

# **Thermo Xcalibur**

TRACE 1300 1310 Gas Chromatograph Setup

# **User Guide**

Revision D

September 2014



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Release history: The Xcalibur manuals support Xcalibur version 2.2 and above.

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# **Preface**

This guide provides the instruction for the control of the TRACE 1300/1310 gas chromatograph TRACE 1300/1310 through Xcalibur.

The Thermo Xcalibur<sup>™</sup> mass spectrometry data system uses a sequence to specify samples of various types and a processing method to automatically detect and analyze the sample. This manual describes how to create and work with processing methods and sequences. To provide us with comments about this document, please click the link below. Thank you in advance for your help.

#### Contents

- Related Documentation
- System Requirements
- Safety and Special Notices
- Safety and Special Notices
- Contacting Us

# **Related Documentation**

Thermo Fisher Scientific provides these documents for Xcalibur:

- Xcalibur Getting Started (Quantitative Analysis)
- Acquisition and Processing User Guide
- Quantitative Analysis User Guide
- •Qualitative Analysis User Guide
- Creating and Searching Libraries User Guide
- XReport User Guide
- Xcalibur System and 21 CFR Part 11 Compliance Administrator Guide

• •Help from within the software

#### To view product manuals

Go to Start > Programs > Xcalibur > Manuals > product-name.

- To open Help
  - From the product-name window, choose **Help** > **product-name Help**.
  - If available for a specific window or dialog box, click **Help** or press **F1** for information about setting parameters.

For more information, including upcoming application notes, visit www.thermo.com.

## **System Requirements**

product-name requires a license. In addition, your system must meet these minimum requirements.

System	Requirements					
PC	4 GHz processor with 4GB RAM					
	CD-ROM drive					
	• Video card and monitor capable of 1280x1024 resolution (XGA)					
	• 250 GB or greater available on the C: drive					
	NTFS format					
Software	Microsoft <sup>®</sup> Windows <sup>®</sup> XP Professional with Service Pack 3					
	• Windows 7 Professional (32-bit) with Service Pack 1					
	<ul> <li>Xcalibur<sup>™</sup> 2.1 or higher</li> </ul>					

## **Safety and Special Notices**

Make sure you follow the precautionary statements presented in this guide. The safety and other special notices appear in boxes.

Safety and special notices include the following:



**CAUTION** Highlights hazards to humans, property, or the environment. Each CAUTION notice is accompanied by an appropriate CAUTION symbol.

**IMPORTANT** Highlights information necessary to prevent damage to software, loss of data, or invalid test results; or might contain information that is critical for optimal performance of the system.

Note Highlights information of general interest.

**Tip** Highlights helpful information that can make a task easier.

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# **TRACE 1300/1310 Configuration**

This chapter contains the instruction to configure your TRACE 1300/1310.

#### Contents

- Introduction
- Configuration General Tab
- Configuration Inlets Tab
- Configuration Detectors Tab
- Configuration Valve Oven Tab
- Configuration Auxiliary Temperature Tab
- Configuration Auxiliary Carrier Tab

1

# Introduction

This dialog box is available from the Instrument Configuration window. To open this view choose Start | Programs | Thermo Foundation | Instrument Configuration.

Click the **TRACE 1300/1310** button located in the Available Devices column. Click **Add**, then **Configure** button. The TRACE 1300/1310 Configuration window is visualized. See Figure 1.

General Inlets Detectors Valve	e Oven Aux. Temperature Aux. Carrier			
Connection	Handshaking			
Network address:	Remote start in: High -> Low 🔽			
	End of run out: High -> Low 💌			
Advanced	Inhibit ready: None 💌			
Options	GC ready out: When Low 💌			
Pressure units: kPa 💌	Start of run out: High -> Low 💌			
Lock GC input during run: 🛛 🗹	Prep-run out: When Low 💌			
Auto-start:				
Get OK Cancel				

Figure 1. TRACE 1300/1310 Configuration Window

Configuration windows is subdivided into the following tabs.

- Configuration General Tab
- Configuration Inlets Tab
- Configuration Detectors Tab
- Configuration Valve Oven Tab
- Configuration Auxiliary Temperature Tab
- Configuration Auxiliary Carrier Tab

Configuration windows includes the following common buttons:

**Get** — Use this button any time you want to automatically enter the configurations already entered into your GC.

**Ok** — Use this button to close the dialog box and confirm your selection.

Cancel — Use this button to clears all modifications done.

**Help** — Use this button to open help instruction.

# **Configuration General Tab**

This tab allows to configure the network address, the handshaking parameters, and the pressure unit. See Figure 2.

**Figure 2.** Configuration Window: General Tab

General Inlets Detectors Valve Oven Aux. Temperature Aux. Carrier					
Connection	Handshaking				
Network address:	Remote start in: High -> Low 🔽				
	End of run out: High -> Low 💌				
Advanced	Inhibit ready: None 💌				
Options	GC ready out: When Low 💌				
Pressure units: kPa 💌	Start of run out: High -> Low 💌				
Lock GC input during run: 🕑	Prep-run out: When Low 🔽				
Auto-start:					
Get	OK Cancel				

This tab includes the following fields:

- Connection
- Option
- Handshaking

## Connection

In this field you set the LAN communication between the TRACE 1300/1310 and the data system. The parameters are described below

• Network Address — Enter the I.P. address to allow the LAN control of the GC through the Thermo data systems.

The TRACE 1300/1310 is shipped with a default IP address, that may not match the needs of the LAN where the GC must be installed. To change the default values, contact your LAN administrator and ask the IP address to be assigned, the netmask, and eventually the port.

- The IP address is a 3 digits x 4 fields given by the network administrator e.g. 192.168.127.10
- The netmask is a 3 digits x 4 fields given by the network administrator e.g. 255.255.255.0

- The port is a 4 digits number given by the network administrator e.g. 4001 (4001 is usually the CPU/LAN default).
- The default IP address of the TRACE 1300/1310 CPU is **192.168.127.254**.
- Advanced Click on this button to open the Advanced LAN Setting window where the advanced parameters for LAN communication may be set.
  - Port No it specifies the port number
  - Timeout (ms) it specifies the timeout value in milliseconds. Generally the two default values are 500 and 4001 respectively.

## Option

This field includes the following options.

- Pressure Unit From the drop-down list, choose one: psi, kPa, bar.
- Lock GC input during run box if GC input are not desired during the run.
- Autostart Select this check box if you want the GC start automatically when ready.

## Handshaking

To configure the signals from external devices, such as an autosampler or mass spectrometer, during analysis. To allow other devices to run properly, you must indicate how the signal will change.

- **Remote Start In** Allows another device to start the GC. The range is L to H (low to high), H to L (high to low). For the AI 3000/AS 3000 II autosampler, you must select H to L.
- End of Run Out Signals another device that the run has ended. The range is L to H (low to high), H to L (high to low).
- Inhibit Ready Delays readiness until the GC receives a signal from another device. The range is L (low), H (high) and Neither.
- **GC Ready Out** Signals another device that the GC is ready. The range is L (low), H (High).
- **Start of Run Out** Signals another device, that the run has started. The range is L to H (low to high), H to L (high to low).
- **Prep Run Out** Signals another device that the GC is preparing for a run. The range is L (low), H (high).

# **Configuration Inlets Tab**

Use this tab to select the inlets installed on your GC and the carrier gas used. See Figure 3.

General	nlets Detectors	Valve	e Oven 🛛 Aux. Tem	perature Aux. Carrier
Inlets	<b>T</b>			
	Туре		Carrier gas	Name
Front:	PTV	*	Helium 🔽	Front Inlet
Back:	S/SL	*	Helium 💌	Back Inlet
Options				
Hydroger	n sensor:			
Get			ОК	Cancel

Figure 3. Configuration Window: Inlets Tab

This tab includes the following fields:

- Inlets
- Options

## Inlets

This field includes the following options:

- Inlet Type Choose the front/back injector module installed on your GC.
  - Front Choose one: None, S/SL, S/SL Backflush, Gas Sampling Valve, Helium Saver S/SL, PTV, or PTV Backflush.
  - Back Choose one: None, S/SL, S/SL Backflush, Gas Sampling Valve, Helium Saver S/SL, PTV, or PTV Backflush.
- **Carrier Gas** Choose the type of carrier gas used to supply the front/back injector module.
  - Front Choose one: Helium, Hydrogen, Nitrogen, Argon, or Argon/Methane.
  - Back Choose one: Helium, Hydrogen, Nitrogen, Argon, or Argon/Methane.
- Name Enter the front/back position the injector module is installed.

## **Options**

Select Hydrogen sensor check box if the hydrogen sensor is installed into the GC.

# **Configuration Detectors Tab**

Use this tab to configure the detectors you will use with your TRACE 1300/1310. See Figure 4.

igure 4. Configuration Willdow. Detectors lab						
General I	nlets De	tectors Valve Ov	en 🛛 Aux. T	emperature	Aux. Carrier	
Detectors	and data cha	nnels				
	Туре	Makeup gas	Channe	el name 🛛 Acq.	rate (Hz)	
Front	NPD 💊	Nitrogen	🖌 Chann	el 1 10	*	
Back:	ECD 💌	Nitrogen	✓ Channel	el 2 10	~	
Aux R:	TCD 💌	(none)	🗸 Chann	el 3 10	~	
Aux L:	FID 🔽	Helium	🖌 Chann	el 4 10	~	
Options Line frequency: 50 Hz						
Get OK Cancel						

**Figure 4.** Configuration Window: Detectors Tab

If you disconnect your detector from your GC, remember to reconfigure your TRACE 1300/1310 here. Detectors chosen here display instrument setup pages and list in the Detector Events located in the "Run Table Page" on page 112.

This tab includes the following fields:

- Detector and Data Channel
- Options

## **Detector and Data Channel**

This field includes the following options:

• **Detector Type** — Choose the front/back/aux L/aux R detector module installed on your GC, TRACE 1310 Auxiliary Oven (Valve Oven), or both.

- Front Select the front detector module (None, FID, ECD, NPD, TCD, FPD, PDD, or GDI) installed on the GC.
- Back Select the back detector module (None, FID, ECD, NPD, TCD, FPD, PDD or GDI) installed on the GC.
- Aux L Select the auxiliary left detector module (None, FID, ECD, NPD, TCD, FPD, PDD, or GDI) installed on the TRACE 1310 Auxiliary Oven module.
- Aux R Select the auxiliary right detector module (None, FID, ECD, NPD, TCD, FPD, PDD, or GDI) installed on the TRACE 1310 Auxiliary Oven module.

**Note** When GDI is selected, the button **Configure GDI...** is visualized for configuring the GDI detector. See Configuring a GDI Detector.

- Makeup Gas Choose the type of makeup gas to use for the front/back/aux L/aux R detector modules.
  - Front Choose one: None, Helium, Hydrogen, or Nitrogen.
  - Back Choose one: None, Helium, Hydrogen, or Nitrogen.
  - Aux L Choose one: None, Helium, Hydrogen, or Nitrogen.
  - **Aux R** Choose one: None Helium, Hydrogen, or Nitrogen.

**Note** The FPD detector does not have makeup gas so the makeup field is disabled.

- Acquisition Rate (Hz) Select the number of data points to take per second during the acquisition. The maximum acquisition frequency is 10 Hz.
- **Channel Name** Channels 1 through 4 are the data sources connected to the GC.

#### **Options**

This field includes the following option.

• Line Frequency — Select the AC power frequency (50 Hz or 60 Hz) that your GC is plugged into. The line frequency control indicates allowable scan rate values.

#### **Configuring a GDI Detector**

The GDI module factory set-up includes three flow restrictors providing a full scale of 50 mL/min of Nitrogen. All three channels are set to **Nitrogen**, and 50 mL/min **full scale** by default.

If a different gas is used, it must be configured, and the full scale also change accordingly. Use the following gas conversion factors to calculate the new full scale.

He = 1.10 H <sub>2</sub> = 2.20 Air = 0.96 Ar = 0.84 Ar/CH <sub>4</sub> = 0.86	
--	--

To obtain the new full scale, multiply the N2 full scale (50 mL/min) by the conversion factor.

He - 55 N	$H_{0} = 110.0$	Δir – 48 0	Δr – 42 0	Δr/CH₄ – 43 0
10 - 00.0	112 - 110.0	7111 - 40.0	711 - 42.0	7 17 01 14 - 40.0

If higher flow rates or very low flow rates are required, the flow restrictor must be replaced by custom one. When a custom flow restrictor is used, the new full scale must be determined. The module is designed to use 1/4-in. encapsulated porous metal flow restrictors.

**Note** For replacing the encapsulated flow restrictor and determining the new full scale, refer to the sections **Adding a Generic Detector Interface | Replacing the Flow Restrictors** in Chapter 9 of the *TRACE 1300/TRACE 1310 Hardware Manual*.

#### \* To configure a GDI Detector

- 1. In the **Configuration** window select the **Detectors** tab.
- 2. Select the Detector Type: choose GDI. The Configure GDI... button is visualized.

TR	TRACE 1300 Series GC Configuration										
0	General Inlets Detectors Aux. Oven Aux. Temperature Aux. Carrier										
Detectors and data channels											
		Туре		Makeup gas	Channel name	Acq. rate (Hz)					
	Front:	GDI	•	Configure GDI	Channel 1	10 💌					
	Back:	FPD	7	(none) 💌	Channel 2	10 💌					
	Aux R:	ECD	•	(none)	Channel 3	10 💌					
	Aux L:	TCD	•	(none)	Channel 4	10 💌					
	Options -										
	Line frequency: 60 Hz										
					ОК	Cancel					

3. Click Configure GDI ...; the GDI Configuration page is visualized.

GDI Configuration							
	Gasture	Full-scale flow					
Gas 1:	Helium 🔻	50.0 mL/min					
Gas 2:	Nitrogen	50.0 mL/min					
Care 2	Nitragen	50.0 ml /min					
Gids 5.		1 30.0 mbmm					
Max. de	tector temperature:	400 °C					
ADC ful	I-scale voltage:	▼ 1.0 V					
	ОК	Cancel					

- **Gas Type:** Select the type of gas used for the detector gases **Gas1**, **Gas2**, and **Gas3**. Choose one: Air, Hydrogen, Nitrogen, Helium, Argon, or Argon/Methane. Nitrogen is the default gas.
- **Full-scale flow** Set the full scale value of the restriction installed for each detector gas. Set a value in the range 1-1000 mL/min. Default value is 50 mL/min.
- Max. detector temperature: Select the maximum detector temperature in the range from 0 °C to 450 °C. The default temperature is 400 °C.
- **ADC full scale voltage:** Select the Analog Digital Converter input full scale voltage. Choose one: 1 V, 5 V, or 10 V. The default value is 1V.

# **Configuration Valve Oven Tab**

These controls allow you to configure and use a Valve Oven module coupled with your TRACE 1300/1310. See Figure 5.

Figure 5. Configuration Window: Valve Oven Tab



This tab includes the following fields:

• Valve Oven

## Valve Oven

- Valve Oven Module Select this check box to enable the setting for the Valve Oven module. See also "Auxiliary Temperature Page" on page 108.
- Valve Oven Events 1-8 Select this check box to enable Valve Oven events. See also "Run Table Page" on page 112.
- Heater 1: Select the components connected to the heater 1 among: Not present, Valve Oven, H. T. Valve Oven, and Aux 3. See also "Auxiliary Temperature Page" on page 108.
- Heater 2: Select the components connected to the heater 2 among: Not present, Aux Col. Oven, Aux 4, and Methanizer.

The temperature limits must be consistent with the configuration as for the auxiliary temperatures. See Table 1.

