Markes International TT24-7 Near Real Time Analyzer - Pre-installation Manual

This document is applicable to all TT24-7 versions i.e. 'e1', 'e2', 'e3'

If you have any questions regarding the information in this manual please email service@markes.com for further advice

Please ensure that you have all the required services in place before requesting installation of your system.

Installation in the UK may be requested via the FaxBack form at the end of this document

1. Computer specifications for TT24-7 control

In general a PC with sufficient resources to run 32 bit Windows™ (95, 98, ME, 2000, XP, NT4 (series4)) will have adequate performance for controlling TT24-7. We strongly recommend the use of currently supported versions of Windows™ software.

The minimum PC requirement recommended is a 400MHz Pentium with 64MB RAM and a minimum of 20MB of free disc space (for the TT24-7 software installation). A Windows compatible mouse is also required.

The user interface requires a minimum SVGA (800 x 600 pixel) screen resolution and ideally an XGA (1024x768 pixel) screen resolution 256 colour in both cases.TT24-7 user interface, is to be used. The browser is not required for system operation.

1.1 Communications between PC and TT24-7

The communication between the TT24-7 and the PC is via **two** spare serial port connections.

TT24-7 communications require the PC serial port settings to be Windows default values. Changes to these settings may result in communications errors between the TT24-7 and the PC.

Two x 9 way Null modem cables are supplied for connecting TT24-7 to the PC communication ports.

Additional serial ports may be made available on the PC via one of the following options

*1.1.1 PCI serial card – **preferred option***

A DESKTOP PC with an available PCI slot can be fitted with a PCI serial card to add two serial ports to the PC.

Requires Windows 95, 98, 2000, or XP software

1.1.2 USB Hub

A powered USB hub (such as U-USBHB) will extend 1 USB port on the PC usually to 4 USB ports. Then a USB-serial port cable (such as U-USBSR) can be used to convert each USB port into a serial port. In this way a single USB port can provide 4 serial connections.

Requires Windows 98, 2000, XP or ME software

2. GC equipment requirements

TT24-7 is usually connected to a gas chromatograph configured with appropriate conventional or mass spectrometer (MS) detectors. No conventional GC injector is required for TT24-7 operation.

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

2.1. Access into the GC oven

The TT24-7 heated transfer line is lined with 0.25 mm I.D., 0.35 mm O.D. uncoated deactivated fused silica which butt connects with the capillary analytical column inside your GC oven. It is important that the heated and insulated portion of the transfer line extends as far as the skin of the GC oven such that the GC oven heating begins at the point where heating of the transfer line ends. An access hole (~32 mm diameter) is thus required into the GC, with a 6.5 mm hole in the GC inner oven wall.

Alternatively the transfer line can be inserted through a split splitless injector body (with no glass liner, septum cap or column outlet fitted) fitted to the Agilent 6850 / 6890 or Thermo Quest GC's. A separate kit – TGK-1000 – is required for installation through the injector body on onto the Thermo Quest GC's and this kit includes a pre-configured cable for the start / ready synchronization.

2.2. GC configuration / parameter selection

From a GC perspective, TT24-7 may simply be regarded as a multipurpose, stand-alone GC injector for capillary operation. Packed columns can be connected to the TT24-7 transfer line outlet, but a 0.32 mm i.d. fused silica insert is recommended for the column flows required. In addition an appropriate secure mounting for the packed column will be required. Please contact your local distributor for further information.

No conventional GC injector is required for operation. The rest of the GC system - column, oven, data handling, detector, etc. - should be configured and used, as per normal chromatographic practice for the analytes of interest.

If multiple applications are to be carried out or if samples are uncharacterised; for example when monitoring unknown atmospheres, a good general purpose GC configuration comprises 25-30 m, 0.25mm or 0.32 mm ID, 1 or 2 µm phase thickness bonded methyl silicone capillary column with a FID or mass spectrometer detector.

