MARKES international

Markes Thermal Desorption Instrumentation

Site Preparation Document

Version 1.3

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1. Purpose of site preparation

Your site must meet this specification to assure a successful and timely installation of your Markes thermal desorption equipment. This document is designed to prevent delays during installation, familiarization and the initial use of the GC system in your application. It outlines the space and utility requirements for Markes TD equipment. It also recommends tools and consumables that may help you get started.

1.1. Customer Responsibilities

Make sure your site meets this specification, including: the necessary space, electric outlets, gases, tubing and operating supplies. Operating supplies include consumables, such as TD sorbent tubes, cold traps etc. required for the successful installation of instruments and systems. If Markes is delivering installation and familiarization services, users of the instrument should be present throughout these services; otherwise, they will miss important operational, maintenance and safety information.

NOTE: If you need assistance please contact your local distributor or Markes International directly (service@markes.com).

2. Dimensions and weight

Select the laboratory bench space before your systems arrives. Pay attention to the total height requirements. Avoid bench space with overhanging shelves. Allow at least 20 cm clearance between the back of the equipment and a wall to dissipate hot air. Allow 10 cm clearance between UNITY / TD-100 and the GC and between UNITY and each ULTRA autosampler.

Component	**Position (viewed from front)**	**H (cm)**	**W (cm)**	**D (cm)**	**W (Kg)**
UNITY	Usually to left of GC	40	16	51	16
ULTRA-UNITY	Left side of GC. ULTRA to the left of UNITY	62	40	53	39
ULTRA-UNITY-ULTRA	Left of GC Sampling ULTRA to left of UNITY Re-collection ULTRA to right of UNITY	62	64	53	62
UltrA5050-UNITY	Left side of GC ULTRA *50:50* to left of UNITY	62	46	53	42
UNITY-AS3/AS8	Left side of GC AS3/8 attached to left of UNITY	40	22.5	51	19
UNITY-CIA8	Left side of GC. CIA 8 either side of UNITY	40	28	51	24
UNITY-CIA *Advantage*	Right side of GC CIA *Advantage* to right of UNITY	42	45	54	37
UNITY-CIA *Advantage* + CIA Satellite[1]	Right side of GC CIA *Advantage* to right of UNITY	42	70	54	55
ULTRA-UNITY- AS3/AS8	Left side of GC AS3/8 attached to left of UNITY ULTRA to left of UNITY-AS3/AS8	62	47	53	42
ULTRA *50:50*-UNITY-AS3/AS8	Left side of GC AS3/8 attached to left of UNITY ULTRA *50:50* to left of UNITY-AS3/AS8	62	53	53	45

Component	Position (viewed from front)	H (cm)	W (cm)	D (cm)	W (Kg)
ULTRA-UNITY-CIA8	Left side of GC ULTRA to left of UNITY CIA8 to right of UNITY (**Note**: CIA 8 & ULTRA cannot be connected simultaneously but sufficient space required for all instruments)	62	52	53	47
ULTRA *50:50*-UNITY-CIA8	Left side of GC ULTRA 50:50 to left of UNITY CIA8 to right of UNITY (**Note**: CIA 8 and ULTRA 50:50 cannot be connected simultaneously but sufficient space required for all instruments)	62	58	53	50
ULTRA-UNITY-CIA *Advantage*	Right side of GC ULTRA to left of UNITY CIA *Advantage* to right of UNITY (**Note**: CIA *Advantage* and ULTRA cannot be connected simultaneously but sufficient space required for all instruments)	62	65	53	60
ULTRA *50:50*-UNITY-CIA *Advantage*	Right side of GC ULTRA 50:50 to left of UNITY CIA *Advantage* to right of UNITY (**Note**: CIA *Advantage* and ULTRA 50:50 cannot be connected simultaneously but sufficient space required for all instruments)	62	71	53	63
TD-100	Usually to left of GC	62	40	53	37

[1] This is the minimum bench space required. The CIA Satellite can be positioned up to 75cm away from the CIA *Advantage* to provide sufficient room for canister connections.

3. Power Consumption

The number and type of electrical outlets depends on the size and complexity of your system. Each TD unit will have a label next to the power cord connector that lists the line voltage requirements.