Table 1. Auxiliary Temperature Limits

Туре	Max Temperature °C	Available on:	Notes
Transfer Line	400	Aux 1, Aux 2	Primary module, display as Transfer Line.
Valve Oven	200	Aux 3 only	Secondary module (Valve Oven)
High Temperature Valve Oven	300	Aux 3 only	Secondary module (Valve Oven)
Aux Column Oven	250	Aux 4 only	Secondary module (Valve Oven)
Methanizer	400	Aux 4 only	Secondary module (Valve Oven)
Aux Temperature (generic)	400	All Aux 1, 2, 3, and 4	Primary and secondary modules, display as Aux Temperature (#)

# **Configuration Auxiliary Temperature Tab**

These controls allow you to configure and use an auxiliary temperature interface. See Figure 6

**Figure 6.** Configuration Window: Auxiliary Temperature Tab

General Inlets Detectors	Valve Oven	Aux. Temperature Aux.	Carrier
Auxiliary temperature control			
Aux. temperature module:		Oven cryogenics:	
External events 1 - 8:		Front inlet cryogenics:	
Heater 1: Transfer Line	~	Back inlet cryogenics:	
Heater 2: Transfer Line	*	Cryo. type: Liquid Nitrogen	~
Get		ОКС	ancel

This tab includes the following field:

• Auxiliary Temperature Control

## **Auxiliary Temperature Control**

The available options are:

- Auxiliary Control Module Select this check box to enable the setting for the auxiliary control modules and options installed on your GC. See also "Auxiliary Temperature Page" on page 108.
- External Events 1-8 Select this check box to enable external events. See also "Run Table Page" on page 112.
- Heater 1 Select the component connected to the Heater 1 among: No present, Transfer Line 1, and Aux Heater. See also "Auxiliary Temperature Page" on page 108.
- Heater 2— Select the component connected to the Heater 2among: No present, Transfer Line 2, and Aux Heater. See also "Auxiliary Temperature Page" on page 108.
- **Oven Cryogenics** Select this check box if the Oven Cryo option is installed in your GC. See also "Oven Page" on page 38.
- Front/Back Inlet Cryogenics Select this check box if the front/back inlet cryogenic option is installed in your GC.
- **Cryo Type** Select the coolant used by your cryogenic option. Choose one: Liquid Nitrogen or Carbon Dioxide.

## **Configuration Auxiliary Carrier Tab**

These controls allow you to configure and use an Auxiliary Carrier interface. See Figure 7

General Inlets Detectors	Valve Oven	Aux. Temperature	Aux. Carrier
Auxiliary carrier			
Auxiliary carrier module 1:		Auxiliary carrier module 2:	
Carrier gas 1: Helium	*	Carrier gas 4: Helium	~
Back-pressure mode:		Back-pressure mode:	
Carrier gas 2: Helium	*	Carrier gas 5: Helium	*
Back-pressure mode:		Back-pressure mode:	
Carrier gas 3: Helium	*	Carrier gas 6: Helium	*
Back-pressure mode:		Back-pressure mode:	
			Canad
Get			Lancel

Figure 7. Configuration Window: Auxiliary Carrier Tab

This menu includes both the Auxiliary Gas modules. One of them will be mounted inside the Valve Oven module, and the other into the GC. See also "Auxiliary Carrier Page" on page 109.

This tab includes the following field:

• Auxiliary Carrier Control

## **Auxiliary Carrier Control**

The available options are:

- Auxiliary Control Module 1 Select this check box to enable the setting for the auxiliary control module and options installed on your GC or Valve Oven module.
  - Carrier Gas 1 Select the type of the carrier gas in use for the selected auxiliary carrier line 1. The choices are He, H<sub>2</sub>, and N<sub>2</sub>.
  - Back-pressure mode Select the corresponding check box if the carrier line is used as vent.
  - Carrier Gas 2 Select the type of the carrier gas in use for the selected auxiliary carrier line 2. The choices are He, H<sub>2</sub>, and N<sub>2</sub>.
  - Back-pressure mode Select the corresponding check box if you want operating in back-pressure mode.
  - Carrier Gas 3 Select the type of the carrier gas in use for the selected auxiliary carrier line 3. The choices are He, H<sub>2</sub>, and N<sub>2</sub>.
  - Back-pressure mode Select the corresponding check box if you want operating in back-pressure mode.
- Auxiliary Control Module 2— Select this check box to enable the setting for the second auxiliary control module and options installed on your GC or Valve Oven module.
  - Carrier Gas 4 Select the type of the carrier gas in use for the selected auxiliary carrier line 4. The choices are He, H<sub>2</sub>, and N<sub>2</sub>.
  - Back-pressure mode Select the corresponding check box if you want operating in back-pressure mode.
  - Carrier Gas 5 Select the type of the carrier gas in use for the selected auxiliary carrier line 5. The choices are He, H<sub>2</sub>, and N<sub>2</sub>.
  - Back-pressure mode Select the corresponding check box if you want operating in back-pressure mode.
  - **Carrier Gas 6** Select the type of the carrier gas in use for the selected auxiliary carrier line 6. The choices are He,  $H_2$ , and  $N_2$ .
  - Back-pressure mode Select the corresponding check box if you want operating in back-pressure mode.

# **TRACE 1300/1310 Status**

This chapter describes the current status of the TRACE 1300/1310.

#### Contents

- Road Map Home Page Status Tabs
- Status
- Temperatures
- Flows
- Pressure

2

# **Road Map Home Page Status Tabs**

Status pages are located on Xcalibur Roadmap-Home page. Just highlight TRACE 1300/1310 from the Roadmap Status tab scroll list and see the following pages (status, temperatures, flows, and pressures) display the current GC status.

Status includes the following tabs:

- Status
- Temperatures
- Flows
- Pressure

## **Status**

This tab displays the current status of the GC and allows to perform maintenance and diagnostics. See Figure 8.

Figure 8. Status Tabs

Status	Temperature	Flow	Pressure	•
		waiuni	y ior prep-	iún key
Run				
Elaj	psed time:		0.07	minutes
Rer	maining time:		14.00	minutes
Dete	ctor signals			
FID	(front) signal:		0.06232	рА
ECI	D (back) signal:		0.8984	kHz
	Start		Stop	
D	iagnostics		Maintena	ince
Le	eak Check		Colum	n
				·

This tab includes the following fields and buttons:

- General
- Run
- Detector Signals
- Start
- Stop

	D	
•	Diagnostic	'S
		0

- Maintenance
- Temperatures
- Leak Check
- Column
- Column Setup

**Note** The buttons Diagnostic, Maintenance, Leak Check, and Column are available only when the GC is in the Stand-by condition.

#### General

This field includes the following option.

• Status — Indicates if the instrument is communicating to Xcalibur.

#### Run

This field includes the following options.

- Elapsed time The amount of time that has elapsed since the run started.
- Remaining time The amount of time that remains before the run finishes.

#### **Detector Signals**

This field indicates the signal level of the detector modules installed in the GC system.

#### Start

Click on this button to start a run.

#### Stop

Click on this button to stop a run in progress.

## **Diagnostics**

Click on this button to bring up diagnostic information including: firmware, hardware and network information; oven, injector and detector status; diagnostic of the possible error; and the run log which records errors that happens during the run time.

By clicking the relevant button the following diagnostics pages are visualized. See Figure 9.

Figure 9.	Diagnostic Pages	

rmware	Item	Value	A	Firmware	Item	Value
	Main unit version	01.99.59		F	Total runs	5028
ardware	HMI version	01.07.B1		Hardware	Date of manufacture	12/05/2011
etwork	Oven version	01.05.00		Markey 1	Main unit serial no.	710000007
OWVOIN	Front PTV inlet version	01.01.00		Network	Electronics serial no.	710100022
adings	Back S/SL inlet version	01.02.00		Poodings	HMI serial no.	710200017
Jaamigo	Front NPD detector version	01.04.00		neaungs	Front S/SL inlet serial no.	712300264
un Loa	Back ECD detector version	01.01.02		Bunlog	Back PTV inlet serial no.	710330001
	Aux. right TCD detector ver	. 01.01.04		Han Log	Front FID detector serial no.	712400470
rrors	Aux. left FID detector version	n UI.U2.UU		Errors	Back ECD detector serial no.	711420002
	Aux. control version	01.01.01			Aux. left I LD detector serial.	. 711410003
	Aux epitier 1 version	01.00.00			Valve oven serial no.	012345678901
	Aux. carrier 2 version	01.00.00	<b>~</b>		Aux, carrier 1 serial no. Aux, carrier 2 serial no.	713510014
	S	ave Clos	e		Sa	ave Clo
1300 Dia	agnostics		×	TRACE 1300 Dia	gnostics	
mware	Item	Value		Firmulare	Item	Value
and and	MAC address	B0:58:1E-00-00-00		i inniviale	Design AC voltage	230.0.V
ardware	IP address	10.06.17:00:00:0D		Hardware	Actual AC voltage	230.0 V 219.7 V
	Subnet mask	255 255 0.0			Actual AC Voltage	213.7 V 99.8 kPa
etwork	Gateway IP address	0000		Network	Oven door	Closed
	Data system TCP port	2551		F	Oven power level	12.2 %
eadings	Telnet TCP port	2550		Readings	Oven exhaust doors	24.0 %
	Boot loader TCP port	2552			Electronics temperature	31 °C
un Log				Run Log	Front inlet manifold temp.	30 °C
				Erroro	Back inlet manifold temp.	32 °C
-11013				LIIDIS	Front detector manifold temp.	31 °C
					Back detector manifold temp	. 31 °C
					Aux. left detector manifold t	46 °C
1 300 Dia	s. agnostics	ave Clos		TRACE 1300 Dia	s.	ave Cl
rmware	Entry Tir	me Old New		Firmware	Entry Ti	me Old New
ardware				Hardware		
etwork				Mahurdi		
adiaga				Deed		
adings				Headings		
un Log				Run Log		
riors				Errors		
-11010						
LINGIG						

## Maintenance

Click on this button to perform the maintenance of GC unit and modules when required. The Maintenance page is visualized. See Figure 10.

Figure 10. Maintenance Page

TRACE 1300 Mainten	ance				
Cooldown	Current	n rt	Maintenance record		
	Current		Date & time	Description	
Front inlet:	100 °C		22/01/2013 11:04	Replaced front septum	
Back inlet:	100 °C		22/01/2013 11:04	рірро	
Front detector:	100 °C				
Back detector:	🔲 30 °C				
Aux right detector:	100 °C				
Aux left detector:	100 °C				
Aux control heater 1:	95 °C				
Aux control heater 2:	96 °C				
Valve oven heater 1:	97 °C				
Valve oven heater 2:	95 ℃				
Ready					
Start Co	oldown		Add Standard Entry	Add Custom Entry	Delete Entry

This page includes the following fields.

- **Cool-down Temperature** To cool down the Oven, Front and Back Inlet, and Front and Back Detector temperatures. Select the check box of the component to cool-down, then set the target temperature. The default value is 50 °C. See also **Start Cool-Down** button.
- **Start Cool-Down** Click on this button to start the cooling of the Oven, Front and Back Inlet, and Front and Back Detector as set in Cool-down temperature field.
- **Maintenance log entries record** From the down list choose the maintenance to be done by selecting the corresponding check box.
  - Click Add Standard Entry to add standard maintenance entries. Select the item you
    want entry by checking the relevant check box.



Click **Add Custom Entry** to add a performed maintenance action into the Maintenance record list.

oldown	Course	- Ch	faintenance record		
Front inlet:	100 °C		Date & time	Description	
Back inlet:	100 °C		22/01/2013 11:04	Replaced front septum	
ront detector:	100 °C				
Back detector:	Add Custom	Main	tenance Entry		
Aux right detector:					
Aux left detector:	Maintenance	actio	n performed: Add Entry		
Aux control heater 1:				Cancel	
Aux control heater 2:			1		
/alve oven heater 1:	95 °C				
/alve oven heater 2:	93 °C				
Readv					

- Click **Delete Entry** to remove an item from the Maintenance record list.

TRACE 1300 Maintena	ince					X
Cooldown		Mainte	nance record			
	Current	Da	te & time	Description		
Front inlet:	□ 100 °C	22/	01/2013 11:04	Replaced front septum		
Back inlet:	100 °C	22/	01/2013 11:04			
Front detector:	100 °C					
Back detector:	□ 31 °C					
Aux right detector:	100 °C					
Aux left detector:	□ 100 °C					
Aux control heater 1:	□ 90 °C					
Aux control heater 2:	92 °C					
Valve oven heater 1:	94 °C					
Valve oven heater 2:	93 °C					
Beadu						
Start Co	oldown	Ade	d Standard Entry	Add Custom Entry	Delete Entry	

• **Close** — Click on this button to close and exit Maintenance page.

## Leak Check

Press this button to perform a leak check at the desired pressure. See Figure 11.

Figure 11. Leak Check Page

TRACE 1300 Leak Ch	eck	X
Inlet: Pressure setpoint: Allowed pressure drop: Duration:	<ul> <li>Front</li> <li>200.0 kPa</li> <li>10.0 kPa</li> <li>1.0 min</li> </ul>	Start Leak Check Close
Elapsed time: Remaining time: Measured pressure:	min min kPa	
Status:		

When you perform an automatic leak check, the GC measures the column flow with a true mass flow sensor and compares it to a calculated flow value obtained from the original column constant to see if the numbers match. The instrument detects a gas leak if there is a significant difference between the two values.

This procedure requires the use of the column-flowmeter connector. Refer to the *TRACE* 1300 and *TRACE* 1310 Hardware Manual for details.

To start the leak check operate as follows:

- 1. Select the Front/Back inlet
- 2. To start leak check press **Start Check** button. You can visualize the actual values of Pressure and Column flow.

**Note** To exit leak check menu without performing leak check, press **Close** button. To abort leak check press **Stop Check** button.

- 3. The system is automatically pressurized with carrier gas and sealed to perform leak check.
- 4. At the end of the leak check, if the system is free of leaks the Leak Check Passed message will be visualized.
- 5. If leaks are found, an error message will be displayed. In this case, eliminate leaks and repeat the leak check procedure.
- 6. Note that only a previous Column Characterization, performed in a condition of true tightness, can ensure the validity of the subsequent Automatic Leak Check responses.

#### Column

Click on **Column** button to open the **Column Setup** dialog box to perform the evaluation of the column in use on the back/front position. See Column Setup.

This function allows the calculation of the actual column ID according to the actual flow of the carrier gas measured at the outlet of the column.

The procedure requires the use of the column-flowmeter connector and of the digital flowmeter. Refer to the *TRACE 1300 and TRACE 1310 Hardware Manual* for details.

## **Column Setup**

This Column Setup dialog window opens by clicking the **Column** button on the Status Page. See Figure 12.

TRACE 1300 Column Setup	$\mathbf{X}$			
Inlet: Front	Location: 🔽 GC Oven			
Column	Pre-column			
Column length: 15.00 m	Using pre-column:			
Column ID: 0.250 mm	Pre-column length: 2.00 m			
Film thickness: 0.25 µm	Pre-column ID: 0.530 mm			
Description:	Post-column			
	Using post-column:			
	Post-column length: 2.00 m			
Measure Column ID	Post-column ID: 0.530 mm			
Measured col. ID: (n/a) mm				
Use col. ID: 💉 Stated	Apply Close			

Figure 12. Column Setup Dialog Window

Column Setup window contains the following fields:

- Inlet
- Location
- Column
- Pre-Column
- Post-Column
- Use Column ID

## Inlet

Select the inlet of the column in use among Front, Back, Aux 1,...Aux 6.

## Location

Select the location where the column is installed: **GC oven**, **Valve Oven**, or **Aux column oven**. The related temperature is used for the flow calculation. The default location is GC oven.

This parameter must be sent to the GC together with column parameters.

### Column

The nominal dimension of the column in use are to be set in this field. The options are described in the following table.

Table 2. Column Nor	ninal Dimension
---------------------	-----------------

Parameter	Description
Column length (m)	Enter the length of the column in the range from 0.01 to 200 m.
Column ID (mm)	Enter the internal diameter of the column in the range from 0.050 to 0.999 mm.
Measured Column ID	This field is not editable. It indicates an averaged calculated ID which reflect the current pneumatic resistance, permitting a more accurate calculation of the carrier gas line velocity.
Film thickness (mm)	Enter the film thickness of the column in the range from 0.01 to 20 $\mu m.$
Description	Enter a description of the column if desired.
Measure ID button	Click on this button to calculate the correct column ID. The calculated value is indicate in the Measure Column ID field.

## **Pre-Column**

If a precolumn is present select **Using pre-column** check box. The menu requires to set the **Pre-column Length** and the nominal internal diameter **Pre-column ID** of in the same ranges valid for the column.

## **Post-Column**

If a post-column is present select **Using post-column** check box. The menu requires to set the **Post-column Length** and the nominal internal diameter **Post-column ID** of in the same ranges valid for the column.

## **Use Column ID**

It is used to operate in flow mode. The deviation of the actual column ID from the nominal value is mostly affecting the column flow rate. To assure the utmost accuracy for the column carrier flow rate calculation, the Column Evaluation procedure is recommended.

Select **Stated** if the use of the column parameters are desired, or **Measured** if the use of the measured flow is desired.

# **Temperatures**

These values show the actual and setpoint Temperature parameters. See Figure 13.

