:


```
diagnose
>RAM Test
```
5. Leave with <QUIT>.
6. Reenter your configuration data and your parameters.

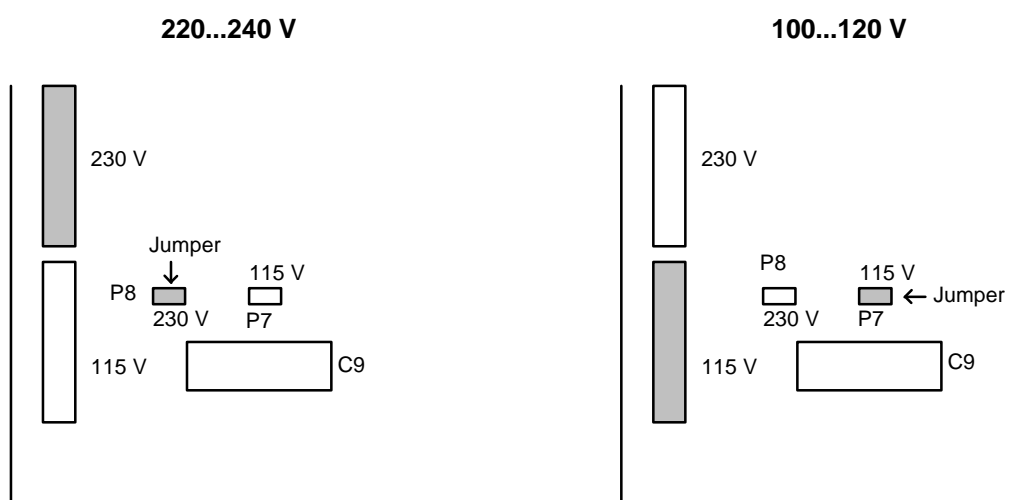
5. Preparations

Ensure that the set operating voltage matches the mains voltage before you switch the apparatus on.

If this is not the case, the **operating voltage** must be changed over:

1. Disconnect mains plug. Detach all tubing and cable connections to the oven. Take out drying flasks.
2. Unscrew the 3 screws at the bottom of the oven at the front.
3. Unscrew the 3 screws at the green edge at the rear of the oven.
4. Carefully lift off top part of oven and lower to the front.
5. The connectors on the board in the vicinity of the power supply unit must be plugged in as follows:

View of the board from above



The white connector on the left is plugged into the appropriate socket.

The jumpers are changed over using tweezers.

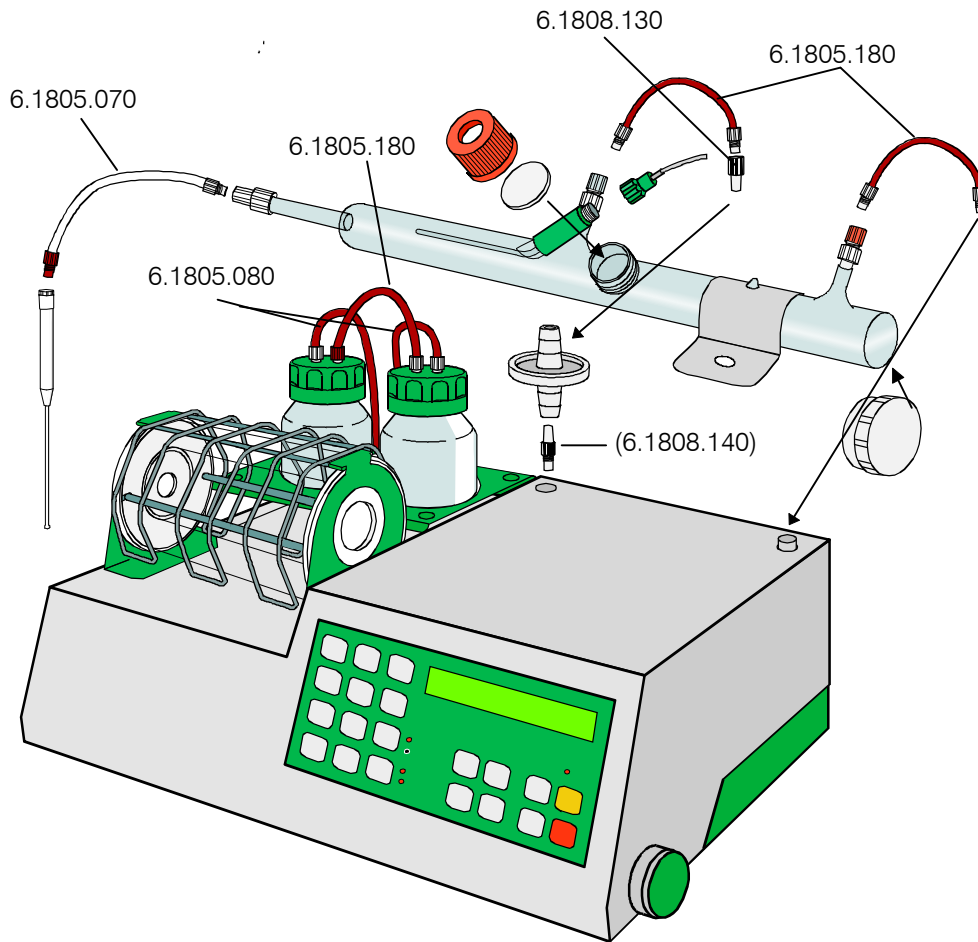
6. Close apparatus again and reconnect tubing and cables.
7. Note the new setting of the voltage on the model plate at the rear of the oven.

