Gas chromatograph

Thermo Trace-1300, Trace-1310

and UniChrom

Contents

General notes

Gas chromatographs Trace-1300, Trace-1310 can be considered as descendants of Thermo models line Trace-2000 and Trace Ultra.

Trace-1300 series chromatographs are instruments with electronic temperature and gas flow control. Instrument control made via panel touch-interface or UniChrom system.

Main instrument highlights:

- On-board computer with touch interface
- Instrument connection over Ethernet TCP network
- Modular detectors capable of fast removal or exchange
- Up to 2 inlets and detectors with independent thermostats
- High heating and cooling oven speeds
- Wide dynamic range for ionization detectors

Instrument connection

Instrument connected to the Ethernet network via UTP cable.

Ethernet cable may be for direct GC-PC link and for connection using LAN switching equipment.

- Direct connection GC-PC requires **cross-cable**, i.e. cable with different wiring scheme at each end:
  one end **T568A** (W-gr,G,W-o,Bl,W-bl,O,W-br,Br),
  another end **T568B** (W-o,O,W-gr,Bl,W-bl,Gr,W-br,Br)
- Connection using switch requires **straight cable -**
  both ends of the cable have identical wiring scheme, generally
  T568B (W-o,O,W-gr,Bl,W-bl,Gr,W-br,Br)

Proper cable should make lit the LINK LED on PC network card and on the GC.

For software connection required the instrument IP address:

- IP can be determined from instrument consoled [Options] / [Connections].

  Default configuration oft the instrument: one of the addresses in network **192.168.10.0** mask **255.255.255.0**

Please note, the GC-PC connection is possible only of they are in one IP sub-network or the routing established between different IP networks.

In the case of one IP sub-network as the rule required one of the following actions:

- Forcibly assign to the PC the IP-address from 192.168.10.0 sub-network with mask 255.255.255.0
- Assign IP alias to the network adapter (yet another IP-address) from sub-network 192.168.10.0 mask 255.255.255.0
- Forcibly assign to the GC then IP address from Enterprise LAN
- Use the IP routing between GC and PC

Practically makes sense during network configuration using the **ping** utility, which allows testing network connectivity level (IP link reliability).

ping 192.168.10.150

…..

Proper connection makes the IP packet come from PC and return echo reply back from GC.

The instrument listens TCP port number 2551

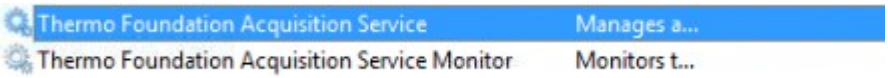
So the connection port name in UniChrom has to be entered similar to:

tcp:192.168.10.150:2551

Work with simultaneously with Xcalibur installed

Trace-1300 instruments do not allow simultaneous access from different systems for control and data collection (contrary the Agilent-7890 and Chromatec-Crystall allows so).

When the PC has Thermo Xcalibur software installed, to provide access to the instrument pair of Windows “Services” which are seizing instrument has to be stopped.



Only the PC Administrator can stop and start Windows services.

Instrument configuration

Configuration of Trace-1310 is made from GC console or using Thermo Xcalibur configuration utilities.

UniChrom during the GC connection analyses the system configuration and allocates in the device tree all the available objects and control zones

External devices which have own thermostats are shown in UniChrom as aux zones or heated samplers.

Gas channel peculiarities

The Trace-1300 instrument supports the following modes for carrier gas channel:

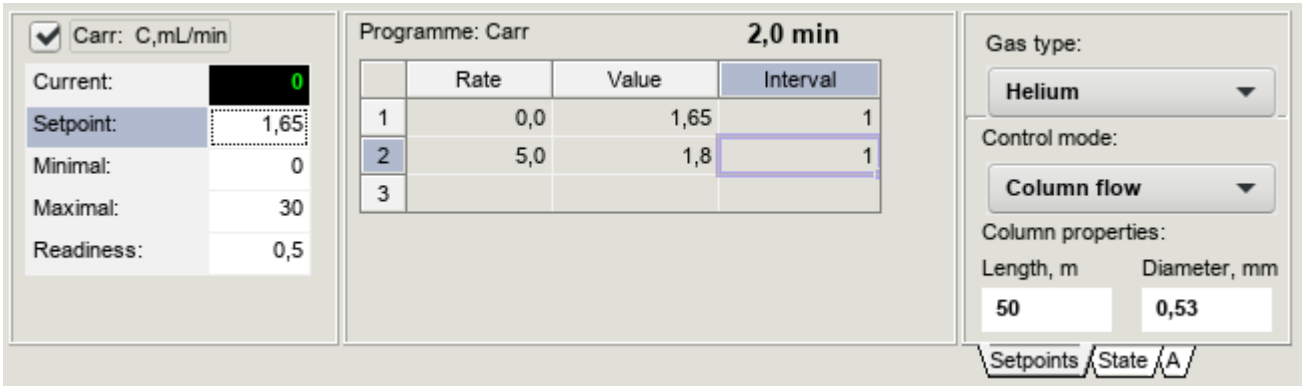
Carrier gas modes

Constant flow and Programmed flow

From the UniChrom point of view these modes are distinct only in gas control program presence.

User has to select in gas parameter panel (rightmost-one) the carrier gas control mode:

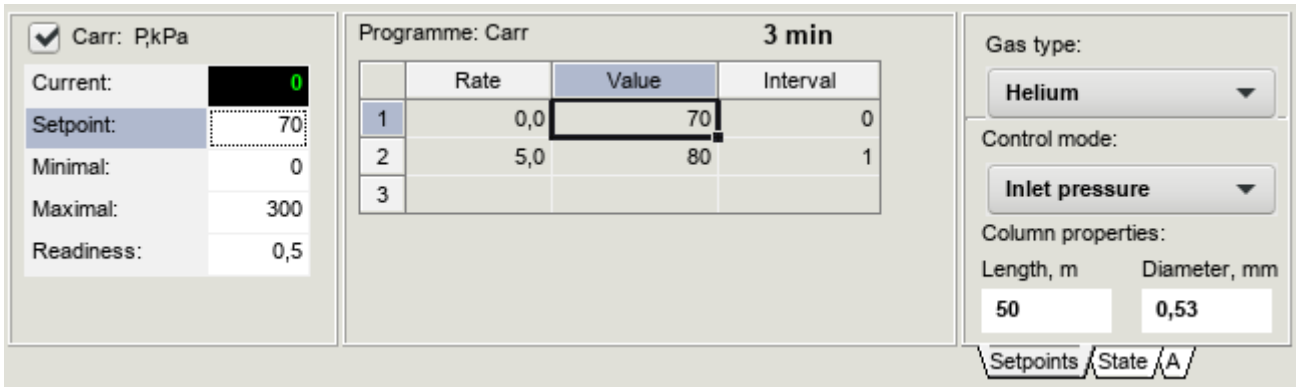
Column flow.



Constant pressure and Programmed pressure

The user has to select in gas parameter panel (rightmost) gas control mode

Inlet pressure.