The power consumption and requirements depend on the system ordered

Component	Line Voltage	Frequency (Hz)	Input inrush Current (amps)	Max Power (W)
UNITY	100-240V automatically selected	50-60	<40	650
ULTRA	100-240V automatically selected	50-60	<40	650
ULTRA + ISDP	100-240V automatically	50-60	<40	650

	selected			
ULTRA *50:50*	100-240V automatically selected	50-60	<40	650
ULTRA 5050 + ISDP	100-240V automatically selected	50-60	<40	650
UNITY-AS3/AS8	100-240V automatically selected	50-60	<40	650
TD-100	100-240V automatically selected	50-60	<40	650
CIA8	100-240V automatically selected	50-60		75
CIA *Advantage*	100-240V automatically selected	50-60	<40	900
ASPMP1	115V	60		55
ASPMP2	230V	50		60

4. Heat Dissipation

Your facilities manager may wish to know the amount of heat that the system creates to understand its contribution to the overall room ventilation requirements.
The following table may help you calculate the additional BTUs of heat dissipation from this new equipment. Maximums represent the heat given off when heated zones are set for maximum temperatures

Component	**BTU/hour maximum**
UNITY	191
ULTRA	191
ULTRA + ISDP	191
ULTRA 5050	191
UltrA 5050 + ISDP	191
UNITY-AS3/AS8	191
TD-100	191
CIA8	22
CIA *Advantage*	265
ASPMP1	16
ASPMP2	17

5. Environmental conditions

Thermal Desorption is a powerful concentrating device and therefore it is advisable to operate the system in a clean laboratory environment with minimal atmospheric concentrations of organic vapours.

Performance can be affected by sources of heat and cold from heating, air conditioning systems, or drafts.

5.1. Temperature

Recommended operating ambient temperature range is 15 to 30°C.

5.2. Humidity

Recommended operating humidity range is 5 to 95% non-condensing.

5.3. Altitude

Recommended operating altitude up to 8000 ft (2500 m), higher altitudes pose no safety risk but instrument performance may be reduced.

NOTE:
For storage or shipping the allowable temperature range is -40 to 70°C and the allowable humidity range is 5-95% non-condensing. After exposing the instrument to extremes of temperature or humidity, allow 2 hours for it to return to the recommended ranges.

6. GC Equipment

The UNITY / TD-100 thermal desorption system (with or without accessories) is usually connected to the left hand side of a gas chromatograph configured with appropriate conventional or mass spectrometer (MS) detectors.

The only exception is for UNITY-CIA *Advantage* systems where it is recommended to locate the instruments to the right hand side of the GC.

6.1. Injectors and Electronic carrier control

No conventional GC injector is required for UNITY / TD-100 operation as the thermal desorber acts as an additional stand-alone injector and does not interfere with other GC accessories. It is typically interfaced to the GC via a direct coupling to the analytical column. The only part of a GC inlet which may be required is a back-pressure regulated electronic pneumatic module. This can be used to provide electronic carrier gas control (ECC) through the entire TD-GC(MS) analyzer and stabilize retention times independent of split flow and other analytical settings.

Note: U-GAS01 is recommended for all UNITY / TD-100 electronic carrier control (ECC) systems to provide pressure regulation of the carrier gas prior to the ECC module and to provide suitable pneumatic control for the dry gas.

6.2. Connections to the GC

The heated and insulated portion of the UNITY / TD-100 transfer line must extend as far as the skin of the GC oven. A 25 mm access hole is thus required into the GC, with a 6.5 mm hole in the GC inner oven wall.

Ready and external start connections are required on the GC in order to synchronise the equipment.

7. Gas Supplies

7.1. Gas supply and lines

Gases are supplied by cylinders, internal distribution systems, or gas generators. Cylinder supplies require two stage pressure regulation. As thermal desorption is a concentrating technique, even trace level contaminants in laboratory gas lines can interfere significantly with the analysis. It is recommended that gas lines be constructed of solvent-rinsed, refrigeration-grade copper tubing connected using approved swage-fittings. Laboratory gas line joints and connections must never be brazed. Position the gas supplies as close as possible to the analytical system i.e. such that the gas lines are as short as possible. High quality pressure regulators incorporating a stainless steel

diaphragm are recommended for carrier gas control.

To connect tubing to the supply it must have one 1/8-inch Swagelok female connector for each gas. Make sure that your regulator has the appropriate sized adapter to end with a 1/8-inch Swagelok male connector.

7.2. Gas Purity and Selection

Two gas supplies are required for TD operation according to the following recommendations:

	Purge Gas	**Carrier Gas**
Gas type	Air or Nitrogen (dry)	Helium, nitrogen or hydrogen[1]
Purity	Zero grade air 5.0 (99.999%) Nitrogen	5.5 (99.9995%)
Function	Purges cold trap box and actuates valve	Carrier gas supply for entire TD-GC(MS) system
Min Pressure (psi)	45	0
Max Pressure (psi)	55	60
Recommended Pressure (psi)	50	Depends on GC column
Line pressure (psi)	10 psi higher than that supplied to UNITY / TD-100	10 psi higher than that supplied to UNITY / TD-100
Control	Secondary pressure regulation prior to the TD system is recommended[2]	Secondary pressure regulation prior to any carrier control is recommended[2]
	Purge Gas	**Carrier Gas**
Dew Point	Lower than -50°C (**NB** conventional compressors / generators may be used provided the gas is adequately dried).	
Consumption	~ 100 ml/min	Dependent on column flow and split flows
Notes	UNITY / TD-100 peltier coolers will not operate without this gas supply	

[1] Although Hydrogen may be used as a carrier gas on most TD systems care must be taken in case the high temperatures involved in thermal desorption cause hydrogenation of reactive and / or unsaturated species. The usual safety precautions, with respect to monitoring for leaks, must be taken if hydrogen is used.
NOTE: Hydrogen **must not** be used as carrier gas on CIA *Advantage* systems.