When the apparatus is opened or if parts are removed from it, certain components may be live if the apparatus is connected to the power supply. The mains cable must therefore always be disconnected when certain adjustments are made or parts replaced.

The mains cables supplied with the instrument are three-core and fitted with a plug with an earthing pin. Each break in the earthing inside or outside the apparatus can make it a source of danger.

Plug in or unplug connecting cables only when the apparatus is switched off.

5.1 Setting up the Oven



Unpack Oven and remove all protective coverings.

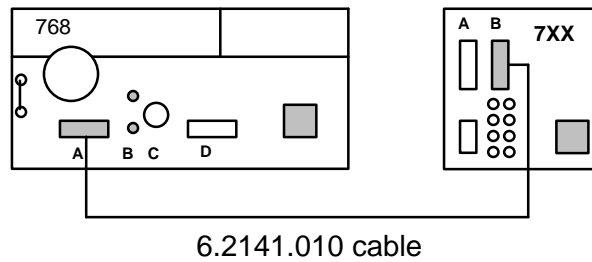
1. Insert 6.2407.020 Insert Tube in the heating chamber of the Oven and fasten it to the Oven with the clamp (red screw). The glass protrusion on the insert tube is positioned in the slot of the clamp.
2. Screw 6.2104.080 Cable onto temperature sensor of the insert tube and connect to the Pt1000 sockets of the Oven.
Important: The grey connector of the cable is plugged into the red (upper) socket of the Oven!
3. Place a 6.1448.040 Septum in the 6.2701.060 Screw Cap and screw it to the thread of the insert tube.
Close the insert tube with the 6.2750.010 Cover.
4. Fill the 6.1608.050 Drying Flasks with molecular sieves.
Screw the 6.1821.040 Inlet Tubes onto the 6.1602.140 Screw Cover.
Screw covers onto drying flasks.
5. Place drying flasks in the holder of the Oven.
Screw 6.1805.080 Tubing to the inlet tube of the left drying flask, see drawing on holder.
Screw other end of the tubing "To drying flask" at the Oven.
6. Connect the left drying flask to the right drying flask using 6.1805.180 Tubing: On the right flask, screw the tubing onto the inlet tube.

7. Connect right drying flask to the gas connection of the Oven "From drying flask" using 6.1805.080 Tubing.
8. Set 6.2724.010 Dust filter onto the connection "Purge" of the Oven and set 6.1808.130 Adapter onto dust filter. Connect this adapter with the left outlet of the insert tube using 6.1805.180 tubing.
9. Set up the tubing connection "To Oven" to the right inlet of the insert tube with another 6.1805.180 Tubing.
10. At the rear of the oven, connect the two tubing connections "Air in" and "Air out" using the 6.1805.040 Tubing.
When working with a gas other than air, this tubing connection is removed. The gas is introduced at tubing connection "Air/N₂ in" using a 6.1808.020 Tubing Connector. Tubing of 3...4 mm internal diameter can be attached to the tubing connector.
11. Plug the 6.2724.010 Dust Filter into the "Filter" connection at the rear of the oven.
11. Screw the 6.1805.070 Outlet Tubing to the insert tube and route other end to the titration vessel, see pages 47ff.
Important: Never wind insulation material around the outlet tubing when working at high sample temperatures as the connection could melt. To avoid condensation in the outlet tubing, the 6.1830.000 Heatable Outlet Tubing can be used.