Figure 13. Temperature Tab

Status	Temperature Flow	Pressu	ure	
- Tem	peratures (°C)			
		Actual	Setpoint	
Ove	en:			
575	L (front) inlet:			
PT۱	V (back) inlet:			
	(())			
FID	(rront) detector:			
TCI	D (back) detector:			

## **Flows**

These values show the actual and setpoint Flow parameters. See Figure 14.

	Figure	14.	Flow	Tab
--	--------	-----	------	-----

sure
Setpoint
# Pressure

These values show the actual and setpoint Pressure parameters. See Figure 15.



# **TRACE 1300/1310 Menu**

This chapter describes the Instrument Setup menu.

#### Contents

- Menu Description
- Using Column Flow Calculator
- Using Vapor Volume Calculator

3

# **Menu Description**

The TRACE menu is located on the Instrument Setup-menu bar. See Figure 16

🗊 U	Intitled - Thermo Xcalibur Instru		
File	Trace II Help		
D	Send Method to GC Get Method from GC		
	Flow Calculator		
	Column Characterization		
TR	ACE II GC		

Figure 16. TRACE 1300/1310 Menu

The pull-down menu contains the following options:

- Send Method to GC command
- Get Method from GC command
- Flow Calculator
- Vapor Calculator

### Send Method to GC command

Downloads the GC portion of the current method from the Instrument Setup window to the gas chromatograph.

#### **Get Method from GC command**

Uploads the current method from the gas chromatograph to the Instrument Setup Window.

#### **Flow Calculator**

This facility can be used to calculate the flow rate through a capillary column when you are using non-DPFC pneumatics or manual pressure settings. The Column Flow Calculator dialog box is used to calculate the flow rate through the column based on the column dimensions, conditions and the type of carrier gas in use.

For more information, see: "Using Column Flow Calculator" on page 30.

# **Vapor Calculator**

A liquid sample injected into a heated GC inlet rapidly vaporizes and expands. Vapor Volume Calculator rapidly calculates the expansion volume of several factors (solvent, injected liquid volume, temperature, and inlet pressure). Included with this calculation is the resulting vapor expansion volume relative to inlet liner's inner dimensions.

Ideally, the vapor volume of an injected aliquot should not exceed the liner volume. Excess vapor can expand into other parts of the inlet and contaminate gas lines or result in sample loss. This facility allows you to determine the volume of the vaporized aliquot under the conditions applied to the inlet.

For more information refer to: "Using Vapor Volume Calculator" on page 33.

# **Using Column Flow Calculator**

In TRACE 1300/1310 drop-down menu select **Flow Calculator** to open the Column Flow Calculator dialog box. See Figure 17.

Figure 17. Column Flow Calculator Dialog Box

Column Flow Calculator			X
Column parameters		Column outlet pressure	
Length (m)	30.0	🖲 1 Atm 🔿 Vacuur	n C Other
	•	Outlet pressure (kPa)	101.2
Inside diameter (mm)	0.320		I01.3
	►		
Temperature (°C)	100	Carrier gas parameters—	
	▶	Gas type: He	elium 💌
Inlet pressure (gauge, kPa)	101.3	Flow (ml/min):	2.734
	▶		(5.50
		Velocity (cm/sec):	45.58
Claus	Dava 1	Holdup time (sec):	65.8
Liose	Hesel		

**Note** When you have completed the calculation, close the dialog box by clicking the **Done** button. These values are retained so that you can refer to them later. If you wish to reset all control parameters back to the factory settings click on **Reset** button. The only parameters for which default values can be changed and saved are pressure units (kPa, psi, or bar) and the controls listed in the Column Outlet Pressure group box (1 atm, vacuum, other, and outlet pressure).

When you have completed the calculation, close the dialog box by clicking the **Done** button. These values are retained so that you can refer to them later. If you wish to reset all control parameters back to the factory settings click on **Reset** button. The only parameters for which default values can be changed and saved are pressure units (kPa, psi, or bar) and the controls listed in the Column Outlet Pressure group box (1 atm, vacuum, other, and outlet pressure).

This window contains the following fields:

- Column Parameters
- Column Outlet Pressure
- Carrier Gas Parameters

### **Column Parameters**

The setting are made via a series of slider bars. The value to be used is shown at the top right hand side of the bar. Choose the parameters to be changed and place the mouse pointer on the slider. Hold down the left mouse button. You can now move the slider along the bar. To fine tune the setting, click on one of the arrow buttons at the ends of the bar.

The parameters are described in Table 3.

#### Table 3. Column Parameters

Parameter	Function
Length	Set the column length in the range 0.1-150 m.
Inside Diameter	Set the diameter in the range 0.050-1.00 mm.
Temperature	Set the temperature in the range from -100 to 450 °C.
Inlet Pressure	Set the inlet pressure in the range 0.0-1000.0 kPa.

#### **Column Outlet Pressure**

Select one of the option radio buttons described in Table 4.

Table 4.	Column	Outlet Pressure	Options
14810 11	ooranni	0000010	optiono

Option	Description
1 Atm	This option sets the pressure to 101.3 kPa on the scale below.
Vacuum	This option sets the pressure to 0.0 kPa on the scale below.
Other	When you choose this option, you can use the scale below to select a value in the range 0.0-300.0 kPa.

## **Carrier Gas Parameters**

The carrier gas parameters are displayed in this field. See Table 5 for details.

 Table 5.
 Carrier Gas Parameters (Sheet 1 of 2)

Parameter	Function
Gas Type	Choose a carrier gas from the drop-down list. The options are: Helium, Hydrogen and Nitrogen.
Flow	This is a read-only field. The value is calculated from the entries made.

Parameter	Function
Velocity	This is a read-only field. The value is calculated from the entries made.
Holdup Time	This is a read-only field. The value is calculated from the entries made and is the time taken for a non retained component to elute from the column.

#### Table 5. Carrier Gas Parameters (Sheet 2 of 2)

When you have completed the calculation, close the dialog box by clicking on the **Done** button. These values are retained so that you can refer to them later. If you wish to start again, click on the **Reset** button.

# **Using Vapor Volume Calculator**

In TRACE 1300/1310 drop-down menu select **Vapor Calculator** to open the Vapor Volume Calculator dialog box. See Figure 18.

When you have completed the calculation, close the dialog box by clicking the **Done** button. These values are retained so that you can refer to them later. If you wish to start again, click on the **Reset** button.

Vapor Volume Calculator	
Inlet parameters	Solvent parameters
Injection volume (μl) 1.0	Type: Methylene chloride 💌
Temperature (°C) 200	Boiling point (°C): 40
Pressure (gauge, kPa) 101.3	Density (g/ml): 1.3266
	Mol. weight (amu): 84.93
Vapor volume	Liner volume
Vapor volume (ml): 0.30	Type (CE Instruments part no.): PTV 2mm metal (45322044)
Close Reset	Liner volume (ml): 0.38

Figure 18. Vapor Volume Calculator Dialog Window

This window includes the following fields:

- Inlet Parameters
- Solvent Parameters
- Vapor Volume
- Liner Volume

#### **Inlet Parameters**

The settings are made via a series of slider bars. The value to be used is shown at the top right hand side of the bar. Choose the parameter to be changed and place the mouse pointer on the slider. Hold down the left mouse button. You can now move the slider along the bar. To fine tune the setting, click on one of the arrow buttons at the ends of the bar.

One click corresponds to an increment, the size of which depends on the number of decimal places used for a particular value. For example, a pressure increment is 0.1 kPa.

The options are described in Table 6.

Table 6.	Inlet parameters
----------	------------------

Option	Function
Injection Volume	Move the slider until the injection volume to be used is shown. The range is 0-10 $\mu L.$
Temperature	Move the slider until the inlet temperature to be used is shown. The range is 0-450 °C.
Pressure	Move the slider until the inlet pressure to be used is shown. The range is 0-1000 kPa.

## **Solvent Parameters**

These options listed in Table 7 describe the properties of the solvents.

Option	Function
Туре	Select the solvent from the drop-down list. Selecting <b>Other</b> , boiling points, density and molecular weight field will be enabled and you can enter the values manually.
Boiling Point	The boiling point of the selected solvent is shown here.
Density	The density of the selected solvent is shown here.
Mol Weight	The molecular weight of the selected solvent is shown here.

 Table 7.
 Solvent Parameters

#### **Vapor Volume**

The volume of vapor derived from the injected aliquot is displayed in the read-only Vapor Volume field.

## **Liner Volume**

Comparing vapor expansion volumes with liner volumes gives an estimate of the sample volume that can be injected under different conditions. In practice, mixing and diluting sample vapor with carrier gas during rapid evaporation means that the actual volume occupied by vapor may be greater than the calculated volume, and it depends on the liner design and how rapidly carrier gas is moving through the inlet.

A good starting point in method development is to choose the liner, injection volume, temperature, and pressure so that the vapor volume does not exceed the liner volume. (For **splitless** injections, the liner volume should also be considered in choosing the purge hold time, so that the inlet will be swept at least once by carrier gas flowing onto the column.) These parameters apply to the column liner volume. See Table 8 for details.

Table 8. Line	r Volume Settings
---------------	-------------------

Option	Function
Туре	Choose the column liner in use.
Liner Volume	The liner volume is displayed in this read-only field.

# **Instrument Setup**

This chapter contains the instructions to edit the TRACE 1300/1310 parameters according to the front/back injector and front/back detector modules, and optional devices installed.

#### Contents

- Edit TRACE 1300/1310 Parameters
- Oven Page
- S/SL Page
- S/SL Backflush Page
- PTV Page
- PTV Backflush Page
- Gas Sampling Valve Page
- Helium Saver Page
- FID Page
- ECD Page
- NPD Page
- TCD Page
- FPD Page
- PDD Page
- GDI Page
- Auxiliary Temperature Page
- Auxiliary Carrier Page
- Run Table Page
- Run-Time Event

4

# Edit TRACE 1300/1310 Parameters

The parameters to set for the TRACE 1300/1310 (oven, injectors and detector) should be set according to GC configuration.

All parameters can be sent to or loaded from the instrument connected by using the functions available in "TRACE 1300/1310 Menu" on page 27.

To open this view:

- 1. Choose Instrument Setup from the Home Page window.
- 2. Click on the TRACE 1300/1310 panel button located in the Instrument Setup window.

**Figure 19.** Roadmap Home Page

😤 Thermo Xcalibur Roadmap	
File Actions View Tools GoTo Help	
Status   Acquinition Queue   (E): Fun Manager (E): TRACE II GC	Instrument       Sequence         Setup       Sequence         Setup       Setup         Qual       Quan         Browser       Browser
For Help, press F1	20/04/2011 11.09

#### Using the TRACE 1300/1310 Tabs:

After you have configured the TRACE and options, you are ready to set the controls to run your method.

## **Oven Page**

To display this page click on the **Oven** tab from the Instrument Setup view.

This page is the method editor for setting up parameters in the GC run. See Figure 20.

)ven PTV (from	nt) S/SL (back)	ECD (front) N	PD (back) TCD (a	ux right) FID (	aux left) Aux. Ter	mperatures A
50 40 -						
30						
10						
0	0.2	0.	4	0.6	0.8	1
Ramps		<u> </u>	Data acquisition time			
# Rate (°C/min)	Temperature Ho (°C) (mi	ld Time n)	Oven run time	1.00 min	Specific time:	10.00 min
Initial	40.0 1.0		Options			
			Max. temperature:	350.0 °C	Oven on:	
			Prep-run timeout:	10.00 min	Cryogenics enable	
			Equilibration time: Ready delay:	0.50 min	Cryo. threshold: Cryo. timeout:	0.00 °C

Figure 20. TRACE 1300/1310 Oven Page

This page includes the following fields:

- Oven Temperature Program Graph
- Ramps
- Acquisition Time
- Options

## **Oven Temperature Program Graph**

Graphical representations of the oven temperature program including any post run events. The axes are temperature in degrees centigrade, and time in minutes. An isothermal run just gives a flat line

#### Ramps

The temperature program comprises an initial isothermal field followed by up to seven linear ramps. The initial row is displayed by default and cannot be hidden.

The parameters in the program timetable are described in Table 9.

Column	Function
Ramps Buttons	Use these buttons to add or remove the number of ramps to use in the oven temperature program. This is the rate in degrees Centigrade per minute the GC oven is ramped up or down from the initial temperature, or the previous level's final ramp temperature. Clicking on the button automatically adds a ramp level after the last one listed. Clicking on the removes the highest level or the one being displayed on the bottom
Rate	This field is not available for the initial field of the program
Rate	Enter a rate of temperature change in the range 0.1-125 °C/min.
Temp	Enter a temperature for the isothermal field of the ramp.
	• The range is 0-450 °C.
	<ul> <li>The range is -50 °C to Oven Maximum with carbon dioxide cryogenic installed. Otherwise the lower limit is 0 °C.</li> </ul>
	<ul> <li>The range is –100 °C to Oven Maximum with liquid nitrogen cryogenic installed. Otherwise the lower limit is 0 °C.</li> </ul>
Hold Time	Enter a time for which the temperature is to be held in the range 0.00-999.99 min.

**Table 9.**Oven Ramps Parameters and Buttons

## **Acquisition Time**

Use this field to set the run time. The acquisition time parameters are described in Table 10.

Table 10. Acquisition Time Parameters

Parameter	Description
Oven Run Time	Select this option button if you want to use the time calculated for the oven program as the run time. The value is displayed in the adjacent read-only field.
Specific Time	Select this option button if you wish to enter a specific run time. The range is 0.01-999.99 min.

# Options

Various oven parameters are set in this field. The oven parameters are described in Table 11.

Table 11. Options Field Parameters (Sheet 1 of 2)

Parameter	Description
Max Temp	Enter a value for the maximum oven temperature in the range 0-450 °C if you are not using cryogenics. With cryogenics enabled, the lower limit is $-50$ °C with carbon dioxide and $-100$ °C with liquid nitrogen. This entry controls the maximum temperature values in the temperature program field.
Prep-run Timeout	Enter a time during which the injection must occur. If this does not happen, the chromatograph returns to the Standby condition. The range is 0.00-999.99 min.
Equilibration Time	This is the time required for equilibrating the oven temperature after it has been set or modified. Enter a value in the range 0.00-999.99 min.
Ready Delay	Set the delay time before the GC enters the Ready to Inject condition. Enter a value in the range 0–99.9 min. This time must not exceed the <b>Prep-run Timeout</b> value.
Oven On	Select this check box to enable the oven control.
Cryogenics enable	This option is visualized if <b>Oven cryogenics</b> has been selected in Instrument Configuration. See "TRACE 1300/1310 Configuration" on page 1. Select/clear this check box to enable or disable the cryogenic system when it is installed and configured with $CO_2$ or $LN_2$ as a coolant.

Parameter	Description
Cryo threshold	This option is visualized if <b>Oven cryogenics</b> has been selected in Instrument Configuration. See "TRACE 1300/1310 Configuration" on page 1. Specify the temperature at which the cryo system begins to supply the coolant. Enter a value in the range 40-200 °C.
Cryo timeout	This option is visualized if <b>Oven cryogenics</b> has been selected in Instrument Configuration. See TRACE 1300/1310 Configuration on page 1. Specify the time after which if the GC does not reach the ready condition, it stops the use of the cryo stops and remains in NOT ready condition. Re-send the method to restore the function. Enter a value from 0.00 to 999.9 min. The default value is 60.00 minutes.

#### **Table 11.** Options Field Parameters (Sheet 2 of 2)

# S/SL Page

To display this page click on the S/SL Front/Back tab from the Instrument Setup view.

This page is the method editor for the front/back Split/Splitless injector module. See Figure 21.

#### Figure 21. TRACE 1300/1310 S/SL Page

Oven S/SL - Front PTV - Back F	ID - Front TCD - Back Run Table
S/SL mode: Split	Carrier mode: Constant Pressure
Inlet	Carrier pressure
Temperature: 🔽 200 °C	Pressure: 🔲 100,00 kPa
Split flow: 🔽 50,0 mL/mit	n
Split ratio: 10,0	
Splitless time: 1,00 min	
Surge	
Surge pressure: 3,00 kPa	
Surge duration: 0,00 min	- Carrier anti-
Septum purge	Vacuum compensation:
Purge flow: 5,0 mL/mit	n Carrier gas saver:
Constant septum purge: 🔽	Gas saver flow: 20,0 mL/min
Stop purge time: 0,00 min	Gas saver time: 2,00 min

This page includes the following fields:

- S/SL Mode
- Inlet
- Surge
- Septum Purge
- Carrier Mode
- Carrier Flow
- Carrier Pressure
- Programmed Carrier Flow
- Programmed Carrier Pressure
- Carrier Options

## S/SL Mode

This parameter enables the fields in this pane. The options are described in Table 12.