[2] Markes recommend the use of U-GAS01

7.3. Filters

It is recommended that suitable filters (to remove oxygen, organics and water) are included in the carrier gas line just upstream of connection to the TD-GC analytical system.

8. PC Equipment

8.1. Minimum computer specification for TD control

CPU	400MHz Pentium
RAM	64 MB
Free Disk Space	20 MB (for installation)
Operating System	Windows 95, 98, ME, 2000, NT4, XP (32-bit), Vista and 7 (32 & 64 bit)
Minimum resolution	800x600
Other requirements	Windows compatible mouse

For CIA *Advantage* systems a different version of software is used which requires a higher specification PC:

CPU	1 GHz Pentium (or equivalent)
RAM	256 MB
Free Disk Space	20 MB (for installation)
Operating System	Windows 95, 98, ME, 2000, NT4, XP (32-bit), Vista and 7 (32 & 64 bit)
Minimum resolution	800x600
Other requirements	Windows compatible mouse

8.2. Serial port requirements

Each of the following requires a free serial comms port for communication with the PC

- UNITY
- each ULTRA™ module (*i.e.* ULTRA, ULTRA 50:50™, AutoSecure ULTRA™)
- CIA8™ canister accessory
- CIA *Advantage* (HL or T)
- CIA Satellite

- TD-100 requires 2 serial ports

Each of these accessories is shipped with a USB to serial port cable which can be connected to a spare USB port / hub to provide the required serial connection.

Note: Neither Series 2 Air Server (3 or 8 channel) nor Series 2 Mass Flow Controllers require additional serial ports.

9. Other considerations

Your TD system is shipped with one pre-conditioned Tenax sorbent tube which has been pre-loaded with a checkout standard (benzene, toluene, o-xylene, camphene, di-octyl phthalate – nominal concentration 90 ng/µL).

Most TD systems are shipped with a general purpose cold trap which is suitable for the analysis of VOCs from $C_{4/5}$ to C_{30-32}.

CIA *Advantage* systems are supplied with an air toxics analyzer cold trap suitable for the analysis of VOCs from ethane to C_{30}.

You will require additional sorbent tubes, and you may need to select a different cold trap for your application.

10. Shipping kit

Your TD system comes with a few basic tools and consumables including:

Tool or consumable	**Used for**
Standard tool kit – selection of wrenches and 1 x Pozidriv screwdriver	Installation and general maintenance
O-rings, 006, (reorder number U-COV06)	General maintenance
O-rings, 007, (reorder number U-COV07)	General maintenance
O-rings, 010, (reorder number U-COV10)	General maintenance
Disk, sintered, 5.1mm,(reorder number U-DISK1)	General maintenance
Ferrule, 1/16 graph vesp, 0.4mm, (reorder number U-FV001)	General maintenance
O-ring insertion tool (reorder number SERZ-0285)	General maintenance
O-ring removal tool (reorder number SERZ-0351)	General maintenance
Selection of washers, unions and clamps	Installation
Copper tubing (3m)	Installing gas lines
Column connector	Connecting fused silica transfer line to the GC column
Tube extractor tool	Removing sorbent tubes from UNITY
Split filter tube (reorder number SERUTD-5065)	Used when samples are not being re-collected
Fused silica transfer line insert (reorder number SERUTD-5093)	Installation

Other useful tools that do not come with your TD system include

Tool or consumable	**Used for**
1/8 inch T piece unions	T'ing into existing gas lines
Digital flow meter	Verifying flows, checking for leaks
Helium leak detector	Pin pointing gas leaks
Column cutters	Cutting columns
1/8 inch tubing cutter	Cut gas supply tubing

INSTALLATION FAX BACK FORM

If you have requested installation of your TD equipment by a Markes Service Engineer please complete the following form and return via fax (+44 1443 231531) or email (service@markes.com).

Company Name:	
Contact Name:	Contact Tel No:
Company Address:	

PC that will run the TD

Make	Processor	RAM	Windows Version
No. of **free** serial ports	Does it also run data handling or other lab equipment: Yes / No If Yes – Please give details:		

GC system onto which the TD will be installed

Make	Model
Datahandling system to be used	Detector:: If Mass Spec. Detector please state: Make: Model:

Additional Accessories e.g. autosampler; headspace system

Accessory:	
Make:	Model:

Gas supply

Carrier Gas	Type: He / N_2 delete as appropriate	Purity (min 5.0 grade)
Pnuematics Gas	Type: dry air / N_2 delete as appropriate	Dew point (at least -50°C)

Any additional factors you feel might affect installation of your system