3. Laboratory location

3.1. Space requirements

TT24-7 occupies minimal bench space, being only 23.5 cm wide, and can sit either side of the gas chromatograph. Details for the instrument are given below:

Weight (kg)	20
Width (cm)	23.5
Height (cm)	48
Depth (cm)	50
Max power consumption (W)	650

3.2 Recommendations relating to the quality of the gas lines

As TT24-7 is a concentrator, even trace level contaminants in the gas lines can become significant interferents in the chromatograms produced. It is recommended that gas lines be constructed of solvent washed, 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. Use a high quality, stainless-steel-diaphragm cylinder head regulator for the carrier gas supply.

4. Services

4.1. Power

TT24-7 is automatically compatible with all conventional mains power supplies ranging from 100 to 240 V (650 Watts Max), 47 to 63 Hz. It is not necessary to manually select or switch voltages.

4.2. Pressure controlled supply of dry gas (air, nitrogen or helium)

4.2.1 Functions

TT24-7 requires a pressure-regulated supply of dry air, nitrogen, or helium at 50 psi both to actuate the main valves and to purge the cold trap box.

Note: It is recommended that TT24-7 is not switched or left on without this gas supply. An inbuilt sensor / switch will ensure that the coolers remain switched off in the event of no gas supply – this will prevent the TT24-7 cold trap from cooling down and hence achieving 'Ready' status.

Note: If Helium is to be used as dry gas please be aware that due to the thermal properties of helium, the TT24-7 cold traps can only be operated at ambient temperatures – however these temperatures will be suitable for the majority of applications e.g. chemical agents etc. For sub-ambient cold trap temperatures air or nitrogen must be used.

It is recommended that a secondary pressure regulator be used to control the supply of dry gas to TT24-7 in addition to that controlling the general laboratory line pressure. Any conventional pressure regulator should suffice for this and suitable pneumatic control may already be available on your GC. Alternatively, Markes International Ltd. supply a pneumatic control accessory (P/N U-GAS01) for both pneumatic and carrier gas. It is recommended that the pressure in the laboratory air line be 10 psi higher than that supplied to TT24-7.

4.2.2. Specification required (dryness / purity)

The compressed air, nitrogen, or helium **must be dry** (dew point lower than -35°C). Conventional air compressors / nitrogen generators may be used provided the gas produced is adequately dried.

4.2.3. Consumption

Pneumatic gas flows at ~50 ml/min into the cold trap box creating a slight positive pressure and minimizing ingress of water from the laboratory atmosphere. If the cold trap box was not purged, ice would quickly build up around the Peltier cell, which is maintained at -25°C throughout TT24-7 operation and this could cause damage to the system.

Gas consumption for valve actuation is minimal.

4.3. Pressure controlled carrier gas supply

4.3.1. Gas selection - type / purity

Helium is invariably used as the carrier gas for capillary chromatography and nitrogen for packed column or sensor work. 5.0 grade (i.e. 99.999%) or higher purity gas is recommended in either case.

Although Hydrogen may be used as a carrier gas for standard GC and thermal desorption applications, care must be taken in case the high temperatures involved in thermal desorption cause hydrogenation of reactive and / or unsaturated species. The usual precautions, with respect to monitoring for large leaks, must be taken if hydrogen is used.

4.3.2. Line pressures and recommended pneumatic control

TT24-7 requires a regulated supply of carrier gas at a pressure to suit the analytical column / system selected. The TT24-7 gas flow path has minimum (<2 psi) impact on

total system impedance. The performance of most common capillary columns is optimised at between 1 and 2 ml/min typically requiring between 10 and 30 psi head pressure. High quality pressure regulators incorporating a stainless steel diaphragm are recommended for carrier gas control. Suitable pneumatic control for the carrier gas may already be available on your GC. Alternatively a carrier gas control module such as U-GAS01 (see below) should be used. The pressure in the laboratory carrier gas line should be at least 10 psi higher than that supplied to TT24-7.