	Table	12.	S/SL	Mode	Options
--	-------	-----	------	------	---------

Option	Function
Split	This option enables the Inlet field only. The carrier flow is split in the injection port with the bulk going out the split vent. Use this injection mode when analyzing high concentration or neat samples, or in instances where sensitivity is less important. The split vent remains open all the time. This method yields the sharpest peaks if the split gas is properly mixed.
Splitless	This option enables the Inlet and Purge fields. The split vent is closed during the injection to drive most of the sample into the column. The solvent effect is required to refocus the analytes, especially more volatile compounds. You can achieve the solvent effect by keeping the analytical column or guard column slightly below the solvent's boiling point. Splitless times of about 1 minute are typical.
Splitless w/Surge	This option enables all fields. Same as <b>Splitless</b> but can also program a surge during an injection. Surge starts at Prep Run and continues until the surge duration time is finished. Surge is further defined in the next group of controls.

# Inlet

The inlet parameters are set in this field which is common to all modes. Inlet parameters are described in Table 13.

-	<b>_</b>
Parameter	Description
Temperature	Select the check box to enable the adjacent field. Enter a value for the inlet temperature in the range 0-400 °C.
Split Flow	Select the check box to enable the adjacent field. Enter a value in the range 5-1250 mL/min. The <b>Split Ratio</b> is adjusted automatically. In addition, this value is governed by the initial column flow rate entered on the associated <b>Carrier mode</b> .
	• If the flow rate is changed, the Split Flow value is adjusted so that the split ratio is maintained. However,
	• if the Split Flow value then falls outside its limits, a warning is generated and you then have to change the entry to a valid number.
Split Ratio	This field is enabled under the following conditions:
	• Mode is set to Split.
	• The Split Flow check box is selected.
	• On the associated Carrier mode, Flow Mode is set to either Constant Flow or Programmed Flow.
	This is the ratio between the split flow and the column flow.
	SplitRatio = $\frac{\text{SplitFlow}}{\text{ColumnFlow}}$
	Enter a value in the range 1-12500. The Split Flow entry is adjusted automatically.
Splitless Time	This field is enabled when the <b>S/SL Mode</b> is set to either <b>Splitless</b> or <b>Splitless w/Surge</b> . Specify the length of time the split valve remains closed after a splitless injection. Enter a value in the range 0.00-999.99 min.
	The timer begins at the start of the run. During this time, most of the sample transfers from the injector to the column. The split vent reopens when the splitless time ends. This occurs in order to remove excess solvent vapor.

## Surge

This field is enabled when the **S/SL Mode** is set to **Splitless** or **Splitless w/Surge**. Make the surge settings in this field. Surge parameters are described in Table 14.

Table 14. S/SL Surge Parameters

Parameters	Description
Surge Pressure	<ul> <li>The pressure applied during the splitless time to produce a surge of flow in the injector to speed transfer of the sample. It may be used, depending upon the analysis, to sharpen peaks closer to the solvent's boiling point where cold trapping is ineffective and solvent effect is the main refocusing mechanism.</li> <li>Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).</li> </ul>
Surge Duration	This is the time for which the surge pressure is maintained. Enter a value in the range 0.00-999.99 min. Typically, set to coincide with the <b>Splitless time</b> .

## **Septum Purge**

This field controls the septum purge for the injector. Septum purge is used to sweep the bottom of the septum to reduce contamination from sample analytes. This prevents carryover from run to run. Septum purge also prevents contamination of the injector from septum bleed. Make the purge settings in this field.

Septum purge parameters are described in Table 15.

Table 15. S/SL Purge parameters

Parameter	Description
Purge Flow	This time indicates the flow at which the septum is continuously flushed.
Constant Septum Purge	Select the check box to continuously flush the septum with a purge flow.
Stop Purge Time	This field is enabled if the Constant Septum Purge check box is cleared. You can then enter a time at which the septum purge ceases. The range is 0.00-999.99 min.

## **Carrier Mode**

In this field, you select the flow mode for the carrier gas.

The choice made here controls the parameters available in the Carrier Flow/ Carrier Pressure and Ramps field.

- Constant Flow A single Flow field is available along with a check box to enable or disable it. The graph shows a horizontal line at the flow rate indicated. See "Carrier Flow" on page 46.
- **Constant Pressure** A single Pressure field is available along with a check box to enable or disable it. The graph shows a horizontal line at the pressure indicated. See "Carrier Pressure" on page 46.
- **Programmed Flow** Flow program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Flow" on page 46.
- **Programmed Pressure** Pressure program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Pressure" on page 47.

### **Carrier Flow**

Use this field to set up flow when **Constant flow** carrier mode has been selected.

Select the **Flow** check box to enable the Flow field. Enter a value in the range 0.001-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

#### **Carrier Pressure**

Use this field to set up pressure when **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi). If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

### **Programmed Carrier Flow**

Use this field to set up flow program when **Programmed Flow** carrier mode has been selected. See Figure 22.

#### Figure 22. Programmed Carrier Flow

-Carrie	r flow -			
Flow enable:				
Flow	ramps		÷	$\times$
Rat (mL	:e ./min²)	Flow (mL/min)	Hold Time (min)	
		1,500	1,00	

In this mode you can program an initial constant flow rate field followed by up to three ramps.

Select the Flow enable check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🗘 button.

Conversely, to reduce the number of rows on display, click on the 🖄 button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the **Flow enable** check box. This disables the Flow column and the program is ignored as shown in the graph which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows:

- **Rate** Enter a value for the rate of flow rate change in the range 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- Flow Enter a value for the constant flow rate field of the ramp in the range 0.001-100 mL/min.
- **Hold Time** Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.

#### **Programmed Carrier Pressure**

Use this field to set up pressure program when **Programmed Pressure** carrier mode has been selected. See Figure 23.

# Figure 23. Programmed Carrier Pressure

Pressure en Pressure rar	able: mps	ب ج	×
Rate Pressure (kPa/min) (kPa)		Hold Time (min)	
	100,00	1,00	

In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the **Pressure enable** check box to enable the flow.

Enable the number of pressure ramps required by clicking on the 🗘 button.

Conversely, to reduce the number of rows on display, click on the  $\overline{\times}$  button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column and the program is ignored as shown in the graph which becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable re the follows.

- **Rate** Enter a value for the rate of pressure change in the range 0.01-1000 kPa/min. This field is not available for the initial field of the program.
- **Pressure** Enter a value for the constant pressure field of the ramp in the range 5-1000 kPa(0.05 to 10 bar; 0.725 to 145 psi).
- Hold Time Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

### **Carrier Options**

This field includes the following parameters.

• **Vacuum Compensation** — Select the check box to enable the vacuum compensation feature. Use this only when the TRACE 1300/1310 is connected with a mass spectrometer. When the check box is not selected, calculations are made for a normal GC detector, which is usually at atmospheric pressure.

• **Carrier Gas Saver** — Select the check box to enable the function in this field. Gas saver controls reduce carrier gas consumption, especially when a large split flow is used. It is set to come on at some point well after the injection to conserve gas.

Gas Saver parameters are described in Table 16.

#### Table 16. Gas Saver Parameters

Parameter	Description
Gas Saver Flow	Enter a value for the gas saver flow rate in the range 5-500 mL/min.
Gas Saver Time	This is time into the run when the gas saver feature starts up. Enter a value in the range 0.00-999.99 min.

# S/SL Backflush Page

To display this page click on the Front/Back S/SL Backflush tab from the Instrument Setup view.

This page is the method editor for the Front/Back Split/Splitless injector module for Backflush. See Figure 24.

Figure 24. TRACE 1300/1310 SSL Backflush Page

Oven S/SL · Front PTV · Back ECD ·	Front NPD - Back Auxiliary Run Table	
S/SL mode: Split	Carrier mode: Constant Pressure	Backflush
Inlet         Temperature:       200       *C         Split flow:       ✓       50.0       mL/min         Split ratio:       10.0       split ratio:       10.0         Splitless time:       1,00       min         Surge       3.00       kPa	Carrier pressure	Backflush enable:        Backflush start:     1,50       Backflush duration: <ul> <li>GC Run Time</li> <li>Duration:</li> <li>1,50</li> <li>min</li> </ul>
Surge duration: 0,00 min Septum purge Purge flow: 5,0 mL/min Constant septum purge:  Stop purge time: 0,00 min	Carrier options Vacuum compensation: Carrier gas saver: Gas saver flow: 20,0 mL/min Gas saver time: 2,00 min	

This page includes the following fields:

- S/SL Mode
- Inlet
- Surge
- Septum Purge
- Carrier Mode
- Carrier Flow
- Carrier Pressure
- Programmed Carrier Flow
- Programmed Carrier Pressure
- Carrier Options
- Backflush

## S/SL Backflush Mode

This parameter enables the fields in this pane. The options are described in Table 17.

Table 17. S	/SL Backflush	Mode Options
-------------	---------------	--------------

Option	Function	
Split	This option enables the Inlet field only. The carrier flow is split in the injection port with the bulk go out the split vent. Use this injection mode when analyzing hi concentration or neat samples, or in instances where sensitivity less important. The split vent remains open all the time. This method yields the sharpest peaks if the split gas is properly mi	
Splitless	This option enables the Inlet and Purge fields. The split vent is closed during the injection to drive most of the sample into the column. The solvent effect is required to refocus the analytes, especially more volatile compounds. You can achieve the solvent effect by keeping the analytical column or guard column slightly below the solvent's boiling point. Splitless times of about 1 minute are typical.	
Splitless w/Surge	This option enables all fields. Same as <b>Splitless</b> but can also program a surge during an injection. Surge starts at Prep Run and continues until the surge duration time is finished. Surge is further defined in the next group of controls.	

## Inlet

The inlet parameters are set in this field which is common to all modes. The S/SL inlet parameters are described in Table 18.

 Table 18.
 S/SL Backflush Inlet Parameters (Sheet 1 of 2)

Parameter	Description			
Temperature	Select the check box to enable the adjacent field. Enter a value for the inlet temperature in the range 0-400 °C.			
Split Flow	Select the check box to enable the adjacent field. Enter a valu the range 5-1250 mL/min. The <b>Split Ratio</b> is adjusted automatically. In addition, this value is governed by the initi column flow rate entered on the associated <b>Carrier mode</b> .			
	• If the flow rate is changed, the Split Flow value is adjusted so that the split ratio is maintained. However,			
	• if the Split Flow value then falls outside its limits, a warning is generated and you then have to change the entry to a valid number.			

Parameter	Description			
Split Ratio	This field is enabled under the following conditions:			
	• Mode is set to Split.			
	• The Split Flow check box is selected.			
	• On the associated Carrier mode, Flow Mode is set to either Constant Flow or Programmed Flow.			
	This is the ratio between the split flow and the column flow.			
	SplitRatio = $\frac{\text{SplitFlow}}{\text{ColumnFlow}}$			
	Enter a value in the range 1-12500. The Split Flow entry is adjusted automatically.			
Splitless Time	This field is enabled when the <b>S/SL Mode</b> is set to either <b>Splitless</b> or <b>Splitless w/Surge</b> . Specify the length of time the split valve remains closed after a splitless injection. Enter a value in the range 0.00-999.99 min.			
	The timer begins at the start of the run. During this time, most of the sample transfers from the injector to the column. The split vent reopens when the splitless time ends. This occurs in order to remove excess solvent vapor.			

#### Table 18. S/SL Backflush Inlet Parameters (Sheet 2 of 2)

# Surge

This field is enabled when the **S/SL Mode** is set to **Splitless** or **Splitless w/Surge**. Make the surge settings in this field. Surge parameters are described in Table 19.

 Table 19.
 S/SL Backflush Surge Parameters

Parameters	Description
Surge Pressure	The pressure applied during the splitless time to produce a surge of flow in the injector to speed transfer of the sample. It may be used, depending upon the analysis, to sharpen peaks closer to the solvent's boiling point where cold trapping is ineffective and solvent effect is the main refocusing mechanism. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to
	145 psi).
Surge Duration	This is the time for which the surge pressure is maintained. Enter a value in the range 0.00-999.99 min. Typically, set to coincide with the <b>Splitless time</b> .

### **Septum Purge**

This field controls the septum purge for the injector. Septum purge is used to sweep the bottom of the septum to reduce contamination from sample analytes. This prevents carryover from run to run. Septum purge also prevents contamination of the injector from septum bleed. Make the purge settings in this field.

Septum purge parameters are described in Table 20.

Fable 20.	S/SL	Backflush	Purge	parameters
-----------	------	-----------	-------	------------

Parameter	Description
Purge Flow	This time indicates the flow at which the septum is continuously flushed.
Constant Septum Purge	Select the check box to continuously flush the septum with a purge flow.
Stop Purge Time	This field is enabled if the Constant Septum Purge check box is cleared. You can then enter a time at which the septum purge ceases. The range is 0.00-999.99 min.

### **Carrier Mode**

In this field, you select the flow mode for the carrier gas.

The choice made here controls the parameters available in the Carrier Flow/ Carrier Pressure and Ramps field.

- Constant Flow A single Flow field is available along with a check box to enable or disable it. The graph shows a horizontal line at the flow rate indicated. See "Carrier Flow" on page 53.
- **Constant Pressure** A single Pressure field is available along with a check box to enable or disable it. The graph shows a horizontal line at the pressure indicated. See "Carrier Pressure" on page 54.
- **Programmed Flow** Flow program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Flow" on page 54.
- **Programmed Pressure** Pressure program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Pressure" on page 55.

### **Carrier Flow**

Use this field to set up flow when **Constant flow** carrier mode has been selected.

Select the Flow check box to enable the Flow field. Enter a value in the range 0.001-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

#### **Carrier Pressure**

Use this field to set up pressure when **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field. Enter a value in the range 3-1000 kPa. If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

### **Programmed Carrier Flow**

Use this field to set up flow program when Programmed Flow carrier mode has been selected. See Figure 25.



Figure 25. Programmed Carrier Flow

In this mode you can program an initial constant flow rate field followed by up to three ramps.

Select the Flow enable check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🗳 button.

Conversely, to reduce the number of rows on display, click on the  $\bowtie$  button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the Flow enable check box. This disables the Flow column and the program is ignored as shown in the graph which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows:

- **Rate** Enter a value for the rate of flow rate change in the range 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- **Flow** Enter a value for the constant flow rate field of the ramp in the range 0.001-100 mL/min.
- **Hold Time** Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.

#### **Programmed Carrier Pressure**

Use this field to set up pressure program when **Programmed Pressure** carrier mode has been selected. See Figure 23.

Carrier pressure			
Pressure en	able:	$\checkmark$	
Pressure ran	nps	÷	$\times$
Rate (kPa/min)	Pressure (kPa)	Hold Time (min)	
	100,00	1,00	

Figure 26. Programmed Carrier Pressure

In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the **Pressure enable** check box to enable the flow.

Enable the number of pressure ramps required by clicking on the 🗘 button.

Conversely, to reduce the number of rows on display, click on the 🞽 button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column and the program is ignored as shown in the graph which becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable re the follows.

- **Rate** Enter a value for the rate of pressure change in the range 0.01-1000 kPa/min. This field is not available for the initial field of the program.
- **Pressure** Enter a value for the constant pressure field of the ramp in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).

• **Hold Time** — Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

## **Carrier Options**

This field includes the following parameters.

- Vacuum Compensation Select the check box to enable the vacuum compensation feature. Use this only when the TRACE 1300/1310 is connected with a mass spectrometer detector. When the check box is not selected, calculations are made for a normal GC detector, which is usually at atmospheric pressure.
- **Carrier Gas Saver** Select the check box to enable the function in this field. Gas saver controls reduce carrier gas consumption, especially when a large split flow is used. It is set to come on at some point well after the injection to conserve gas.

The parameters are described in Table 21.

Table 21. Gas Saver Parameters

Parameter	Description
Gas Saver Flow	Enter a value for the gas saver flow rate in the range 5-500 mL/min.
Gas Saver Time	This is time into the run when the gas saver feature starts up. Enter a value in the range 0.00-999.99 min.

### **Backflush**

Use this field to set up the Backflush parameters. They are described in Table 22.

