Turbotherm - Infrared Rapid Digestion System

Construction

The Turbotherm is a versatile infrared rapid digestion system capable of handling a wide range of samples in today's modern laboratory. The digestion time is dramatically reduced due to the extremely short heating up and cooling down periods. The instrument accepts tubes from 100 up to 800 ml, making the Turbotherm a very versatile system. The insert rack, exhaust manifold and drip tray can be inserted on the two-tier console which reduces bench space and makes handling easier.

Turbotherm with electronic timer and power control

- By using the modern electronic-control up to 9 different programs can be entered. Each program has up to 9 variable heating levels and time settings. The current status is permanently displayed with manual override possible at any time.

Turbotherm with manual control

- This model is the alternative for a low budget. The power selection is done manually using an energy controller.

The Models

The Turbotherm can be used for many applications. The option of using 5 different insert racks allows the instrument to accept tubes of 100, 250, 400 and 800 ml. There is even the possibility of using the Turbotherm as a multifunctional, programmable heater for inorganic acid digestions.

Exhaust manifold

The acid vapours generated during the digestion are effectively removed via the exhaust manifold by either using a water jet pump or the **Turbosog-suction washer** (see page 8). This provides the maximum possible safety in the laboratory as no acid vapours escape from the unit.

Configuration

All rapid digestion systems consist of a Turbotherm base unit, two-tier console, insert rack with tubes, exhaust manifold with drip tray, water jet pump and 1.5 m of isoversinic-tubing.

Order No.	Type	Description
705000	TT 625	Rapid digestion unit with electronic time temperature controller, complete 6-place, for tubes 250 ml
715000	TT 625 M	As model TT 625 but with manual controller
705030	TT 125	Rapid digestion unit with electronic time temperature controller, complete 12-place, for tubes 250 ml
715030	TT 125 M	As model TT 125 but with manual controller
705010	TT 440	Rapid digestion unit with electronic time temperature controller, complete 4-place, for tubes 400 ml
715010	TT 440 M	As model TT 440 but with manual controller
705020	TT 480	Rapid digestion unit with electronic time temperature controller, complete 4-place, for tubes 800 ml
715020	TT 480 M	As model TT 480 but with manual controller
705040	TT 100	Rapid digestion unit with electronic time temperature controller, complete 12-place, for tubes 100 ml
715040	TT 100 M	As model TT 100 but with manual controller

The rapid digestion units can be easily adapted to be used with various digestion tubes. In order to ensure this flexibility, all insert racks can be ordered separately with the corresponding exhaust manifolds.

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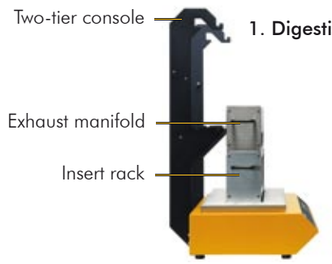
Two-tier console

The two-tier console has the advantage of hjolding the insert rack as well as the exhaust manifold. This feature makes the operation safe and simple as well as saving valuable bench-space.



1. Digestion mode

2. Cooling down mode

3. Standby mode

Kjeldatherm - Block Digestion Units

KBL 20 S + TZ + Turbosog

Precise Digestion Systems

The comprehensive product range of Kjeldahl models made by C. Gerhardt includes the compact Kjeldatherm block digestion systems for simultaneous multiple Kjeldahl digestions in 100 ml, 250 ml, and 400 ml tubes. Precise temperature control permits the conditions for the digestions to be optimized thus providing reproducible results.

All digestion blocks consist of the following components:

- Digestion block made of aluminum with holes for digestion tubes. Energy efficient heating and insulation to retain heat within the block.
- Insert rack made of aluminum with integrated heat shield and window provide easy and safe observation of the samples.
- Exhaust system with heat insulated handles, integrated glass exhaust manifold and water jet pump. Exhaust system and digestion tubes can be easily and safely handled separately.
- Two-tier console mounted directly on the block. The insert rack as well as the exhaust manifold can be stored safely above the block during the cooling down periods. This has a positive impact on the safe operation of the Kjeldatherm and at the same time, saves bench space.
- Kjeldatherm digestion tubes depending on the system used KMT (100ml), KTG (250 ml) or BS (400 ml).
- Excess temperature protection as well as an excess current switch for safety.
- Electronic temperature controller **TR** for all manual systems.
- Programmable temperature time controller **TZ** for all automatic systems with lift.

Kjeldalift

- In the digestion systems with the Kjeldalift the two tier console is equipped with a lift for moving the insert rack plus manifold in and out of the block.