4.3.3. TT24-7 Pneumatic Control Accessory - U-GAS01

To ensure adequate pneumatic control to the TT24-7 it is recommended that both the carrier gas and the dry gas are regulated between the cylinder and the TT24-7 itself. Markes recommend the pnueumatic control accessory U-GAS01 for this. U-GAS01 includes a high quality Porter regulator and 0-60 psi gauge for control of the carrier gas and a Norgren regulator and 1-100 psi gauge for control of the dry gas. Both gas lines are also equipped with on / off toggle valves. Contact your local Markes dealer for more information.

4.4. Electronic pneumatic control

Electronic or programmable pneumatic control for the TT24-7 carrier gas supply can be used without any changes to the instrument. The GC must be configured with an appropriate electronic pneumatic control module and it is recommended that a carrier gas control module such as the U-GAS01 (see below) is used to regulate the carrier pressure to the GC module.

The GC manufacturers already tested and operational for use with TT24-7 are the Agilent 6850/90 or Thermo Quest GC's.

4.4.1 Agilent 6850 / 6890 GC

Note: the GC must be configured with an ***additional*** EPC module to that supplied with any injector which is to be used for liquid injection.

For example an Agilent 6890GC should be supplied with

either a split / splitless injector with EPC (***dedicated*** to the thermal desorber)

or an additional EPC module for split / splitless inlet [G1544-60500]

(**Note:** do not use the Agilent ***Auxiliary*** EPC module for electronic pneumatic control with column head pressure monitoring)

Connection to an Agilent EPC module in this way allows precise electronic control of constant, or ramped, carrier gas pressure at the split inlet to the fused silica transfer line independent of flow. This therefore provides retention time stability independent of changes to split flow, trap temperature, tube / trap packing etc. as well as the standard benefits of total flow read-out, enhanced diagnostics and pneumatic programming that is directly linked to the GC oven programme.

For connection to an Agilent 6890 GC it is essential that the firmware on the GC be as follows:

For 6890 A-series the firmware should be A.03.08 or later and for 6890 N-series, the firmware needs to be N.04.08

To check the firmware version, use the keyboard on the GC press: O*ptions, Diagnostics, Instrument Status* and then scroll down to *'version'* where you will see the current GC firmware version.

4.4.2 Thermo Quest GCs

TT24-7 can be connected to a Thermo Electron GC fitted with a Digital Pressure Flow Control (DPFC) module. The Thermo GC DPFC module must be set up for back pressure regulation which requires the two bottom switches on the EPC PCB to be correctly set (orientated toward the front of the GC) to operate correctly.

4.4.3 Shimadzu GCs fitted with Advanced Flow Control (AFC)

TT24-7 can be connected to a Shimadzu GC with AFC module. The inlet split mode on the Shimadzu GC must be set to Direct and the septum purge flow rate should be set to ~ 5 ml/min. When connected to the Shimadzu GC the TT24-7 ready logic must be set to Open or the GC ready logic can be changed on the GC keypad.

For further information on connecting TT24-7 to these gas chromatographs please contact Markes International (techsupport@markes.com)

4.5 Filters

Following good laboratory practice, it is recommended that filters are installed in the carrier gas line just upstream of connection to the TT24-7 – GC analytical system. An oxygen trap, moisture trap and hydrocarbon trap should be considered. All these items are available from Markes International.

INSTRUMENT FAX BACK FORM

If you have requested installation of your TT24-7 by a Markes Service Engineer, please complete this form and fax (+441443 231531) or e-mail (service@markes.com) to us prior to installation date. Alternatively contact your local distributor for assistance.

Company name	
Contact name	Contact tel. no
Address	

PC that will run TT24-7

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

GC system onto which TT24-7 will be installed

Make	Model
Data handling system to be used	Is there a mass spec detector? Make Model

Additional Accessories e.g. auto sampler; headspace system

Accessory	
Make	Model

Gas supply

Carrier gas Type:	He / N_2 / H_2 (delete as appropriate)	Purity (min 5.0 grade):
Pneumatics gas Type:	dry air / N_2 / He (delete as appropriate)	Dew point (≤ 35°C):

Any additional factors you feel might affect installation of your system

If you have any queries about this form please contact - service@markes.com -