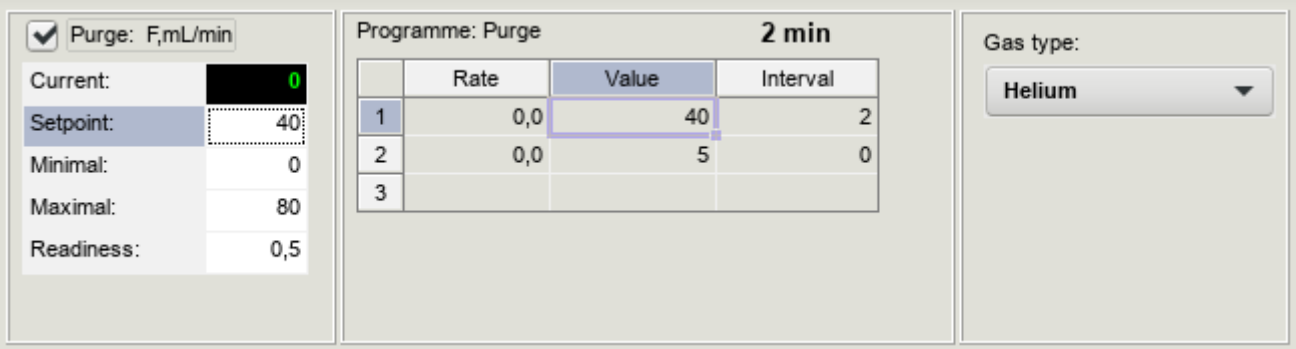
Inlet gas velocity and back-pressure control is not supported by the instrument.

Split regulator modes

Inlet split channel can work in the following modes:

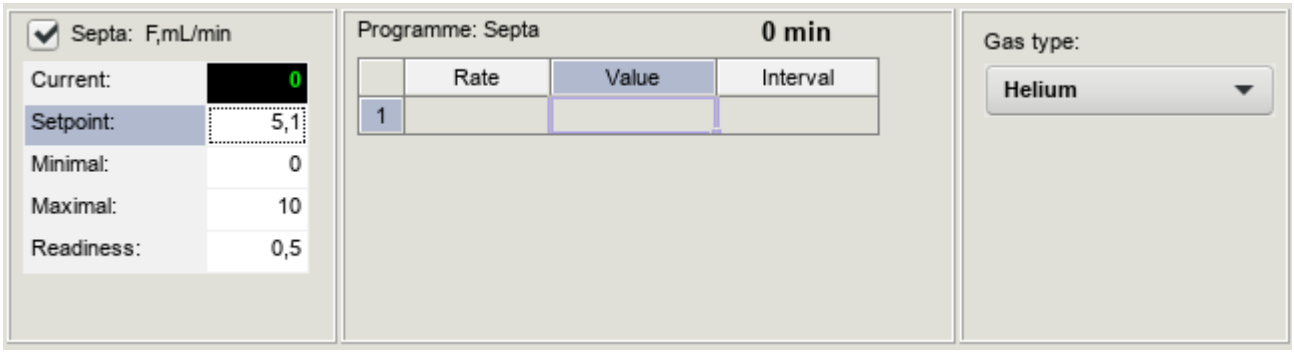
Split flow mode

In this mode the program for split gas channel is entered with 1st non-zero ramp



2nd ramp provides the split flow in gas-saver mode. The picture above shows that 2 minutes after start the gas saver becomes active and sets split flow to 5 ml/min.

In the active split mode the septa purge flow can be set at static value but not ramped.



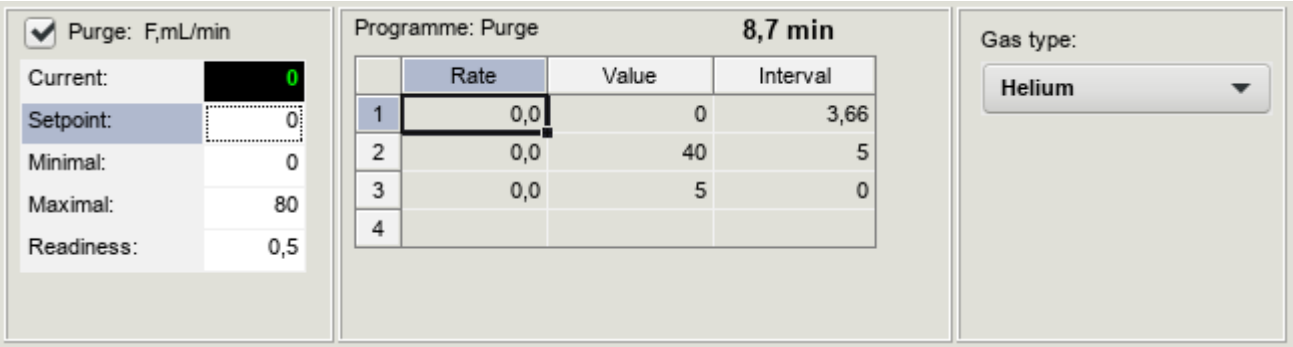
Setting the septum ramp program makes no sense in this case.