Table 22. S/SL Backflush Parameters

ParameteR	Description
Backflush Enable	Select this check box to enable the Backflush field.
Backflush Start	Set here the time at which the backflush starts.
Backflush Duration	Choose between GC Run Time and Specific Time.
	• GC Run Time — Select this option if you want to use the time calculated for the oven program as the run time.
	• <b>Specific Time</b> — Select this option button if you wish to enter a specific run time.
Duration	This parameter is enable when <b>Specific Time</b> has been selected. Set here the duration of the backflush in the range 0.00-999.99 min.

# **PTV Page**

To display this page click on the Front/Back PTV tab from the Instrument Setup view.

This page is the method editor for the Front/Back Programmable Temperature Vaporizing injector module. See Figure 27.

Figure 27. TRACE 1300/1310 PTV Page

Iven S/SL - Fi	ront    PTV - Back	FID - F	ront   TCD - Back	R	un Table						
PTV mode:	PTV Split	•	Carrier mode: Co	nstant	Pressure 💌	Injection	phases —				
Inlet	,		Carrier pressure				Press. kPa	Rate °C/sec	Temp. °C	Time min	Flow mL/min
Temperature:	<b>▼</b> 35 °C		Pressure:		100,00 kPa	Injection	70,00			0,05	50,0
Split flow:	✓ 10,0 mL	./min				Transfer	210,00	14,5	200	1,00	
Split ratio:	10,0										
Splitless time:	0,00 mir	n									
Surge						European		_	Transforts	wo delau	1.00 min
C		-				E vapulai	ion priase.	-	Destaurale	mp. delay.	1 1,00 11111
Surge pressure:	3,00 KP	a				Cleaning	phase:		temperatur	re: 🔽	Turn Off
Surge duration:	0,00 mir	n	Carrier options			Ramped	pressure:				Turn Off
Sentum nurge					_			Sł	now Chart		Maintain
			vacuum compens	ation:	1						
Purge flow:	5,0 mL	./min	Carrier gas saver:								
Constant septum	purge: 🔽		Gas saver flow:		20,0 mL/min						
Stop purge time:	0,00 mir	n	Gas saver time:		2,00 min						
Cryogenics											
Cryogenics enab	le: 🔽		Cryogenics thresh	old:	50,0 °C						
Cool during:	▼ Prep-Run		Cryogenics timeou	t	10,00 min						

This page includes the following fields:

- PTV Mode
- Inlet
- Surge
- Septum Purge
- Carrier Mode
- Carrier Flow
- Carrier Pressure
- Programmed Carrier Flow
- Programmed Carrier Pressure
- Carrier Options
- Injection Phases
- Cryogenics

## **PTV Mode**

The Mode setting controls the availability of the parameters in this pane. Select the appropriate entry for your injector.

- All **PTV** injection modes are **programmable ramped temperatures** you operate at varying temperatures with specified times and temperature increments. Selecting PTV modes activates various controls listed in the **Injections Phases** field.
- All **CT** injection modes are **constant temperature** (isothermal) modes you operate at set temperatures and time increments. Selecting CT modes disables all controls in the **Injections Phases** field.
- **On-Column** injection mode is selected to use the PTV similarly to an On-Column injector.

The options are described in the following table.

#### Table 23. PTV Modes

PTV Mode	Description
PTV Split	The carrier flow is split in the injection port with the bulk going out the split vent. The split vent remains open all the time.
PTV Splitless	To close the split vent during injection to drive all the sample into the column. Splitless times of about 1minute are typical.
PTV Large Volume	To eliminate the solvent before the sample enters the column.
CT Split	To perform traditional isothermal split operation. The carrier flow is split in the injection port with the bulk going out the split vent. The split vent remains open all the time.
CT Splitless	To perform traditional isothermal splitless operation. The split vent is closed during injection to drive all the sample into the column. Splitless times of about 1minute are typical.
CT Splitless w/surge	Same as <b>Splitless</b> but can also program a surge during an injection. Surge starts at Prep Run and continues until the surge duration time is finished. Surge is further defined in next group of controls.
On-Column	To use the PTV injector as an On-Column injector. The injector heats with an automatic temperature rate emulating the oven temperature. When using this technique, set the initial oven temperature below the solvent boiling point.

### Inlet

The inlet parameters are set in this field and described in Table 24.

Parameter	Description
Temperature	Select the check box to enable the adjacent field. If the cryogenic option is present, enter a value for the inlet temperature in the range from - 50 to 450 °C with carbon dioxide and -100 to 450 °C with liquid nitrogen. Otherwise the lower limit is 0 °C. For non-cryogenic use, this temperature is usually set near above the solvent boiling point. Optimum temperature for an analytical method varies with the method and sample requirements. The entry also has a check box for on/off values, so that the temperature setting may be turned off without affecting the setpoint (usually used for troubleshooting purposes.)
Split Flow	Select the check box to enable the adjacent field. Enter a value in the range 5-1250 mL/min. The <b>Split Ratio</b> is adjusted automatically. In addition, this value is governed by the initial column flow rate entered on the associated <b>Carrier mode</b> .
	• If the flow rate is changed, the Split Flow value is adjusted so that the split ratio is maintained. However,
	• if the Split Flow value then falls outside its limits, a warning is generated and you then have to change the entry to a valid number.
Split Ratio	This field is enabled under the following conditions:
	• Mode is set to PTV Split or CT Split.
	• The Split Flow check box is selected.
	• On the associated Carrier mode, Flow Mode is set to either Constant Flow or Programmed Flow.
	This is the ratio between the split flow and the column flow.
	SplitRatio = $\frac{\text{SplitFlow}}{\text{ColumnFlow}}$
	Enter a value in the range 1-12500. The Split Flow entry is adjusted automatically.
Splitless Time	This field is enabled when the <b>Mode</b> is set to either <b>Splitless</b> or <b>Splitless w/Surge</b> . Specify the length of time the split valve remains closed after a splitless injection. The timer begins at the start of the run. During this time, most of the sample transfers from the injector to the column. The split vent reopens when the splitless time ends. This occurs in order to remove excess solvent vapor. Enter a value in the range 0.00-999.99 min.

 Table 24.
 PTV Inlet Parameters (Sheet 1 of 2)

Parameter	Description
Splitless Time	This field is disabled when the Mode is set to either PTV Split or CT Split. It is the time for which the split valve is closed. Enter a value in the range 0.00-999.99 min.

Table 24. PTV Inlet Parameters (Sheet 2 of 2)

### Surge

This field is enabled when the Mode is set to CT Splitless w/Surge. The parameters are described in Table 25.

 Table 25.
 PTV Surge Parameters

Parameters	Description
Surge Pressure	The CT Splitless w/Surge mode allows a higher inlet pressure to be applied during injection. This serves to reduce the volume of the vapor cloud created when injected sample is vaporized, and may improve separated analytes resolution. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).
Surge Duration	This is the time necessary to ensure the injected sample transfers to the analytical column; so that the column flow is slightly affected. Enter a value in the range 0.00-999.99 min.

### **Septum Purge**

This field controls the septum purge for the injector. Septum purge is used to sweep the bottom of the septum to reduce contamination from sample analytes. This prevents carryover from run to run. Septum purge also prevents contamination of the injector from septum bleed. Make the purge settings in this field.

Septum purge parameters are described in Table 20.

#### Table 26. PTV Purge parameters

Parameter	Description
Purge Flow	This time indicates the flow at which the septum is continuously flushed.
Constant Septum Purge	Select the check box to continuously flush the septum with a purge flow.
Stop Purge Time	This field is enabled if the Constant Septum Purge check box is cleared. You can then enter a time at which the septum purge ceases. The range is 0.00-999.99 min.
#### **Carrier Mode**

In this field, you select the flow mode for the carrier gas.

The choice made here controls the parameters available in the Carrier Flow/ Carrier Pressure and Ramps field.

- Constant Flow A single Flow field is available along with a check box to enable or disable it. The graph shows a horizontal line at the flow rate indicated. See "Carrier Flow" on page 61.
- **Constant Pressure** A single Pressure field is available along with a check box to enable or disable it. The graph shows a horizontal line at the pressure indicated. See "Carrier Pressure" on page 61.
- **Programmed Flow** Flow program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Flow" on page 61.
- **Programmed Pressure** Pressure program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Pressure" on page 62.

## **Carrier Flow**

Use this field to set up flow when **Constant flow** carrier mode has been selected.

Select the **Flow** check box to enable the Flow field.

Enter a value in the range 0.001-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

#### **Carrier Pressure**

Use this field to set up pressure when **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).

If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

## **Programmed Carrier Flow**

Use this field to set up flow program when **Programmed Flow** carrier mode has been selected. See Figure 28.

Figure 28.	Program	med Carrie	r Flow			
Carrier flow						
Flow enable	Flow enable:					
Flow ramps		÷	$\times$			
Rate Flow (mL/min²) (mL/min)		Hold Time (min)				
	1,500	1,00				

In this mode you can program an initial constant flow rate field followed by up to three ramps.

Select the Flow enable check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🗘 button.

Conversely, to reduce the number of rows on display, click on the 🖄 button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the **Flow enable** check box. This disables the Flow column and the program is ignored as shown in the graph which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows:

- **Rate** Enter a value for the rate of flow rate change in the range 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- Flow Enter a value for the constant flow rate field of the ramp in the range 0.001-100 mL/min.
- **Hold Time** Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.

#### **Programmed Carrier Pressure**

Use this field to set up pressure program when **Programmed Pressure** carrier mode has been selected. See Figure 29.

#### Figure 29. Programmed Carrier Pressure

-(	Carrier pressure				
	Pressure enable:				
	Pressure ran	nps	$+ \times$		
	Rate (kPa/min)	Pressure (kPa)	Hold Time (min)		
		100,00	1,00		

In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the Pressure enable check box to enable the flow.

Enable the number of pressure ramps required by clicking on the 🕈 button.

Conversely, to reduce the number of rows on display, click on the  $\bowtie$  button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column and the program is ignored as shown in the graph which becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows.

- **Rate** Enter a value for the rate of pressure change in the range 0.01-1000 kPa/min. This field is not available for the initial field of the program.
- **Pressure** Enter a value for the constant pressure field of the ramp in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).
- Hold Time Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

## **Carrier Options**

This field includes the following parameters.

• Vacuum Compensation — Select the check box to enable the vacuum compensation feature. Use this only when the TRACE 1300/1310 is connected with a mass spectrometer detector. When the check box is not selected, calculations are made for a normal GC detector, which is usually at atmospheric pressure.

• **Carrier Gas Saver** — Select the check box to enable the function in this field. Gas saver controls reduce carrier gas consumption, especially when a large split flow is used. It is set to come on at some point well after the injection to conserve gas.

The parameters are described in Table 27.

#### Table 27. Gas Saver Parameters

Parameter	Description
Gas Saver Flow	Enter a value for the gas saver flow rate in the range 5-500 mL/min.
Gas Saver Time	This is time into the run when the gas saver feature starts up. Enter a value in the range 0.00-999.99 min.

## **Injection Phases**

This field is enabled for PTV mode options only. The fields are activated by selections made in the **Options** field. Further restrictions apply. These are described as necessary.

There are four phases: **Injection**, **Evaporation**, **Transfer** and **Cleaning**. These are arranged in a table.

For details refer to the following tables.

 Table 28.
 PTV Injection Phases (1) (Sheet 1 of 2)

Phases	Description	
Injection	Use this control for the injection's ramped pressure. Available only with PTV Splitless or PTV Large Volume mode.	
Evaporation	It is enabled when <b>Evaporation phase</b> check box is selected. This group of controls allows you to specify solvent evaporation controls: pressure (PTV Splitless only), rate, temperature, and time in minutes. Set the solvent evaporation temperature; set the rate to reach the solvent evaporation temperature.	
Transfer	This group of controls allows you to specify controls for the sample transfer into the column: Pressure (PTV Splitless only), rate, temperature, and time in minutes. Specify the pressure if available. Set the rate in °C/s to reach the sample transfer temperature. Set the temperature for sample transfer into the column. Set the time in minutes for the transfer temperature to be maintained.	

Phases	Description
Cleaning	It is enabled when <b>Cleaning phase</b> check box is selected.
	Set the rate necessary to reach the cleaning temperature. Set the injector cleaning temperature. Set the time in minutes the cleaning temperature must be maintained.
Evaporation Phase	Select this check box to enable the Evaporation phase parameters in the Injection Phases field.
Cleaning Phase	Select this check box to enable the Cleaning phase parameters in the Injection Phases field.
Ramped Pressure	Select this check box to enable the Pressure parameters in the Injection Phases field. This is enabled only when Mode is set to PTV Splitless.
Transfer temp. delay	It is active only when Large Volume mode is set. It delays the temperature ramp start after evaporation phase. Enter a value in the range 0.00 to 999.99
Post-cycle temperature	Choose one among Turn Off, Cool Down, Maintain as required

 Table 28.
 PTV Injection Phases (1) (Sheet 2 of 2)

Table 29.	PTV Inj	ection	Phases	(2)
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Column	Faction	
Pressure	This column is enabled only when Mode is PTV Splitless and the Ramped Pressure check box is selected. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi). This parameter does not apply to the Cleaning phase.	
Rate	This column is enabled only when the Evaporation Phase check box is selected. Enter a value in the range 0.1-14.5°C/min. This parameter does not apply to the Injection phase.	
Temp	This is the temperature of the phase. Enter a value in the range 0-450°C (- 50 to 450 °C with carbon dioxide and -100 to 450 °C with liquid nitrogen).	
Time	This is time for which the temperature of the phase is to be held. Enter a value in the range 0.00-999.99 min.	
Flow	This parameter applies only to the Injection and Cleaning phases. For the Injection phase, Mode must be set to PTV Large Volume. For the Cleaning phase, the Cleaning Phase check box must be selected. Enter a value in the range 5-1250 mL/min.	

#### **Show Graph**

To view the PTV phases dialog box, click on the **Show Graph** button.



This is a read-only, graphical display of changes in temperature, flow rate, and valve state with time. You can use the arrow buttons in the bottom left-hand corner to expand the time scale and view the early phases in more detail. The left-hand button expands the scale while the right hand one contracts it. The graph cannot be scrolled in expanded mode.

## Cryogenics

This field is visualized if **Front/Back Inlet cryogenics** has been enabled in Instrument Configuration. See "TRACE 1300/1310 Configuration" on page 1.

The Cryogenics parameters are described in Table 30.

**Table 30.** Cryogenics Field Parameters

Parameter	Description
Cryogenics enable	Select this check box to enable the cryogenic system.
Cool during	Select when performing the cool. Choose between Prep-Run or Post -Run,
Cryo threshold	Specify the temperature at which the cryo system begins to supply the coolant. Enter a value in the range 40-200 °C.
Cryo timeout	Enter the time at which the cryo system will be disabled. Enter a value in the range 0–30 min.

# **PTV Backflush Page**

To display this page click on the Front/Back PTV Backflush tab from the Instrument Setup view.

This page is the method editor for the Front/Back Programmable Temperature Vaporizing injector module for Backflush. See Figure 27.

Figure 31. TRACE 1300/1310 PTV Backflush Page

Oven S/SL - Front PTV - Back ECD -	Front NPD · Back Auxiliary Run Table	
PTV mode: PTV Large Volume -	Carrier mode: Constant Pressure	Injection phases
Inlet	Carrier pressure	Press. Rate Temp. Time Flow Back kPa *C/sec *C min mL/min flush
Temperature: 🔽 35 °C	Pressure: 🔲 100,00 kPa	Injection 70,00 0,05 50,0 🔽
Split flow: 🔽 10,0 mL/min		Evap. 140,00 14,5 200 1,00 50,0 🔽
Split ratio: 6,7		Transfer 210,00 14,5 200 1,00
Splitless time: 0,00 min		Cleaning 14,5 200 1,00 50,0 🔽
Surge		Evaporation phase: 🔽 Transfer temp. delay: 1,00 min
Surge pressure: 3,00 kPa		Cleaning phase: V Post-cycle
Surge duration: 0,00 min		Ramped pressure:
Septum purge	Vacuum compensation:	Show Chart
Purge flow: 5,0 mL/min	Carrier gas saver:	
Constant septum purge: 🔽	Gas saver flow: 20,0 mL/min	
Stop purge time: 0,00 min	Gas saver time: 2,00 min	
Cryogenics		
Cryogenics enable:	Cryogenics threshold: 50,0 °C	
Cool during:	Cryogenics timeout: 10,00 min	

This page includes the following fields:

- PTV Mode
- Inlet
- Surge
- Septum Purge
- Carrier Mode
- Carrier Flow
- Carrier Pressure
- Programmed Carrier Flow
- Programmed Carrier Pressure
- Carrier Options
- Injection Phases
- Backflush
- Cryogenics

# **PTV Mode**

The Mode setting controls the availability of the parameters in this pane. Select the appropriate entry for your injector.