Recommended accessory

- Scrubber unit **Turbosog** see page 8

Kjeldatherm-Automatic

When using the automatic digestion systems the handling of the insert rack and manifold is done using a lift-motor. Working with the temperature-time-controller TZ, ensures the fully automated process of programming the temperature as well as the time (see page 8). Best of all: the TZ controller is included in the shipment of all KBL systems at no additional costs!

Order No.	Type	Description
700801	KBL 8 S	Kjeldalift-Digestion unit, with 8 digestion tubes, 250 ml and lift-motor
700821	KBL 8 S-BS	Kjeldalift-Digestion unit, with 8 digestion tubes, 400 ml and lift-motor, suited especially for samples prone to excessive foaming
702001	KBL 20 S	Kjeldalift-Digestion unit, with 20 digestion tubes, 250 ml and lift-motor
704001	KBL 40 S	Kjeldalift-Digestion unit, with 40 digestion tubes, 100 ml and lift-motor

Technical data see page 11

KBL 20 S + TZ + TLS

Kjeldatherm-Manual

The user has to lift and lower the insert racks by hand. All manual KB digestion units include the TR temperature controller (see page 8).

Order No.	Type	Description
700800	KB 8 S	Kjeldatherm-Digestion unit, with 8 digestion tubes, 250 ml
700820	KB 8 S-BS	Kjeldatherm-Digestion unit, with 8 digestion tubes, 400 ml, suited especially for samples prone to excessive foaming
702000	KB 20 S	Kjeldatherm-Digestion unit, with 20 digestion tubes, 250 ml
704000	KB 40 S	Kjeldatherm-Digestion unit, with 40 digestion tubes, 100 ml

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KB 8 S + TR

Trace Metal and COD-Digestion Systems

SMA
Trace Metal
Block system for the digestion with aqua regia to determine the acid-soluble metals in sludge, sediments and soils.

CSB
Chemical Oxygen Demand
Digestion block systems for the determination of the Chemical Oxygen Demand of water. The required heating up phase of the samples to around 148 °C is reached in less than 10 minutes.

C. Gerhardt offers SMA- and COD-units in two options: Sophisticated, automatic units with lift and easy, manual units.

Automatic Systems
When using the automatic systems the handling of the heavy insert rack and manifold is done with the help of the lift-motor. Equipped with water condensers and motor-driven lifting device with insert racks for sample tubes and condensers. For a fully automated process controlling the cooling water supply and suction as well as temperature -time programming the system is equipped with the **TZ** time-temperature-controller (see page 8)!

- The automatic lift system can separate or connect all the digestion tubes and reflux water condensers in just one step
- All digestion tubes can be lifted together with the insert rack
- The installation is very simple as the supply of cooling water is organized with just one central supply and discharge
- The instrument is designed to allow for the cooling down of the samples in the insert rack outside the hot block thus offering safer handling and a significant reduction of the cooling down-phase

Manual Systems
Lifting and lowering of the insert rack has to be done by the user in all these systems. The controller TR is included in the standard configuration (see page 8).

SMA-Automatic Systems
- Kjeldatherm digestion block KB made of aluminum with holes for tubes SMG
- Time-temperature controller **TZ**
- Insert rack EB-A made of aluminum with two insulated handles
- Two tier console EBL-C with built-in motor for the vertical movement of the samples and water condensers.
- Insert rack EB-K for condenser fitting the two tier console EBL-C and the water condensers SMK with KS 40
- CSB/SMA-Sample tubes SMG, 250 ml with KS 40
- CSB/SMA-Water condenser SMK with KS 40
- Absorption traps
- PVC-exhaust manifold
- Water jet pumps

Order No.	Type	Description
700815	SMA 8 A	Automatic trace metal digestion unit, 8-place, complete system incl. **TZ**
702015	SMA 20 A	Automatic trace metal digestion unit, 20-place, complete system incl. **TZ**

Recommended accessory
- Scrubber unit Turbosog see page 8

SMA-Manual Systems
The alternative for labs with low sample throughput.
The manual trace metal digestion units offer the same features as the automatic SMA-model, however, they don't have the two tier console EBL. Also included is a controller, this time a TR.