Splitless flow mode

In this mode the split flow channel is closed in the beginning of analysis and then opens in specified amount of time. For entering this split mode the 1st ramp has to be at 0, the length of 1st ramp determines the time in which the split channel would be opened.

2nd program ramp determines the split channel flow after it is opened. The length of 2nd ramp determines the time in which the gas-saver mode becomes active.

3rd program ramp determines the split-channel flow in gas-saver mode.



Splitless flow mode with Surge

Not supported at the moment

Instrument configuration parameters

Terms

Parameters marked [C], retained for compatibility or have technological purpose. It is desired that they were absent or configured at default values. Parameters marked [T] are technological and used only in instrument field tune-up. The page of driver properties (in Configuration Editor) mentioned in “quotes” and marked fro instance as: «Detectors». Setting values allowed in hexadecimal form (e.g. 19 = $13).

Parameter	**Type**	**Designation and the range of input values**
WaitTime		Equilibration time in seconds in the range (0 .. 24*60*60) before the system becomes ready. Default value 20. Entered at «Behaviour» page
FlameDelta0 .. FlameDelta1		FID flame-on level - signal value which means for the instrument the flame is lit. Default value 2. Entered at «Igntion» page.

Working with instrument

After successful connection the UniChrom obtains actual and methodical (setpoints) instrument state. As soon the instrument modifies its state after the «entire» method upload there is no sense in editing «Chromatograph» page directly. The page should be copied (right mouse button on «Chromatograph» tab and select «Make a copy»). The copy made can be altered and prepared to new analytical method then uploaded to instrument via context menu «Load» at the tab. Details in working with instrument modes are described in «Users guide and operation manual» of UniChrom.

Automatic samplers

In general for making analysis with the sampling system the GC method (instrument setpoints) have to be accompanied with sampler method. At the page «GC instrument» in UniChrom every sampler is depicted as separate zone contained in general one heated object and two sampling machines (sampler towers). Temperature of sampler is obviously that heated object. Sampler parameters (probe injection way and other attributes not related to sample) are entered in properties of each injection machine (tower).

All the parameters related to sample itself as:

- Sample vial number
- Sampling machine number (tower number)
- Injection volume (sample amount)
- Sample temperature
- Sample exposition (preheating) time
- etc.

are entered in the «Samples» table of UniChrom.

The sampler parameters — part of GC method, but the sample parameters — part of the sequence.

Automatic liquid sampler AS-3000

Sampler contains XX vials for samples and YY vials for waste, ZZ vials for solvent. Washing the sampler syringe take place from vial (parameter «number of sample wash»). Details of sampler parameters are in sampler manual.

Depending on the sampler version the list of supported parameters would be limited or expanded to full.

Parameter	**Designation and units of measurement**
Injection dwell time	1 s — wait time with syringe needle in inlet (preheat)
Post injection dwell time	0 s — wait time after sample is injected
Viscosity delay	1 s — wait time with syringe plunger in top position for viscous liquids
Pre wash with solvent A	4 — number of rinses load/drain of solvent **A** before sample injection
Pre wash with solvent B	4 — number of rinses load/drain of solvent **B** before sample injection
Post wash with solvent A	4 — number of rinses load/drain of solvent **A** after sample injection
Post wash with solvent B	4 — number of rinses load/drain of solvent **B** after sample injection
Number of plunger movements	4 — number of plunger movement when loading sample
Pre wash with sample	4 - number of rinses syringe with sample
Sample skim depth	1 — syringe depth in vial
V syringe	10000 nl — syringe volume in nanoliters (10^{-9} dm^3)