- All **PTV** injection modes are **programmable ramped temperatures** you operate at varying temperatures with specified times and temperature increments. Selecting PTV modes activates various controls listed in the **Injections Phases** field.
- All **CT** injection modes are **constant temperature** (isothermal) modes you operate at set temperatures and time increments. Selecting CT modes disables all controls in the **Injections Phases** field.

The options are described in the following tables.

#### Table 31. PTV Modes

PTV Mode	Description	
PTV Split	The carrier flow is split in the injection port with the bulk going out the split vent. The split vent remains open all the time.	
PTV Splitless	To close the split vent during injection to drive all the sample into the column. Splitless times of about 1minute are typical.	
PTV Large Volume	To eliminate the solvent before the sample enters the column.	
CT Split	To perform traditional isothermal split operation. The carrier flow is split in the injection port with the bulk going out the split vent. The split vent remains open all the time.	
CT Splitless	To perform traditional isothermal splitless operation. The split vent is closed during injection to drive all the sample into the column. Splitless times of about 1minute are typical.	
CT Splitless w/surge	Same as <b>Splitless</b> but can also program a surge during an injection. Surge starts at Prep Run and continues until the surge duration time is finished. Surge is further defined in next group of controls.	

## Inlet

The inlet parameters are set in this field and described in Table 24.

Parameter	Description		
Temperature	Select the check box to enable the adjacent field. If the cryogenic option is present, enter a value for the inlet temperature in the range from - 50 to 450 °C with carbon dioxide and -100 to 450 °C with liquid nitrogen. Otherwise the lower limit is 0 °C. For non-cryogenic use, this temperature is usually set near above the solvent boiling point. Optimum temperature for an analytical method varies with the method and sample requirements. The entry also has a check box for on/off values, so that the temperature setting may be turned off without affecting the setpoint (usually used for troubleshooting purposes.)		
Split Flow	Select the check box to enable the adjacent field. Enter a value in the range 5-1250 mL/min. The <b>Split Ratio</b> is adjusted automatically. In addition, this value is governed by the initial column flow rate entered on the associated <b>Carrier mode</b> .		
	• If the flow rate is changed, the Split Flow value is adjusted so that the split ratio is maintained. However,		
	• if the Split Flow value then falls outside its limits, a warning is generated and you then have to change the entry to a valid number.		
Split Ratio	This field is enabled under the following conditions:		
	• Mode is set to PTV Split or CT Split.		
	• The Split Flow check box is selected.		
	• On the associated Carrier mode, Flow Mode is set to either Constant Flow or Programmed Flow.		
	This is the ratio between the split flow and the column flow.		
	SplitRatio = $\frac{\text{SplitFlow}}{\text{ColumnFlow}}$		
	Enter a value in the range 1-12500. The Split Flow entry is adjusted automatically.		
Splitless Time	This field is enabled when the <b>Mode</b> is set to either <b>Splitless</b> or <b>Splitless w/Surge</b> . Specify the length of time the split valve remains closed after a splitless injection. The timer begins at the start of the run. During this time, most of the sample transfers from the injector to the column. The split vent reopens when the splitless time ends. This occurs in order to remove excess solvent vapor. Enter a value in the range 0.00-999.99 min.		

Table 32.	PTV Backflush	<b>Inlet Parameters</b>	(Sheet 1 of 2)
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Parameter	Description
Splitless Time	This field is disabled when the Mode is set to either PTV Split or CT Split. It is the time for which the split valve is closed. Enter a value in the range 0.00-999.99 min.

**Table 32.** PTV Backflush Inlet Parameters (Sheet 2 of 2)

## Surge

This field is enabled when the Mode is set to CT Splitless w/Surge. The parameters are described in Table 25.

Table 33. PTV Surge Parameters

Parameters	Description	
Surge Pressure	The CT Splitless w/Surge mode allows a higher inlet pressure to be applied during injection. This serves to reduce the volume of the vapor cloud created when injected sample is vaporized, and may improve separated analytes resolution. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).	
Surge Duration	This is the time necessary to ensure the injected sample transfers to the analytical column; so that the column flow is slightly affected. Enter a value in the range 0.00-999.99 min.	

## **Septum Purge**

This field controls the septum purge for the injector. Septum purge is used to sweep the bottom of the septum to reduce contamination from sample analytes. This prevents carryover from run to run. Septum purge also prevents contamination of the injector from septum bleed. Make the purge settings in this field.

Septum purge parameters are described in Table 20.

Table 34. PTV Backflush Purge Parameters

Parameter	Description
Purge Flow	This time indicates the flow at which the septum is continuously flushed.
Constant Septum Purge	Select the check box to continuously flush the septum with a purge flow.
Stop Purge Time	This field is enabled if the Constant Septum Purge check box is cleared. You can then enter a time at which the septum purge ceases. The range is 0.00-999.99 min.

#### **Carrier Mode**

In this field, you select the flow mode for the carrier gas.

The choice made here controls the parameters available in the Carrier Flow/ Carrier Pressure and Ramps field.

- Constant Flow A single Flow field is available along with a check box to enable or disable it. The graph shows a horizontal line at the flow rate indicated. See "Carrier Flow" on page 71.
- **Constant Pressure** A single Pressure field is available along with a check box to enable or disable it. The graph shows a horizontal line at the pressure indicated. See "Carrier Pressure" on page 71.
- **Programmed Flow** Flow program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Flow" on page 71.
- **Programmed Pressure** Pressure program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Pressure" on page 72.

## **Carrier Flow**

Use this field to set up flow when **Constant flow** carrier mode has been selected.

Select the **Flow** check box to enable the Flow field.

Enter a value in the range 0.001-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

#### **Carrier Pressure**

Use this field to set up pressure when **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi). If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

## **Programmed Carrier Flow**

Use this field to set up flow program when **Programmed Flow** carrier mode has been selected. See Figure 28.

# Figure 32. Programmed Carrier Flow Carrier flow Flow enable: Flow ramps Image: Carrier flow Rate Flow (mL/mir?) (mL/min) 1,500 1,00

In this mode you can program an initial constant flow rate field followed by up to three ramps.

Select the Flow enable check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🕈 button.

Conversely, to reduce the number of rows on display, click on the 🖄 button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the **Flow enable** check box. This disables the Flow column and the program is ignored as shown in the graph which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows:

- **Rate** Enter a value for the rate of flow rate change in the range 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- **Flow** Enter a value for the constant flow rate field of the ramp in the range 0.001-100 mL/min.
- **Hold Time** Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.

#### **Programmed Carrier Pressure**

Use this field to set up pressure program when **Programmed Pressure** carrier mode has been selected. See Figure 29.

#### Figure 33. Programmed Carrier Pressure

Carrier pressure				
	Pressure enable:		$\overline{\mathbf{v}}$	
	Pressure ramps		÷	$\times$
	Rate (kPa/min)	Pressure (kPa)	Hold Time (min)	
		100,00	1,00	

In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the Pressure enable check box to enable the flow.

Enable the number of pressure ramps required by clicking on the 🍄 button.

Conversely, to reduce the number of rows on display, click on the 🔀 button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column and the program is ignored as shown in the graph which becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows.

- **Rate** Enter a value for the rate of pressure change in the range 0.01-1000 kPa/min. This field is not available for the initial field of the program.
- **Pressure** Enter a value for the constant pressure field of the ramp in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi).
- Hold Time Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

#### **Carrier Options**

This field includes the following parameters.

• Vacuum Compensation — Select the check box to enable the vacuum compensation feature. Use this only when the TRACE 1300/1310 is connected with a mass spectrometer detector. When the check box is not selected, calculations are made for a normal GC detector, which is usually at atmospheric pressure.

• **Carrier Gas Saver** — Select the check box to enable the function in this field. Gas saver controls reduce carrier gas consumption, especially when a large split flow is used. It is set to come on at some point well after the injection to conserve gas. The parameters are described in Table 27.

Table 35. Gas Saver Parameters

Parameter	Description
Gas Saver Flow	Enter a value for the gas saver flow rate in the range 5-500 mL/min.
Gas Saver Time	This is time into the run when the gas saver feature starts up. Enter a value in the range 0.00-999.99 min.

#### **Injection Phases**

This field is enabled for PTV mode options only. The fields are activated by selections made in the **Options** field. Further restrictions apply. These are described as necessary.

There are four phases: **Injection**, **Evaporation**, **Transfer** and **Cleaning**. These are arranged in a table.

For details refer to the following tables.

Phases	Description	
Injection	Use this control for the injection's ramped pressure. Available only with PTV Splitless or PTV Large Volume mode.	
Evaporation	It is enabled when <b>Evaporation phase</b> check box is selected. This group of controls allows you to specify solvent evaporation controls: pressure (PTV Splitless only), rate, temperature, and time in minutes. Set the solvent evaporation temperature; set the rate to reach the solvent evaporation temperature.	
Transfer	This group of controls allows you to specify controls for the sample transfer into the column: Pressure (PTV Splitless only), rate, temperature, and time in minutes. Specify the pressure if available. Set the rate in °C/s to reach the sample transfer temperature. Set the temperature for sample transfer into the column. Set the time in minutes for the transfer temperature to be maintained.	

Table 36. PTV Backflush Injection Phases (1) (Sheet 1 of 2)

Phases	Description
Cleaning	It is enabled when <b>Cleaning phase</b> check box is selected.
	Set the rate necessary to reach the cleaning temperature. Set the injector cleaning temperature. Set the time in minutes the cleaning temperature must be maintained.
Evaporation Phase	Select this check box to enable the Evaporation phase parameters in the Injection Phases field.
Cleaning Phase	Select this check box to enable the Cleaning phase parameters in the Injection Phases field.
Ramped Pressure	Select this check box to enable the Pressure parameters in the Injection Phases field. This is enabled only when Mode is set to PTV Splitless.
Transfer temp. delay	It is active only when Large Volume mode is set. It delays the temperature ramp start after evaporation phase. Enter a value in the range 0.00 to 999.99
Post-cycle temperature	Choose among Turn Off, Cool Down, Maintain

**Table 36.** PTV Backflush Injection Phases (1) (Sheet 2 of 2)

 Table 37. PTV Backflush Injection Phases (2) (Sheet 1 of 2)

Column	Faction
Pressure	This column is enabled only when Mode is PTV Splitless, and the Ramped Pressure check box is selected. Enter a value in the range 5-1000 kPa. This parameter does not apply to the Cleaning phase.
Rate	This column is enabled only when the Evaporation Phase check box is selected. Enter a value in the range 0.1-14.5°C/min. This parameter does not apply to the Injection phase.
Temp	This is the temperature of the phase. Enter a value in the range 0-450°C (- 50 to 450 °C with carbon dioxide and -100 to 450 °C with liquid nitrogen).
Time	This is time for which the temperature of the phase is to be held. Enter a value in the range 0.00-999.99 min.

Column	Faction
Flow	This parameter applies only to the Injection and Cleaning phases. For the Injection phase, Mode must be set to PTV Large Volume. For the Cleaning phase, the Cleaning Phase check box must be selected. Enter a value in the range 5-1250 mL/min.
Backflush	Select the check box to enable the backflush during Injection, Evaporation (only in Large Volume mode), and/or Cleaning phases.

Table 37. PTV Backflush Injection Phases (2) (Sheet 2 of 2)

#### **Show Graph**

To view the PTV phases dialog box, click on the **Show Graph** button.



Figure 34. Example Graph

This is a read-only, graphical display of changes in temperature, flow rate, and valve state with time. You can use the arrow buttons in the bottom left-hand corner to expand the time scale and view the early phases in more detail. The left-hand button expands the scale while the right hand one contracts it. The graph cannot be scrolled in expanded mode.

## Backflush

This field is visualized when CT Split, CT Splitless, or CT Splitless w Surge mode has been selected. In the PTV modes the backflush can be enabled during the injection, evaporation, and cleaning phases depending on the mode chosen. See Figure 35

PTV mode: CT Split	Carrier mode: Programmed Flow	Backflush
Inlet Temperature:	Carrier flow Flow enable: Flow ramps	Backflush enable:           Backflush enable:       Image: Comparison of the second
Septum purge Purge flow: 5,0 mL/min Constant septum purge: 🔽 Stop purge time: 0,00 min	Carrier options       Vacuum compensation:           Carrier gas saver:           Gas saver flow:        20.0 mL/min          Gas saver time:        2.00 min	
Ctyogenics Ctyogenics enable: 🔽 Cool during: 💽 Prep-Run	Cryogenics threshold: 50,0 °C Cryogenics timeout: 10,00 min	

Figure 35. PTV Backflush Field

Use this field to set up the Backflush parameters. They are described in Table 38.

Table 38.	PTV	Backflush	Parameters
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ParameteR	Description	
Backflush Enable	Select this check box to enable the Backflush field.	
Backflush Start	Set here the time at which the backflush starts.	
Backflush Duration	Choose between GC Run Time and Specific Time.	
	• GC Run Time — Select this option if you want to use the time calculated for the oven program as the run time.	
	• <b>Specific Time</b> —Select this option button if you wish to enter a specific run time.	
Duration	This parameter is enable when <b>Specific Time</b> has been selected. Set here the duration of the backflush in the range 0.00-999.99 min.	

# Cryogenics

This field is visualized if **Front/Back Inlet cryogenics** has been enabled in Instrument Configuration. See "TRACE 1300/1310 Configuration" on page 1.

The Cryogenics parameters are described in Table 30.

 Table 39.
 Cryogenics Field Parameters

Parameter	Description
Cryogenics enable	Select this check box to enable the cryogenic system.
Cool during	Select when performing the cool. Choose between Prep-Run or Post -Run.
Cryo threshold	Specify the temperature at which the cryo system begins to supply the coolant. Enter a value in the range 40-200 °C.
Cryo timeout	Enter the time at which the cryo system will be disabled. Enter a value in the range 0–30 min.

# **Gas Sampling Valve Page**

This page is the method editor for the Front/Back Gas Sampling Valve (GSV) module. See Figure 36.

Figure 36. TRACE 1300 - GSV Page

Oven GSV - Front PTV - Back ECD	Front NPD - Back Auxiliary Run Table	
S/SL mode: Split ▼ Inlet Temperature: 200 °C Split flow: ▼ 50.0 mL/min	Carrier mode: Constant Pressure  Carrier pressure Pressure:  100.00 kPa	Backflush Backflush enable: Backflush start: 1,50 min Backflush duration: GC Run Time
Split ratio: 10,0 Splitless time: 1,00 min Surge		Duration: 1,50 min
Surge pressure: 3,00 kPa Surge duration: 0,00 min	Carrier options	
Injection start time 1,50 min	Carrier gas saver: Gas saver flow: Gas saver flow: Carrier 20.0 mL/min Gas saver time: 2,00 min	

This page includes the following fields:

- S/SL Mode
- Inlet
- Surge
- Valve
- Carrier Mode
- Carrier Flow
- Carrier Pressure
- Programmed Carrier Flow
- Programmed Carrier Pressure
- Carrier Options
- Backflush

# S/SL Mode

This parameter enables the fields in this pane. The options are described in Table 40.

Table 40. GSV - S/SL Mode Options

Option	Function
Split	This option enables the Inlet field only. The carrier flow is split in the injection port with the bulk going out the split vent. Use this injection mode when analyzing high concentration or neat samples, or in instances where sensitivity is less important. The split vent remains open all the time. This method yields the sharpest peaks if the split gas is properly mixed.
	<b>IMPORTANT</b> When <b>Split</b> mode is selected the Gas Sampling Valve parameters in the <b>Valve</b> field are enabled. See "Valve" on page 82.
Splitless	This option enables the Inlet and Purge fields. The split vent is closed during the injection to drive most of the sample into the column. The solvent effect is required to refocus the analytes, especially more volatile compounds. You can achieve the solvent effect by keeping the analytical column or guard column slightly below the solvent's boiling point. Splitless times of about 1 minute are typical.
	<b>IMPORTANT</b> When <b>Splitless</b> mode is selected the Gas Sampling Valve parameters in the <b>Valve</b> field are disabled. In this case the <b>Sampling time</b> coincides with the <b>Splitless Time</b> . See "Valve" on page 82.
Splitless w/Surge	This option enables all fields. Same as <b>Splitless</b> but can also program a surge during an injection. Surge starts at Prep Run and continues until the surge duration time is finished. Surge is further defined in the next group of controls.
	<b>IMPORTANT</b> When <b>Splitless w/Surge</b> mode is selected the Gas Sampling Valve parameters in the <b>Valve</b> field are disabled. In this case the <b>Sampling time</b> coincides with the <b>Splitless Time</b> . See "Valve" on page 82.