If the filter on the Oven is blocked, you may remove the filter as well as the 6.1808.140 adapter and connect the tubing directly to the Oven. Order a new 6.2724.010 filter immediately to avoid blocking of the built-in pump.

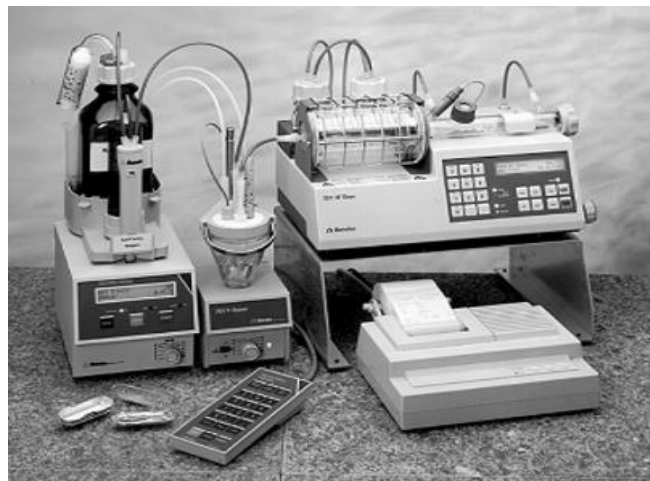
5.2 Connection of the 756 KF Coulometer or of a Titrino

The Titrino or the 756 Coulometer, resp., is connected to the 768 KF Oven as follows (warning: plug cable ends into proper sockets):

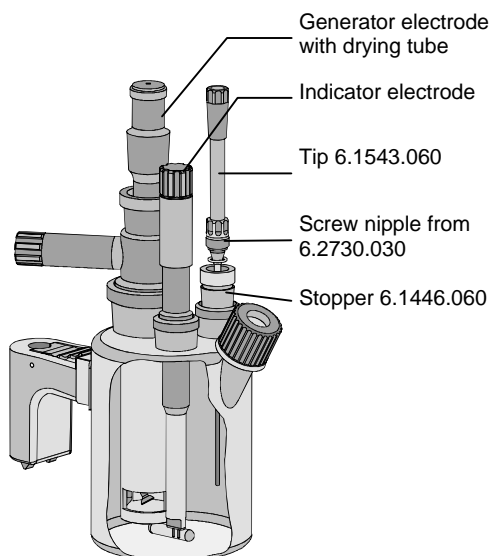


If you wish to have the Oven data incorporated in the report of the 756 Coulometer, you have to connect the RS interfaces of the Coulometer and the Oven by means of 6.2125.110 cable.

Set up the instruments with the aid of the 6.2041.180 Instrument Bridge:



5.2.1 Installation of the coulometric cell (756 KF Coulometer)



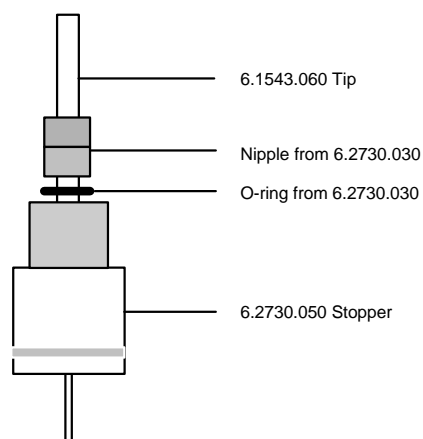
Equip the cell for gas inlet as follows:
Introduce the tip in the SGJ 14/15 by means of 6.14446.060 stopper. Screw tip into stopper with nipple and O-ring from 6.2730.030.

If you wish to aspirate the solvent automatically, set up gas inlet into the lateral aperture. You need the following accessories:

Tip	6.1543.060
Screw cap	6.2701.060
O-ring	A.254.0104

A titration vessel with two lateral apertures is available: ordering number 6.1465.320.