Order No.	Type	Description
700816	SMA 8 M	Manual trace metal digestion unit, 8-place complete system incl. controller **TR**

Recommended accessory
- Scrubber unit Turbosog see page 8

CSB-Automatic Systems
- Kjeldatherm digestion block KB made of aluminum with holes for tubes SMG
- Time-temperature controller **TZ**
- Insert rack EB-A made of aluminum with two insulated handles
- Two tier console EBL-C with built-in motor for the vertical movement of the samples and water condensers.
- Insert rack EB-K for condenser fitting the two tier console EBL-C and the water condensers SMK with KS 40
- CSB/SMA-Sample tubes SMG, 250 ml with KS 40
- CSB/SMA-Water condenser SMK with KS 40

Order No.	Type	Description
700810	CSB 8 A	Automatic COD-digestion unit, 8-place, complete system incl. **TZ**
702010	CSB 20 A	Automatic COD-digestion unit, 20-place, complete system incl. **TZ**

Technical data see page 11

CSB-Manual Systems
- Kjeldatherm digestion block KB made of aluminum with holes for tubes SMG
- Temperature-controller **TR**
- Insert rack EB-A made of aluminum with two insulated handles
- COD-sample tubes SMG-8, 250 ml with NS 29
- COD-air condenser SML, 750 mm length, with NS 29

Order No.	Type	Description
700805	CSB 8 M	Manual COD-digestion unit, 8-place, complete system incl. **TR**
702005	CSB 20 M	Manual COD-digestion unit, 20-place, complete system incl. **TR**

Recommended Accessories
(not included in the standard configuration):

7035	ST-SML	PP-Rack for 10 air condensers with drip tray
7035/1	ST-SML	PP-Rack for 12 air condensers with drip tray

Controller Units and Scrubber Units

TZ-Control Unit

TZ is a time- temperature controller - easily programmed for the automated operation of the Kjeldatherm-, Kjeldalift- and COD and SMA-digestion units, mounted on the side of the system.
Up to 9 different programs can be defined and stored. Each program offers the possibility of up to 9 different temperature- and time steps. This feature ensures optimal control of the heating up phase, the digestion phase, as well as cooling.
The fume scrubber **Turbosog** can also be turned on and off automatically.
With cooling water control, an external pressure valve (optional) can monitor and control the flow of cooling water for the COD and Trace Metal Systems.

- 9 programs with 9 program steps
- Programmable temperature range (room temperature up to 430 °C)
- Accuracy **< 0,5 %** in the upper temperature range
- Suction is turned on automatically when the previously defined block temperature is passed - thus greater safety when working with acid fumes.
- Automatic controls of fume suction and cooling water flow
- Optical and acoustic messages

Order No.	Type	Description
7210	TZ	TZ-Controller, 230 V
7045	TLS	Rack for TZ- and TR-Controller
7211	WTZ	Cooling water valve

Controller TZ + TLS

TR-Controller

Electronic temperature controller, mounted on the side of the system.

- Digital display
- Temperature range Rt up to 430 °C,
- Accuracy **< 1,0 %** in the upper temperature range

Order No.	Type	Description
7043	TR	Temperature controller
7045	TLS	Rack for TZ- and TR-controller

Controller TR + TLS

Turbosog

The Turbosog centrifugal scrubber condenses and neutralizes aggressive acid fumes. The Turbosog works in two steps, separating and washing out acid fumes. The removal of the fumes is very efficient with extremely low running costs. Little service is required as no activated carbon filters are used in the system. Turbogsog can be connected to all Gerhardt digestion units with suction.

Order No.	Type	Description
630010	TUR/K	Turbosog - Scrubber

Additional cooling unit for Turbosog
Additional condensate bottle for a more efficient separation of condensate when doing water digestions with Kjeldatherm or Turbotherm digestion units. The system can be easily cleaned, has screw caps with snap lids and cooling water control. The unit is attached at the side of the Turbosog and connected to the water supply. Thus upgrades of existing units are done without problems.

Order No.	Type	Description
6330	ZKE	Additional cooling unit complete, incl. water control

Turbosog + ZKE Cooling unit

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Decomposition and Digestion Instrument

Determination of cyanide

Digestion instrument, which has been especially developed, for the decomposition of water- and soil samples for the determination of cyanide resp. for the total cyanide determination as well as for other determinations.
The integrated magnetic stirrer allows simultaneous heating and stirring of the 4 heating places.

TT 4 CAR

Features

- Thanks to the IR heating system, a fast and even heating up of the instrument is made possible
- Gas flow counter located at the side
- Up to four samples can be digested simultaneously
- Steckmatic connection makes handling of compressed air resp. inlet tubings easy
- Four sample tubes can be handled easily and simultaneously by using an insert rack
- Connection to in-house compressed air resp. nitrogen tubing is possible, thus economic and safe flow of gas
- Use of inert materials

The basic system is the Turbotherm infrared digestion unit (see page 2 - 3). The decompsition instrument can be used for further digestions when special accessories are added.
Both models consisting of:
Turbotherm basic unit, insert rack, energy console with controller for the gas inlet and the cooling water distribution, tubing, drip tray, set of glass consisting of: digestion tube, reflux condenser, absorption trap, and dropping funnel.