# Inlet

The inlet parameters are set in this field which is common to all modes. The inlet parameters are described in Table 41.

Parameter	Description
Temperature	Select the check box to enable the adjacent field. Enter a value for the gas sampling valve temperature in the range 0-150 °C.
Split Flow	Select the check box to enable the adjacent field. Enter a value in the range of 5-1250 mL/min. The <b>Split Ratio</b> is adjusted automatically. In addition, this value is governed by the initial column flow rate entered on the associated <b>Carrier mode</b> .
	• If the flow rate is changed, the Split Flow value is adjusted so that the split ratio is maintained. However, if the Split Flow value then falls outside its limits, a warning is generated and you then have to change the entry to a valid number.
Split Ratio	This field is enabled under the following conditions:
	• Mode is set to Split.
	• The Split Flow check box is selected.
	• On the associated Carrier mode, the Flow Mode is set to either Constant Flow or Programmed Flow.
	This is the ratio between the split flow and the column flow.
	$SplitRatio = \frac{SplitFlow}{ColumnFlow}$
	Enter a value in the range of 1-12500. The Split Flow entry is adjusted automatically.
Splitless Time	This field is enabled when the <b>S/SL Mode</b> is set to either <b>Splitless</b> or <b>Splitless w/Surge</b> . The splitless time coincides with the <b>injection duration</b> parameter of the gas sampling valve. Enter a value in the range of 0.00-999.99 min.
	The timer begins at the start of the run. During this time, most of the sample transfers from the sample loop to the column. The split vent reopens when the splitless time ends. This occurs in order to remove excess solvent vapor.

lable 41. GSV - Inlet Paramete	ers
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# Surge

This field is enabled when the **S/SL Mode** is set to **Splitless** or **Splitless w/Surge**. Make the surge settings in this field. Surge parameters are described in Table 42.

#### Table 42. GSV - Surge Parameters

Parameter	Description
Surge Pressure	The pressure applied during the splitless time to produce a surge of flow in the injector to speed transfer of the sample. It may be used, depending upon the analysis, to sharpen peaks closer to the solvent's boiling point where cold trapping is ineffective and solvent effect is the main refocusing mechanism.
	bar).
Surge Duration	This is the time for which the surge pressure is maintained. Enter a value in the range of 0.00-999.99 min. Typically, set to coincide with the <b>Splitless time</b> .

#### Valve

This field is enabled when the **S/SL Mode** is set to **Split** and allows the injection with the gas sampling valve. The field is disabled when **S/SL Mode** set to **Splitless** or **Splitless w/Surge**; in this case the sampling time coincides with the Splitless time. Valve parameters are described in Table 43.

Table 43. SSLGSV - Valve Parameters

Parameter	Description
Injection start time	Defines the time at which the injection must begin.
Injection duration	Defines the time the sampling valve must be maintained on injection position.

## **Carrier Mode**

In this field, you select the flow mode for the carrier gas.

The choice made here controls the parameters available in the Carrier Flow/Carrier Pressure and Ramps field.

- **Constant Flow** A single Flow field is available along with a check box to enable or disable it. The graph shows a horizontal line at the flow rate indicated. See Carrier Flow.
- **Constant Pressure** A single Pressure field is available along with a check box to enable or disable it. The graph shows a horizontal line at the pressure indicated. See Carrier Pressure.
- **Programmed Flow** The Flow program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Flow" on page 83.

• **Programmed Pressure** — The Pressure program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Pressure" on page 84.

#### **Carrier Flow**

Use this field to set up flow when the **Constant flow** carrier mode has been selected.

Select the **Flow** check box to enable the Flow field. Enter a value in the range of 0.1-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

#### **Carrier Pressure**

Use this field to set up pressure when **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field. Enter a value in the range of 5-1000 kPa (0.725-145 psi; 0.05-10 bar). If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

#### **Programmed Carrier Flow**

Use this field to set up a flow program when the **Programmed Flow** carrier mode has been selected. See Figure 37.



Figure 37. Programmed Carrier Flow

In this mode you can program an initial constant flow rate field followed by up to three ramps.

Select the Flow enable check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🗘 button.

Conversely, to reduce the number of rows on display, click on the 🔀 button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the **Flow enable** check box. This disables the Flow column and the program is ignored as shown in the graph, which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are as follows:

- **Rate** Enter a value for the rate of flow rate change in the range of 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- **Flow** Enter a value for the constant flow rate field of the ramp in the range of 0.001-100 mL/min.
- **Hold Time** Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.

#### **Programmed Carrier Pressure**

Use this field to set up a pressure program when **Programmed Pressure** carrier mode has been selected. See Figure 38.



Figure 38. Programmed Carrier Pressure

In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the **Pressure enable** check box to enable the pressure.

Enable the number of pressure ramps required by clicking on the 🕈 button.

Conversely, to reduce the number of rows on display, click on the  $\times$  button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column, and the program is ignored as shown in the graph which, becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are as follows.

- **Rate** Enter a value for the rate of pressure change in the range 0.01-1000 kPa/min (0.001-145 psi; 0.0001-10 bar). This field is not available for the initial field of the program.
- **Pressure** Enter a value for the constant pressure field of the ramp in the range 5-1000 kPa (0.725-145 psi; 0.05-10 bar).
- Hold Time Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

#### **Carrier Options**

This field includes the following parameters:

- Vacuum Compensation Select the check box to enable the vacuum compensation feature. Use this only when the TRACE 1300 is connected to a mass spectrometer detector. When the check box is not selected, calculations are made for a normal GC detector, which is usually at atmospheric pressure.
- **Carrier Gas Saver** Select the check box to enable the function in this field. Gas saver controls reduce carrier gas consumption, especially when a large split flow is used. It is set to come on at some point well after the injection to conserve gas.

The parameters are described in Table 44.

Table 44. Gas Saver Parameters

Parameter	Description
Gas Saver Flow	Enter a value for the gas saver flow rate in the range 5-500 mL/min.
Gas Saver Time	This is time into the run when the gas saver feature starts up. Enter a value in the range of 0.00-999.99 min.

## Backflush

Use this field to set up the Backflush parameters. They are described in Table 45.

Table 45. GSV - Backflush Parameters (Sheet 1 of 2)

Parameter	Description
Backflush Enable	Select this check box to enable the Backflush field.
Backflush Start	Set the time at which the backflush starts here.

Parameter	Description
Backflush Duration	Choose between GC Run Time and Specific Time.
	• GC Run Time — Select this option if you want to use the time calculated for the oven program as the run time.
	• <b>Specific Time</b> — Select this option button if you want to enter a specific run time.
Duration	This parameter is enabled when <b>Specific Time</b> has been selected. Set the duration of the backflush here in the range of 0.00-999.99 min.

 Table 45. GSV - Backflush Parameters (Sheet 2 of 2)

# **Helium Saver Page**

This page is the method editor for the front/back Instant Connect Helium Saver Injector (HeS-S/SL) module.

See Figure 39.

Figure 39. TRACE 1300/1310 HeS-S/SL Page

Iven PTV (front) HeS-S/SL (back) N	IPD (front) ECD (back) TCD (aux right) FID (aux left) Aux. Oven Aux. Carriers Run Table
S/SL mode: Splitless 💌	Carrier mode: Constant Pressure  Helium conservation
Inlet	Carrier pressure Conservation enable:
Temperature: 🔲 200 °C	Pressure: T 100.00 kPa Helium delay: 011 min
Split flow: 🔽 50.0 mL/min	
Split ratio: 33.3	
Splitless time: 1.00 min	
Surge	
Sume pressure: 5.00 kPa	
Surge duration: 0.00 min	
,	Carrier options
Septum purge	Vacuum compensation:
Purge flow: 5.0 mL/min	Carrier gas saver:
Constant septum purge: 🔽	Gas saver flow: 20.0 mL/min
Stop purge for: 0.00 min	Gas saver time: 2.00 min

This page includes the following fields:

- S/SL Mode
- Inlet
- Surge
- Septum Purge

- Carrier Mode
- Carrier Flow
- Carrier Pressure
- Programmed Carrier Flow
- Programmed Carrier Pressure
- Carrier Options
- Helium Conservation

#### Related Topic:

• Determining Helium Regulator Pressure

#### S/SL Mode

This parameter enables the fields in this pane. The options are described in Table 46.

#### Table 46. HeS-S/SL Mode Options

Option	Function
Split	This option enables the Inlet field only. The carrier flow is split in the injection port with the bulk going out the split vent. Use this injection mode when analyzing high concentration or neat samples, or in instances where sensitivity is less important. The split vent remains open all the time. This method yields the sharpest peaks if the split gas is properly mixed.
Splitless	This option enables the Inlet and Purge fields. The split vent is closed during the injection to drive most of the sample into the column. The solvent effect is required to refocus the analytes, especially more volatile compounds. You can achieve the solvent effect by keeping the analytical column or guard column slightly below the solvent's boiling point. Splitless times of about 1 minute are typical.
Splitless w/Surge	This option enables all fields. Same as <b>Splitless</b> but can also program a surge during an injection. Surge starts at Prep Run and continues until the surge duration time is finished. Surge is further defined in the next group of controls.

## Inlet

The inlet parameters are set in this field which is common to all modes. Inlet parameters are described in Table 47.

Parameter	Description
Temperature	Select the check box to enable the adjacent field. Enter a value for the inlet temperature in the range 0-400 °C.
Split Flow	Select the check box to enable the adjacent field. Enter a value in the range 5-1250 mL/min. The <b>Split Ratio</b> is adjusted automatically. In addition, this value is governed by the initial column flow rate entered on the associated <b>Carrier mode</b> .
	• If the flow rate is changed, the Split Flow value is adjusted so that the split ratio is maintained. However,
	• if the Split Flow value then falls outside its limits, a warning is generated and you then have to change the entry to a valid number.
Split Ratio	This field is enabled under the following conditions:
	• Mode is set to Split.
	• The Split Flow check box is selected.
	• On the associated Carrier mode, Flow Mode is set to either Constant Flow or Programmed Flow.
	This is the ratio between the split flow and the column flow.
	SplitRatio = $\frac{\text{SplitFlow}}{\text{ColumnFlow}}$
	Enter a value in the range 1-12500. The Split Flow entry is adjusted automatically.
Splitless Time	This field is enabled when the <b>S/SL Mode</b> is set to either <b>Splitless</b> or <b>Splitless w/Surge</b> . Specify the length of time the split valve remains closed after a splitless injection. Enter a value in the range 0.00-999.99 min.
	The timer begins at the start of the run. During this time, most of the sample transfers from the injector to the column. The split vent reopens when the splitless time ends. This occurs in order to remove excess solvent vapor.

#### Table 47. HeS-S/SL Inlet Parameters

# Surge

This field is enabled when the **S/SL Mode** is set to **Splitless** or **Splitless w/Surge**. Make the surge settings in this field. Surge parameters are described in Table 48.

Table 48.	HeS-S/SL	Surge	Parameters
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Parameters	Description
Surge Pressure	The pressure applied during the splitless time to produce a surge of flow in the injector to speed transfer of the sample. It may be used, depending upon the analysis, to sharpen peaks closer to the solvent's boiling point where cold trapping is ineffective and solvent effect is the main refocusing mechanism. Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to
	145 psi).
Surge Duration	This is the time for which the surge pressure is maintained. Enter a value in the range 0.00-999.99 min. Typically, set to coincide with the <b>Splitless time</b> .

## **Septum Purge**

This field controls the septum purge for the injector. Septum purge is used to sweep the bottom of the septum to reduce contamination from sample analytes. This prevents carryover from run to run. Septum purge also prevents contamination of the injector from septum bleed. Make the purge settings in this field.

Septum purge parameters are described in Table 49.

Table 49. HeS-S/SL Purge parameters

Parameter	Description
Purge Flow	This time indicates the flow at which the septum is continuously flushed.
Constant Septum Purge	Select the check box to continuously flush the septum with a purge flow.
Stop Purge Time	This field is enabled if the Constant Septum Purge check box is cleared. You can then enter a time at which the septum purge ceases. The range is 0.00-999.99 min.

## **Carrier Mode**

In this field, you select the flow mode for the carrier gas.

The choice made here controls the parameters available in the Carrier Flow/ Carrier Pressure and Ramps field.

 Constant Flow — A single Flow field is available along with a check box to enable or disable it. The graph shows a horizontal line at the flow rate indicated. See "Carrier Flow" on page 90.

- **Constant Pressure** A single Pressure field is available along with a check box to enable or disable it. The graph shows a horizontal line at the pressure indicated. See "Carrier Pressure" on page 90.
- **Programmed Flow** Flow program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Flow" on page 90.
- **Programmed Pressure** Pressure program fields are displayed. The graph represents the ramps in the program. See "Programmed Carrier Pressure" on page 91.

#### **Carrier Flow**

Use this field to set up flow when **Constant flow** carrier mode has been selected.

Select the **Flow** check box to enable the Flow field. Enter a value in the range 0.001-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

#### **Carrier Pressure**

Use this field to set up pressure when **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field.

Enter a value in the range 5-1000 kPa (0.05 to 10 bar; 0.725 to 145 psi). If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

#### **Programmed Carrier Flow**

Use this field to set up flow program when **Programmed Flow** carrier mode has been selected. See Figure 40.

Figure 40. Programmed Carrier Flow

Carrier flow		2	
Flow ramps	•		×
Rate (mL/min²)	Flow (mL/min)	Hold Time (min)	
	1,500	1,00	

In this mode you can program an initial constant flow rate field followed by up to three ramps.

Select the **Flow enable** check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🗳 button.

Conversely, to reduce the number of rows on display, click on the 🖄 button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the **Flow enable** check box. This disables the Flow column and the program is ignored as shown in the graph which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are the follows:

- **Rate** Enter a value for the rate of flow rate change in the range 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- Flow Enter a value for the constant flow rate field of the ramp in the range 0.001-100 mL/min.
- **Hold Time** Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.

#### **Programmed Carrier Pressure**

Use this field to set up pressure program when **Programmed Pressure** carrier mode has been selected. See Figure 41.

#### Figure 41. Programmed Carrier Pressure



In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the **Pressure enable** check box to enable the flow.

Enable the number of pressure ramps required by clicking on the 🕈 button.

Conversely, to reduce the number of rows on display, click on the 🔀 button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column and the program is ignored as shown in the graph which becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable re the follows.

- **Rate** Enter a value for the rate of pressure change in the range 0.01-1000 kPa/min. This field is not available for the initial field of the program.
- **Pressure** Enter a value for the constant pressure field of the ramp in the range 5-1000 kPa(0.05 to 10 bar; 0.725 to 145 psi).
- Hold Time Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

#### **Carrier Options**

This field includes the following parameters.

- Vacuum Compensation Select the check box to enable the vacuum compensation feature. Use this only when the TRACE 1300/1310 is connected with a mass spectrometer. When the check box is not selected, calculations are made for a normal GC detector, which is usually at atmospheric pressure.
- **Carrier Gas Saver** Select the check box to enable the function in this field. Gas saver controls reduce the consumption of nitrogen pressurized gas, especially when a large split flow is used. It is set to come on at some point well after the injection to conserve gas.

Gas Saver parameters are described in Table 50.

Table 50. Gas Saver Parameters

Parameter	Description
Gas Saver Flow	Enter a value for the gas saver flow rate in the range 5-500 mL/min.
Gas Saver Time	This is time into the run when the gas saver feature starts up. Enter a value in the range 0.00-999.99 min.

#### **Helium Conservation**

This field includes the parameters for the helium conservation.

Helium conservation parameters are described in Table 51.

Parameter	Description
Conservation enable	Select the check box to enable the helium conservation feature.
Helium Delay	Set the delay time before the helium conservation feature starts up. Enter a value in the range 0.00-999.99 min.

 Table 51.
 HeS-S/SL Helium Conservation Parameters

# **Determining Helium Regulator Pressure**

Table 52 serves as a guide for setting the correct helium regulator pressure for column type.