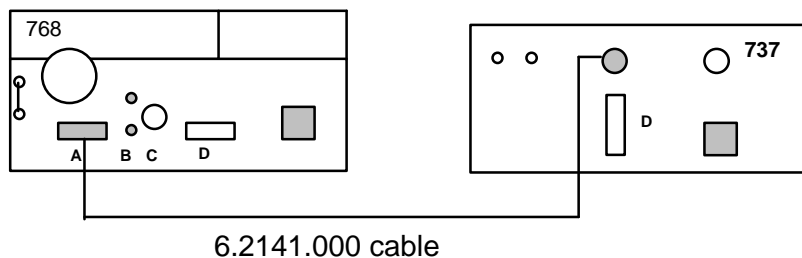
5.2.2 Installation of the titration vessel for Titrinos (volumetry)



The titration vessel is converted for the gas introduction. Instead of the 6.2730.020 Septum Stopper, the 6.2730.050 Stopper with the 6.1543.060 Tip is used. (Nipple and O-ring of 6.2730.030 from accessories of the Titrino.)

5.3 Connection of the 737 KF Coulometer

The 737 KF Coulometer is connected to the 768 KF Oven as follows:



Connection of the 684 KF Coulometer is analogous to that of the 737 KF Coulometer.

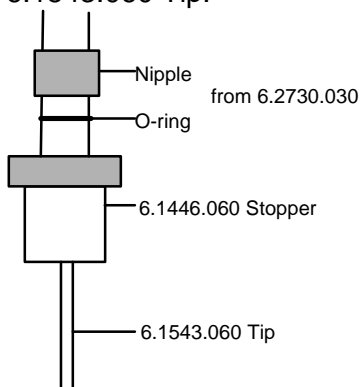
For work together with the KF Oven, the titration cell of the KF Coulometer is installed on the left and the instruments set up as follows:



Convert measuring cells for gas supply as follows:

Diaphragm-free cell

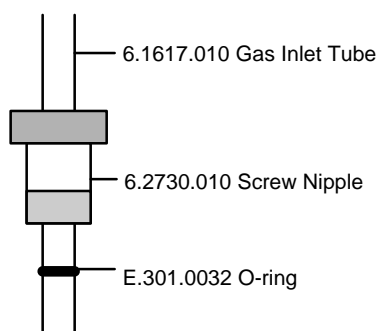
6.1446.060 Stopper with nipple and O-ring of 6.2730.030 (from the accessories of the KF Coulometer) with the 6.1543.060 Tip.



If you wish to add solvent using the 703 Ti Stand, insert a burette tip through the screw cap with an A.254.0104 sealing ring.

Measuring cell with diaphragm

6.1617.010 Gas Inlet Tube through the 6.2730.010 Screw Nipple (from the accessories of the KF Coulometer)

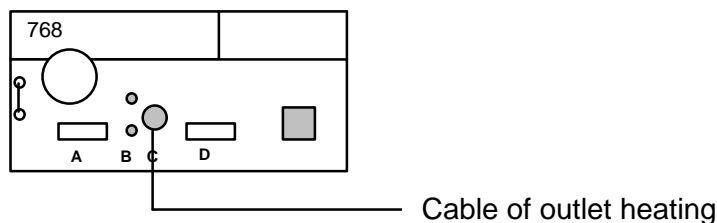


5.4 Connection of the outlet heating

If the 6.1830.000 Heatable Outlet Tubing is used, appreciably shorter determination times are achieved.

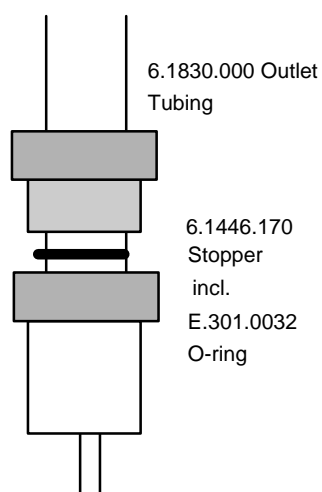
The heatable outlet tubing should be used in all cases where problems arise with condensation water in the normal outlet tubing.

Screw tubing to the outlet connection and connect cable of the outlet heating to the KF Oven:

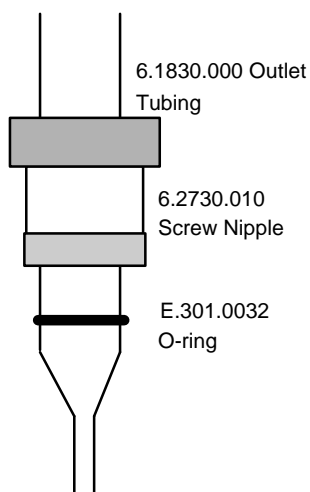


The heatable outlet tubing is inserted in the titration vessel as follows:

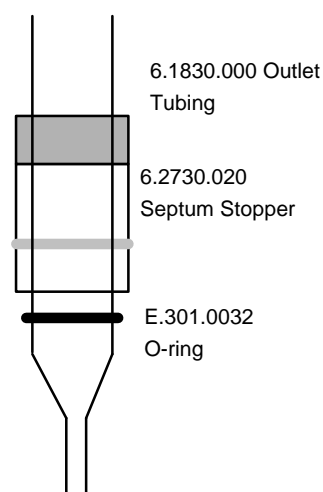
756 KF Coulometer or 737 KF Coulometer, cell without diaphragm



737 KF Coulometer, cell with diaphragm



Volumetric KF titration vessel

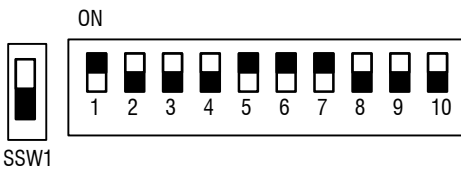
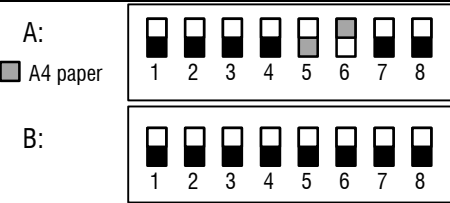



- If you use the outlet heating together with the 756 KF Coulometer in a lateral aperture of the titration vessel, use the A.254.0102 sealing ring instead of A.254.0104 (see section 5.2).

5.5 Connection of a printer

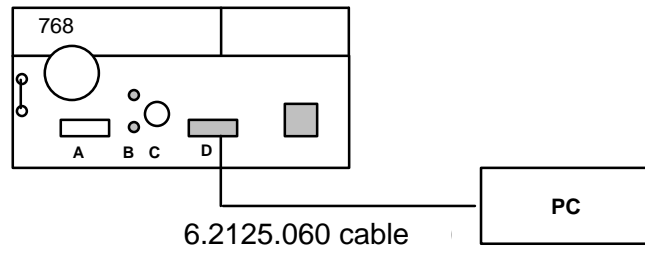
A variety of printers can be connected to the RS232 interface of the Oven. If you connect a printer other than one of those mentioned below, ensure that the Epson mode is emulated or that it uses the international character set following the IBM Standard Table 437 and IBM-compatible graphics control characters.

You may connect the KF Oven together with the Titrator at the same printer using the 2.145.0100 Auto-Switch. Connect the Metrohm instruments with 6.2125.020 cable to the Auto-Switch and use the printer cable as mentioned in the table below from the Auto-Switch to the printer.

Printer	Cable	Settings at the Oven	Settings at the printer
Seiko DPU-414	6.2125.130	baud rate: 9600 data bit: 8 stop bit: 1 parity: none handshake: HWs send to: Seiko	none
Citizen iDP562 RS	6.2125.050	baud rate: 9600 data bit: 8 stop bit: 1 parity: none handshake: HWs send to: Citizen	ON  SSW1
Epson LX-300	6.2125.050	as above	see printer manual
HP Desk Jet with serial inter- face	6.2125.050	baud rate: 9600 data bit: 8 stop bit: 1 parity: none handshake: HWs send to: HP	A:  B: 
HP Desk Jet with parallel in- terface	6.2125.020 + 2.145.0300 parallel serial con- verter	baud rate: 9600 data bit: 8 stop bit: 1 parity: none handshake: HWs send to: HP	see printer manual

5.6 Connection of a computer

The computer can be connected as follows:



For connection to a 9-pin socket of the Pc you need 6.2125.110 cable.

Preselection on 768 KF Oven:

RS232 settings: depending on control program of computer

Send to: IBM

6. Appendix

6.1 Technical specifications

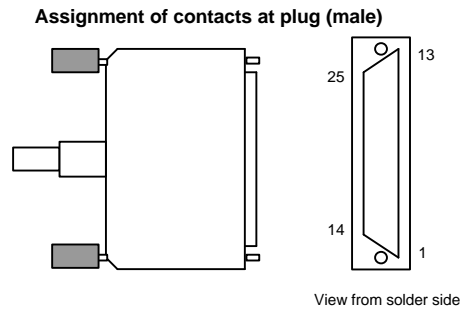
Sample temperature	50...300 °C (Pt1000 resistance thermometer)
Gas flow with built-in air pump	0... 15 L/h or ca. 250 mL/min (0 °C, 0 m a.s)
Size of the weighing boat	
Length	64 mm
Width	20 mm
Depth	12 mm
Materials	
Housing	Light metal
Membrane keypad	Polycarbonate (PC)
Display	LCD, 2 lines each of 24 characters, 5 mm character height
RS232 interface	For printer or computer connection
Conventional input/output lines	Inputs: Cond.ok, Start, Stop, Terminate Outputs: Ready, Heat Smpl, Start, Stop, Terminate, Error
Socket for outlet heating	Output: DC 8.5 V, 3 W
Ambient temperature	
Operational range	5...40 °C
Storage, transport	-20...60 °C
Safety specifications	Construction and testing according to IEC publication 1010, Protection class I. These instructions for use contain information and warnings which must be heeded by the user if safe operation of the apparatus is to be assured.
Power supply	
Nominal voltages	100-120 V; 220-240 V ± 10% (switchable)
Frequency	50...60 Hz
Power consumption	250 VA
Fusing	Fusible cutout + 2 × 2A (TH)
Dimensions incl. accessories	
Width	380 mm
Height	250 mm
Depth	275 mm
Weight incl. accessories	ca. 7.8 kg

6.2 "Remote" socket

6.2.1 Pin assignment

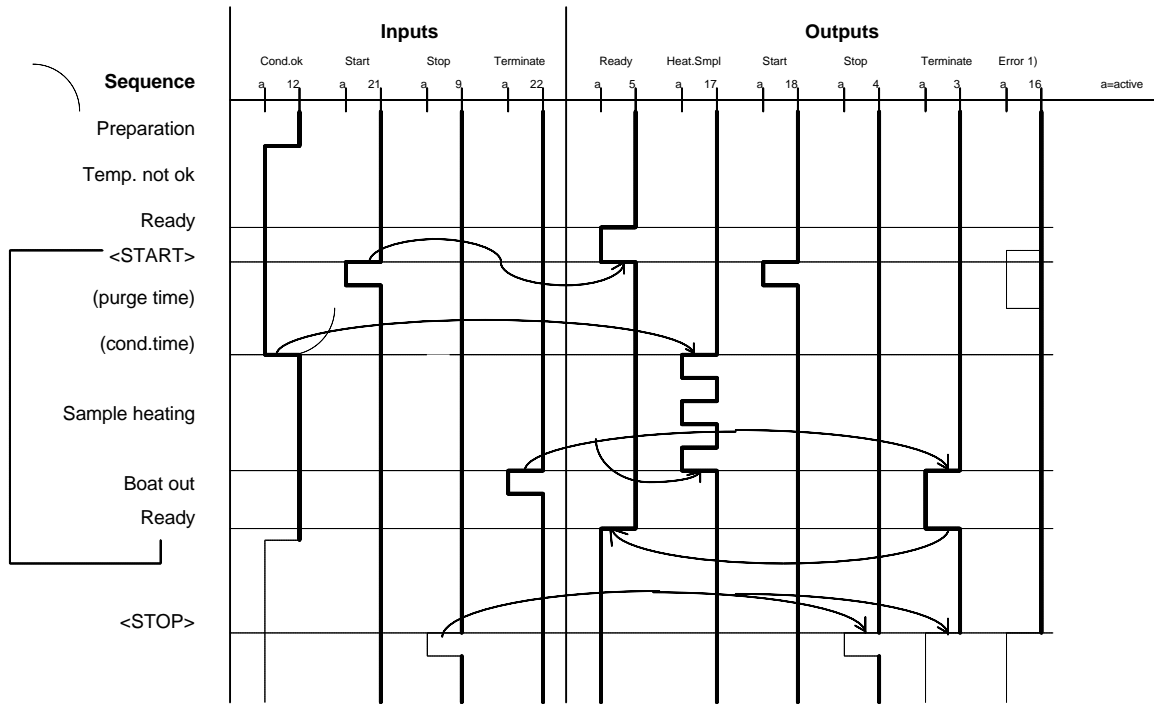
We accept no responsibility whatsoever for damage arising from improper interconnection for the instruments.