Cyanide Automatic TT 4 CAR

- TT 4 CAR is equipped with a modern controller. Thus, up to 9 different programs can be defined

Order No.	Type	Description
705055	TT 4 CAR	Decomposition instrument automatic

Cyanide Manual TT 4 CMR

- TT 4 CMR with manual power setting using the energy controller

Order No.	Type	Description
715055	TT 4 CMR	Decomposition instrument manual

Technical data see page 11

Cyanid without magnetic stirrer
The Cyanie digestion units are also available without magnetic stirrer. Please contact us to get more informations.

Consumables

When replacing consumables or spares, please make sure, that you buy only original parts from C.Gerhardt. This is the only way we can guarantee a trouble-free, analytical process with precise and reliable results.

Catalyst-Tablets

Tin with1000 tablets

Order No.	Type	Description
6121	ST	3,5 g K_2SO_4 + 0,0035 g Se
6122	S	5,0 g K_2SO_4 + 0,005 g Se
6123	CX	5,0 g K_2SO_4 + 0,5 g $CuSO_4 \times 5H_2O$
6124	CT	5,0 g K_2SO_4, 0,15 g $CuSO_4 \times 5H_2O$ + 0,15 g TiO_2
6126	SQ	1,5 g K_2SO_4 + 0,0015 g Se
6128	IB/61	5,0 g K_2SO_4, $CuSO_4 \times 5H_2O$ + Se (100:6:1 parts) acc. to Wieninger
6129	CK	3,5 g K_2SO_4 + 0,4 g $CuSO_4 \times 5H_2O$
6130	TCT	3,5 g K_2SO_4 + 0,105 g $CuSO_4 \times 5H_2O$+ 0,105 g $TiO_2 \times 5H_2O$
6131	C	5,0 g K_2SO_4 + 0,1 g $CuSO_4 \times 5H_2O$
6132	CQ	1,5 g K_2SO_4 + 0,15 g $CuSO_4 \times 5H_2O$
6133		K_2SO_4 + $CuSO_4$+$5H_2O$
6134	KS	100 x K_2SO_4 1xSe
6135	NACT	1,0 g Na2SO4, 0,03 g CuSO4 x 5H2O, 0,03 g TiO2

Antifoam-tablets

Tin with1000 tablets

6127	AS	Antifoam tablets

Digestion Tubes

Order No.	Type	Description	for type
6100	KTG	Digestion tube macro, 250 ml	TT 625, TT 125, KB(L) 8 S, KB(L) 20 S
6103	KMT	Digestion tube micro, 100 ml	TT 100, KB 40
6104	KMT/E	Digestion tube micro, 100 ml with constriction	TT 100, KB 40
6105	KTG/E	Digestion tube macro, 250 ml with constriction	TT 625, TT 125, KB(L) 8 S, KB(L) 20 S
6106	KTG/K	ditto 6100 but hand-selected for Vapodest 50s carousel	TT 625, TT 125, KB(L) 8 S, KB(L) 20 S
6108	BS 400	Special tube 400 ml, diminished	KB(L) 8 S-BS
6816	SMG	Digestion tube, 250 ml with KS 40	CSB 8 A, CSB 20 A, SMA 8 A, SMA 20 A, SMA 8 M
6715	SMG 8	Digestion tube, 250 ml with NS 29	CSB 8 M, CSB 20 M
6460	KDD 400	Digestion tube, 400 ml	TT 440
6461	KDD 800	Jumbo-digestion tube, 800 ml	TT 480
7091	AGC	Digestion tube for Cyanide-system, 800 ml, NS 45-Schliff	TT 4 CAR, TT 4 CMR

More accessories and information available on request!

Digestion and Distillation from one Source

The perfect combination for our Kjeldatherm program is the distillation range **Vapodest**. All systems are suitable for the distillation of Kjeldahl digestion solutions and for other steam distillation procedures. The Vapodest product range is available in various levels of automation, from the Vapodest 10s semi-automatic distillation system to the Vapodest 50s distillation and titration system with carousel auto sampler.
Further product information is available from our product brochure **Vapodest** or from the Gerhardt representative in your country.