<p>Inputs</p> <p>$t(\text{pulse}) > 100 \text{ ms}$</p>	<table border="1"> <thead> <tr> <th>Pin</th> <th>Meaning</th> </tr> </thead> <tbody> <tr><td>21</td><td>Start</td></tr> <tr><td>9</td><td>Stop</td></tr> <tr><td>22</td><td>Terminate</td></tr> <tr><td>12</td><td>Cond.ok</td></tr> <tr><td>10</td><td>not used</td></tr> <tr><td>23</td><td>not used</td></tr> <tr><td>11</td><td>not used</td></tr> <tr><td>24</td><td>not used</td></tr> </tbody> </table>	Pin	Meaning	21	Start	9	Stop	22	Terminate	12	Cond.ok	10	not used	23	not used	11	not used	24	not used
Pin	Meaning																		
21	Start																		
9	Stop																		
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12	Cond.ok																		
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11	not used																		
24	not used																		
<p>Outputs</p> <p>$V(\text{CE}0) = 40 \text{ V}$ $I(\text{C}) = 20 \text{ mA}$ $t(\text{pulse}) > 100 \text{ ms}$</p>	<table border="1"> <thead> <tr> <th>Pin</th> <th>Meaning</th> </tr> </thead> <tbody> <tr><td>5</td><td>Ready</td></tr> <tr><td>17</td><td>Heat Smpl</td></tr> <tr><td>18</td><td>Start</td></tr> <tr><td>4</td><td>Stop</td></tr> <tr><td>3</td><td>Terminate</td></tr> <tr><td>16</td><td>Error</td></tr> <tr><td>1</td><td>not used</td></tr> <tr><td>2</td><td>not used</td></tr> </tbody> </table>	Pin	Meaning	5	Ready	17	Heat Smpl	18	Start	4	Stop	3	Terminate	16	Error	1	not used	2	not used
Pin	Meaning																		
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1	not used																		
2	not used																		
<p>Voltage</p> <p>+ 5 V 0 V</p>	<p>$I \leq 75 \text{ mA}$</p> <p>0 V: active 5 V: inactive</p>																		



Ordering numbers:
K.210.9004 (housing) and K.210.0002

6.2.2 Status of the lines during the automatic determination



1): The error signal is reset as soon as the fault has been rectified.

6.3 Checking sample temperature

For GLP requirements it may be necessary to check the sample temperature of the Oven with the 6.5615.000 measuring equipment. The actual measurement of the temperature is carried out with a type K thermal element (with yellow plug) and a suitable temperature measuring device. Purchase this measuring device separately at your laboratory equipment agency.

Proceed as follows:

1. Fill a similar amount of sample (or NaCl) as for your applications into the 6.2415.010 boat of the measuring equipment.
If you normally work with Al inserts, fold insert into the boat and fill in sample (or NaCl).
2. Introduce temperature probe into the tube of the 6.2415.010 boat. Clip the guide rod onto the boat and set both into the insert tube of the Oven. Place the temperature probe in the middle of the boat (where you normally place your sample).
3. Screw cover onto the insert tube. Pull the sealing wire/cover app. 20 cm away from the cover (otherwise the boat can't be moved into the Oven).
4. Move the boat into the Oven (key <BOAT IN>).
You may now screw the sealing onto the cover.
5. Switch on heater (key <HEATER>) and pump (key <PUMP>) of the Oven and set a gas flow as for your applications, e.g. 100 mL/min.
6. Adjust the sample temperature (key <PARAM>).
7. Plug the yellow plug into the temperature measuring device and set device to "Measure".
8. Wait until a stable sample temperature is reached (app. 20 minutes).
9. Read temperature of the temperature measuring device.
10. If you screwed the sealing onto the cover, unscrew it.
Remove boat from Oven (key <BOAT OUT>).

If there is any difference between the measures temperature and the sample temperature of the Oven, you may correct it as follows:

Example:

Nominal temperature (key <PARAM>).....	200 °C
Temperature at the measuring device	205 °C

1. Correction of the nominal temperature

Set the temperature to 195 °C (key <PARAM>).

or

2. Temperature correction

Temperature correction (key <CONFIG>, >oven settings)..... - 5 °C

In the Oven display you will see the currently measured temperature without correction. The highest and lowest temperatures in the result report as well are the measured temperatures of the Oven without correction.

6.4 Warranty and certificates

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

For day and night operation, the warranty is valid for 6 months.

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

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

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

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

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

Certificate of Conformity and System Validation

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

Name of commodity:	768 KF Oven
System software:	Stored in ROMs
Name of manufacturer:	Metrohm Ltd., Herisau, Switzerland

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

Electromagnetic compatibility: Emission

EN50081-1/92, EN55022 / class B, EN55011 / class B

Electromagnetic compatibility: Immunity

EN50082-1/92	Immunity
IEC801-2/91 (level 3), NAMUR/93	Static discharge
IEC801-3, ENV50140/93 (level 2)	

Radiated rf electromag.field immunity

IEC801-4, IEC1000-4-4/95 (level 3)	El.fast transient requirements
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IEC801-5, IEC1000-4-5/95 (level 2/3)	"Surges" immunity
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IEC801-6, IEC1000-4-6/96, ENV50141/93 (level 3)	
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Immunity to conducted disturbances

NAMUR/93 Paragr. 3.2.2.	Voltage dips, short interruptions
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Security specifications

IEC1010 class1, EN61010 class1, UL3101-1, EN60947:IP20

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

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

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

Herisau, April 23, 1998



Dr. J. Frank
Development Manager

Ch. Buchmann
Production and
Quality Assurance Manager

Ionenanalytik • Analyse des ions • Ion analysis • Análisis iónico
768 KF Oven



Metrohm Ltd.
CH-9101 Herisau
Switzerland
Phone +41 71 353 85 85
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EC Declaration of Conformity

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

768 KF Oven

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

Source of the specifications:

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

Description of the instrument:

Oven to heat samples. Used together with a Karl Fisher Titrator for water determinations.

Herisau, April 23, 1998



Dr. J. Frank

Ch. Buchmann

Development Manager

Production and
Quality Assurance Manager

6.5 Accessories, scope of delivery

768 KF Oven

2.768.0010

including the following accessories:

1 Set septa (5 items) for 6.2701.060 Screw Cap	6.1448.040
1 Tip for gas inlet	6.1543.060
2 Covers for drying flasks	6.1602.145
2 Drying flasks	6.1608.050
1 Tubing connection, 9 cm.....	6.1805.040
1 Tubing connection, 10.5 cm.....	6.1805.070
2 Tubing connections, 25 cm.....	6.1805.080
3 Tubing connections, 16 cm.....	6.1805.180
1 Tubing connector with thread	6.1808.020
1 Adapter, inner thread M6/Luer	6.1808.130
2 Inlet tubes for drying flasks	6.1821.040
1 Holding clamp for sample boat	6.2056.000
1 Cable for temperature sensor	6.2104.080
1 Oven insert tube	6.2407.020
3 Sample boats	6.2415.000
1 Guide rod	6.2416.010
2 Sets Al inserts (25 items per set).....	6.2623.000
1 Screw cap GL45.....	6.2701.060
2 Dust filter	6.2724.010
1 Stopper for volumetric KF titration vessel	6.2730.050
1 Cover for oven insert tube	6.2750.010
1 Bottle molecular sieves, 250 g.....	6.2811.000
1 Mains cable with cable socket type CEE(22),V Cable plug to customer's specifications:	
Type SEV 12 (Switzerland...)	6.2122.020
Type CEE(7),VII (Germany...).....	6.2122.040
Type NEMA/ASA (USA...)	6.2122.070
1 Instructions for Use.....	8.768.1001
1 Quick references	8.768.1011

Options

Cables and accessories

Cable 768 KF Oven – 756 KF Coulometer, control.....	6.2141.010
Cable 768 KF Oven – 756 KF Coulometer, data.....	6.2125.110
Cable 768 KF Oven – 737 KF Coulometer, control.....	6.2141.000
Cable 768 KF Oven – Titrino	6.2141.010
Cable 768 KF Oven – Citizen printer iDP560RS	6.2125.050
Cable 768 KF Oven – Seiko printer DPU-414.....	6.2125.130
Cable 768 KF Oven – Epson LX-300.....	6.2125.050
Cable 768 KF Oven – HP DeskJet, serial interface	6.2125.050
Cable 768 KF Oven – HP DeskJet, parallel interface	6.2125.020+2.145.0300
Serial Auto Switch (Oven and Titrator at the same printer)	2.145.0100
Cable Metrohm instrument - Serial Auto Switch.....	6.2125.020

Accessories for outlet heating

Heatable outlet tubing.....6.1830.000

756 Coulometer:

Stopper for heatable outlet tubing.....6.1446.170

737 Coulometer, cell without diaphragm:

Stopper for heatable outlet tubing.....6.1446.170

Sealing ring for solvent addition..... A.254.0104

General

Instrument bridge for setting up instruments.....6.2041.180

Adapter outer thread M6/Luer.....6.1808.140

Measuring equipment for temperature check6.5615.000

Boat of equipment for temperature check.....6.2415.010

Guide rod of equipment for temperature check with T sensor6.2416.110

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