Technical Data

Type	TT 625 / TT 625 M	TT 125 / TT 125 M	TT 440 / TT 440 M	TT 480 / TT 480 M
Order No.	705000 / 715000	705030 / 715030	705010 / 715010	705020 / 715020
Nominal voltage*	230 V AC	230 V AC	230 V AC	230 V AC
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Nominal wattage	1500 W	1500 W	1500 W	1500 W
Weight	21 kg	22,5 kg	22,5 kg	21,5 kg
Dimensions (W x D x H)	525 x 450 x 740 mm	525 x 450 x 740 mm	525 x 450 x 740 mm	525 x 450 x 740 mm
Temperature max.	750 °C	750 °C	750 °C	750 °C
Heating places	6	12	4	4
Size of tube	250 ml	250 ml	400 ml	800 ml
Type	**TT 100 / TT 100 M**	**KB 8 S**	**KB 8 S-BS**	**KB 20 S**
Order No.	705040 / 715040	700800	700820	702000
Nominal voltage*	230 V AC	230 V AC	230 V AC	230 V AC
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Nominal wattage	1500 W	1000 W	1000 W	2200 W
Weight	22,5 kg	16 kg	16 kg	26 kg
Dimensions (W x D x H)	525 x 450 x 740 mm	415 x 415 x 650 mm	415 x 415 x 650 mm	415 x 530 x 650 mm
Temperature max.	750 °C	430 °C	430 °C	430 °C
Heating places	12	8	8	20
Size of tube	100 ml	250 ml	400 ml	250 ml
Type	**KB 40 S**	**KBL 8 S**	**KBL 8 S-BS**	**KBL 20 S**
Order No.	704000	700801	700821	702001
Nominal voltage*	230 V AC	230 V AC	230 V AC	230 V AC
Frequency	50/60 Hz	50 HZ	50 Hz	50 Hz
Nominal wattage	2200 W	1160 W	1160 W	2360 W
Weight	26 kg	29 kg	29 kg	39 kg
Dimensions (W x D x H)	415 x 530 x 650 mm	460 x 415 x 740 mm	460 x 415 x 740 mm	460 x 530 x 740 mm
Temperature max.	430 °C	430 °C	430 °C	430 °C
Heating places	40	8	8	20
Size of tube	100 ml	250 ml	400 ml	250 ml
Type	**KBL 40 S**	**CSB 8 M**	**CSB 20 M**	**CSB 8 A**
Order No.	704001	700805	702005	700810
Nominal voltage*	230 V AC	230 V AC	230 V AC	230 V AC
Frequency	50 Hz	50/60 HZ	50/60 Hz	50 Hz
Nominal wattage	2360 W	1000 W	2200 W	1160 W
Weight	39 kg	15 kg	24 kg	31 kg
Dimensions (W x D x H)	460 x 530 x 740 mm	415 x 415 x 1150 mm	415 x 530 x 1150 mm	470 x 415 x 800 mm
Temperature max.	430 °C	430 °C	430 °C	430 °C
Heating places	40	8	20	8
Size of tube	100 ml	250 ml	250 ml	250 ml
Type	**CSB 20 A**	**SMA 8 A**	**SMA 20 A**	**SMA 8 M**
Order No.	702010	700815	702015	700816
Nominal voltage*	230 V AC	230 V AC	230 V AC	230 V AC
Frequency	50 Hz	50 Hz	50 Hz	50/60 Hz
Nominal wattage	2360 W	1160 W	2360 W	1000 W
Weight	45 kg	32 kg	46 kg	29 kg
Dimensions (W x D x H)	470 x 530 x 800 mm	470 x 415 x 1000 mm	470 x 530 x 1000 mm	415 x 415 x 1000 mm
Temperature max.	430 °C	430 °C	430 °C	430 °C
Heating places	20	8	20	8
Size of tube	250 ml	250 ml	250 ml	250 ml
Type	**TR**	**TZ**	**TUR/K**	**TT 4 CAR / TT 4 CMR**
Order No.	7043	7210	630010	705055 / 715055
Nominal voltage*	230 V AC	230 V AC	230 V AC	230 V AC
Frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Nominal wattage	-	-	205 W	1500 W
Weight	1,4 kg	2,3 kg	19 kg	40 kg
Dimensions (W x D x H)	85 x 150 x 155 mm	85 x 240 x 255 mm	330 x 450 x 420 mm	570 x 450 x 740 mm
Temperature range / max.	0 - 430 °C	0 - 430 °C (450 °C)	-	750 °C
Heating places	-	-	-	4
Size of tube	-	-	-	800 ml

* Other voltages on request