Column Length	Column i.d.	Desired Flow $*$	Required helium regulator pressure psig (kPa; bar) **
5 m/10 m	0.10 mm	0.4 mL/min	110 psig (760 kPa; 7.6 bar)
		0.5 mL/min	120 psig (830 kPa; 8.3 bar)
		0.6 mL/min	130 psig (900 kPa; 9 bar)
10 m/20 m	0.18 mm	0.8 mL/min	100 psig (690 kPa; 6.9 bar)
		1.0 mL/min	110 psig (760 kPa; 7.6 bar)
		1.2 mL/min	120 psig (830 kPa; 8.3 bar)
		1.5 mL/min	130 psig (900 kPa; 9 bar)
		2.0 mL/min	140 psig (970 kPa; 9.7 bar)
15 m	0.25 mm	1.0 mL/min	100 psig (690 kPa; 6.9 bar)
		1.2 mL/min	110 psig (760 kPa; 7.6 bar)
		1.7 mL/min	120 psig (830 kPa; 8.3 bar)
		2.2 mL/min	130 psig (900 kPa; 9 bar)
		2.7 mL/min	140 psig (970 kPa; 9.7 bar)
30 m	0.25 mm	1.0 mL/min	100 psig (690 kPa; 6.9 bar)
		1.2 mL/min	110 psig (760 kPa; 7.6 bar)
		1.7 mL/min	120 psig (830 kPa; 8.3 bar)
		2.2 mL/min	130 psig (900 kPa; 9 bar)
		2.7 mL/min	140 psig (970 kPa; 9.7 bar)
		3.2 mL/min	150 psig (1030 kPa; 10.3 bar)
60 m	0.25 mm	1.0 mL/min	120 psig (830 kPa; 8.3 bar)
		1.2 mL/min	130 psig (900 kPa; 9 bar)
		1.7 mL/min	140 psig (970 kPa; 9.7 bar)
		2.2 mL/min	150 psig (1030 kPa; 10.3 bar)

**Table 52.** Determining Correct Helium Regulator Pressure for Column Type (Sheet 1 of 2)

Column Length	Column i.d.	Desired Flow $*$	Required helium regulator pressure psig (kPa; bar) **
100 m	0.25 mm	1.0 mL/min	130 psig (900 kPa; 9 bar)
		1.2 mL/min	140 psig (970 kPa; 9.7 bar)
		1.7 mL/min	150 psig (1030 kPa; 10.3 bar)
30 m	0.32 mm	1.5 mL/min	100 psig (690 kPa; 6.9 bar)
		2.0 mL/min	110 psig (760 kPa; 7.6 bar)
		2.5 mL/min	120 psig (830 kPa; 8.3 bar)
		3.0 mL/min	130 psig (900 kPa; 9 bar)
		3.5 mL/min	140 psig (970 kPa; 9.7 bar)
60 m	0.32 mm	1.5 mL/min	110 psig (760 kPa; 7.6 bar)
		2.0 mL/min	120 psig (830 kPa; 8.3 bar)
		2.5 mL/min	130 psig (900 kPa; 9 bar)
		3.0 mL/min	140 psig (970 kPa; 9.7 bar)
		3.5 mL/min	150 psig (1030 kPa; 10.3 bar)
100 m	0.32 mm	1.5 mL/min	130 psig (900 kPa; 9 bar)
		2.0 mL/min	140 psig (970 kPa; 9.7 bar)
		2.5 mL/min	150 psig (1030 kPa; 10.3 bar)

 Table 52.
 Determining Correct Helium Regulator Pressure for Column Type (Sheet 2 of 2)

For flow rates not specifically listed, round up in pressure to the next highest value. For example, if 1.5 mL/min is desired using a 0.25 mm ID column of 15 m length, use a helium regulator pressure of 110 psig (760 kPa; 7.6 bar).

\*\* Minimum pressure required to avoid nitrogen back diffusion into the helium carrier gas. Higher pressure will result in a slightly higher (than minimum) consumption of helium, but will not result in adverse analytical performance.

# **FID Page**

To display this page click on the FID Front/Back/Aux L/Aux R tab from the Instrument Setup view.

FID Page is the method editor for the Front/Back /Aux L/Aux R Flame Ionization Detector module. See Figure 42.

Figure 42. Flame Ionization Detector (FID) Page

Oven S/SL - Front	PTV - Back FID - Fi	ront TCD - Back Run Table	
Detector		Signal	
Flame on:		Acquire data:	$\overline{\mathbf{v}}$
Temperature:	✓ 50 °C	GC peak width:	
Ignition threshold:	0,5 pA	Standard (> 1 sec.):	0
Flameout retry:	V	Fast (< 1 sec.):	۰
Flow			
Air:	☑ 350,0 mL/min		
Hydrogen:	☑ 35,0 mL/min		
Makeup gas:	☑ 30,0 mL/min		

This page includes the following fields:

- Detector
- Flow
- Signal

## Detector

Set the detector parameters in this field. See Table 53 for details.

#### Table 53. FID Detector Parameters

Parameter	Description
Flame On	Select the check box to ignite the flame. This can only happen if the Base Temperature is at least 150 °C and air and hydrogen flows are enabled in the Flow field. If you clear this check box, the Air and Hydrogen check boxes are cleared automatically.
Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. In the field enter a temperature in the range 0-450 °C.

#### Table 53. FID Detector Parameters

Parameter	Description
Ignition Threshold	If Flameout Retry is enabled, the flame will re-ignite if the signal current drops below this value. Enter a value in the range 0-10 pA.
Flameout Retry	Select the check box to enable this feature.

## Flow

These check boxes allow you to turn the flows on and off only. See Table 54 for details.

#### Table 54. FID Flow Parameters

Parameter	Description
Air	Select the check box to switch on the air flow and enable the adjacent flow rate field. Enter a value in the range 5-500 mL/min.
Hydrogen	Select the check box to switch on the hydrogen flow and enable the adjacent flow rate field. Enter a value in the range 1-100 mL/min.
Makeup gas	Select the check box to switch on the makeup flow and enable the adjacent flow rate field. Enter a value in the range 1-50 mL/min.

# Signal

Check the Acquire data box to enable the acquisition of the data.

Select Standard GC peaks (> 1 s) or Fast GC peaks (< 1 s) radio option button as required.
# **ECD Page**

To display this page click on the ECD Front/Back/Aux L/Aux R tab from the Instrument Setup view.

ECD Page is the method editor for the Front/Back/Aux L/Aux R Electron Capture Detector module. See Figure 43.

Figure 43. Electron Capture Detector (ECD) Page

	Oven	S/SL - Front	PT	V - Back	ECD ·	Front	NPD - Back	Auxiliary	Run Table	
anananan	Detec	ctor					Signal			
enging)	Temp	perature:	◄	250	°C		Acquire data:		◄	
ang ng	Use a	default pulse sett	ings:				GC peak width:			
Pargarge	Refer	rence current:		1,0	nA		Standard (> 1	sec.):	0	
Palbalba	Pulse	amplitude:		50,0	V		Fast (< 1 sec.	):	۰	
Dal Dal Da	Pulse	width:		1,0	μsec					
nginging										
an Dar Dar	FIOW									
and a day	Make	eup gas:		20,0	mL/min					
anger o						1				

This page includes the following fields:

- Detector
- Flow
- Signal

## Detector

Set the detector parameters in this field. See Table 55 for details.

#### Table 55. ECD Detector Parameters (Sheet 1 of 2)

Parameter	Description
Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. Enter a value in the range 0-400 °C.
Use Default Pulse Setting	Select the check box to enable this feature. Reference current, Pulse amplitude and Pulse width are set to optimum working values.When the check box is selected, the fields of these parameters are not enabled.

Parameter	Description				
Reference Current	Enter a value for the cell reference current in the range 0.1-1.5 nA.				
Pulse Amplitude	Select the voltage applied to the detector. Enter a value for the pulse amplitude in the range 5-50 V.				
Pulse Width	Select a value for the pulse width from the drop-down list. The range is from 0.1 $\mu$ s to 2.0 $\mu$ s in steps of 0.1 $\mu$ s.				
	The value selected depends on the type of makeup gas being used with the ECD.				
	<ul> <li>Use of Nitrogen requires a pulse width value typically of 1.0 μs.</li> </ul>				
	<ul> <li>Use of Argon/Methane requires a 0.1 μs pulse to produce the highest linear range.</li> </ul>				

 Table 55.
 ECD Detector Parameters (Sheet 2 of 2)



**WARNING** In a very clean systems the cell base frequency may fall lower than 1 kHz, being the 1 kHz frequency the optimal cell frequency. When this happens, to recover the cell frequency back to 1 kHz, it is advisable to reduce the Pulse Width by 0.1 µs steps until the optimal frequency is reached.

We advise you to avoid working with ECD frequencies lower than 1 kHz.

### Flow

The **Makeup** check box allows you to turn the flow on and off only. The parameters are described in Table 56.

Table 56. ECD Makeup Parameters

Parameter	Description
Makeup gas	Select the check box to enable the makeup gas flow and the adjacent field. The range for this entry depends on the gas being used. The range of the makeup gas flow rate is 5-500 mL/min for <b>Nitrogen</b> or <b>Argon/Methane</b> .

## Signal

Check the Acquire data box to enable the acquisition of the data.

Select Standard GC peaks (> 1 s) or Fast GC peaks (< 1 s) radio option button as required.

## **NPD** Page

To display this page click on the NPD Front/Back/Aux L/Aux R tab from the Instrument Setup view.

NPD Page is the method editor for the Front/Back/Aux L/Aux R Nitrogen Phosphorous Detector module. See Figure 44.

Figure 44. Nitrogen Phosphorus Detector Page

Oven S/SL-	Front PTV - Back E	CD - Front NPD - Back	Auxiliary Run Table
Detector		Signal	
Source current	t 🔽 1.000 A	. Acquire data:	
Source saver (	on: 🗖	GC peak width:	
Temperature:	🗹 🔽 300 °C	Standard (> 1 :	sec.): 💿
Use default po	olarization voltage: 🔲	Fast (< 1 sec.):	С
Polarization vo	ltage: 4.0 V		
Flow			
Air:	✓ 60.0 mL.	/min	
Hydrogen:	✓ 2.3 mL.	/min	
Makeup gas:	M 15.0 mL	/min	

This page includes the following fields:

- Detector
- Flow
- Signal

## Detector

Set the detector parameters in this field. See Table 57 for details.

 Table 57.
 NPD Detector Parameters (Sheet 1 of 2)

Parameter	Description
Source Current	This is the current applied to heat the thermionic source. Enter a value in the range 1.000-5000 A.
Source Saver On	Check this box to enable the source saver function intended to reduce the consumption of the NPD source.

Parameter	Description
Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. Enter a value in the range 0-450 °C.
Use Default Polarization Voltage	Select the check box to enable this feature. When selected, the Polarization voltage field is not enabled.
Polarization Voltage	Enter a value in the range 1-100 V.

#### **Table 57.** NPD Detector Parameters (Sheet 2 of 2)

## Flow

These check boxes allow you to turn the gas flows on and off only. The parameters are described in Table 58.

Parameter	Description
Air	Select the check box to switch on the air flow and enable the adjacent flow rate field. Enter a value in the range 5-500 mL/min.
Hydrogen	Select the check box to switch on the hydrogen flow and enable the adjacent flow rate field. Enter a value in the range 0.1-10 mL/min.
Makeup gas	Select the check box to switch on the makeup flow and enable the adjacent flow rate field. Enter a value in the range 1.0-50.0 mL/min.

## Signal

Check the Acquire data box to enable the acquisition of the data.

Select Standard GC peaks (> 1 s) or Fast GC peaks (< 1 s) radio option button as required.

# **TCD** Page

To display this page click on the TCD Front/Back/Aux L/Aux R tab from the Instrument Setup view.

TCD Page is the method editor for the Front/Back/Aux L/Aux R Thermal Conductivity Detector module. See Figure 45.

Figure 45. Thermal Conductivity Detector Page

Oven	S/SL - Front	PTV - Back	FID - Fr	ont	TCD - Back	Run Table	
Detector			Г	Signal			
Temperature:		☑ 30 °C			Acquire data:		
Filam	ent power on:			GC peak width:			
Filament temperature:		50 °C			Standard (> 1 sec.):		0
					Fast (< 1 sec	.):	e
Flow Makeup gas:			mL/min		Negative polarity	<i>r</i> .	
Carrier source:		▼ Front					

This page includes the following fields:

- Detector
- Flow
- Signal

## Detector

Set the detector parameters in this field. See Table 59 for details.

Table 59. TCD Detector Parameters (Sheet 1 of 2)

Parameter	Description
Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. Enter a value in the range 0-400 °C.
	Typical temperature is 200 °C depending on the application used. Set the temperature to a higher value than the maximum temperature reached by the GC column oven during the analysis.

Parameter	Description	
Filament Power	Select the check box to switch on the power to the filament.	
Filament Temperature	Enter a value for the constant filament temperature in the range 50-450 $^{\circ}\mathrm{C}.$	
	Filament temperatures should be kept 50-100 °C higher than the block temperature. The greater the difference the better the sensitivity. However, the usable difference between the block temperature and the filament temperature depends on the carrier gas used. The suggested $\Delta T$ is:	
	• from 50 °C to 100 °C if the carrier gas is helium.	
	• 100 °C if the carrier gas is nitrogen.	

#### **Table 59.** TCD Detector Parameters (Sheet 2 of 2)

### Flow

The TCD Flow parameters are described in Table 60.

Table 60. TCD Flow Parameters

Parameter	Description
Makeup Gas	Select the check box to enable the makeup gas flow and the adjacent field. Enter a value for the makeup gas flow rate in the range 0.5-5.0 mL/min.
Carrier Source	When two injectors are present, this parameter tells the chromatograph which inlet is connected to the TCD. It is used to protect the filaments on DGFC systems when the carrier gas supply is inadvertently shut off, for example following septum replacement. From the drop-down list, select Front or Back.

## Signal

Check the Acquire data box to enable the acquisition of the data.

Select Standard GC peaks (> 1 s) or Fast GC peaks (< 1 s) radio option button as required.

## **FPD Page**

To display this page click on the FPD Front/Back/Aux L/Aux R tab from the Instrument Setup view. FPD Page is the method editor for the Front/Back/Aux L/Aux R Flame Photometric Detector module. See Figure 46.

C	Oven PTV (front) S/SL (back) FPD (front) ECD (back) TCD (aux right) FID (aux left)				
	Detector			Signal	
	Flame on:	Γ		Acquire data:	
	Base temperature:	□ 250 °C		GC peak width:	
	Cell temperature:	□ 150 °C		Standard (> 1 sec.):	e
	Ignition threshold:	0.5 nA		Fast (< 1 sec.):	0
	Use default PMT volt	age: 🔽			
	PMT voltage:	80C V			
	Gas flow				
	Air:	🔲 🛛 350.0 mL/min			
	Hydrogen:	🔲 🛛 35.0 mL/min			

Figure 46. Flame Photometric Detector (FPD) Page

This page includes the following fields:

- Detector
- Gas Flow
- Signal

## Detector

Set the detector parameters in this field. See Table 61 for details.

Table 61. FPD Detector Parameters (Sheet 1 of 2)

Parameter	Description
Flame On	Select the check box to ignite the flame. This can only happen if the Base Temperature and Cell Temperature are at least 150 °C, and air and hydrogen flows are enabled in the Flow field. If you clear this check box, the Air and Hydrogen check boxes are cleared automatically.
Base Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector base. In the field enter a temperature in the range 0-450 °C.

Parameter	Description	
Cell Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. In the field enter a temperature in the range 0-200 °C.	
	<b>WARNING</b> The default Cell Temperature for the FPD is 150 °C. This is enough to prevent water generated by the flame to condensate inside the FPD body. Higher temperatures can be used but they may have adverse effects on PMT sensitivity.	
Ignition Threshold	Ignition threshold is the point at which the FPD attempts to re-ignite. Set a value in the range 0.0-10.0 nA. The default value is 0.0 nA. <b>Note</b> To select a good value for the <b>Ignition Threshold</b> parameter, the intensity of the baseline signal at flame ON must be determined. Note the value of the baseline intensity at flame OFF, then note the value of the baseline intensity at flame ON, and choose an Ignition Threshold between these two levels.	
Use default PMT voltage	Select the check box if you want selecting the default PMT voltage of - 800 V. The PMT Voltage field is disabled.	
PMT Voltage	This box is enabled if the Use default PMT voltage check box is clear. Set a value in the range from -800 V to -1200 V. This field is disabled when the Use default PMT voltage check box is selected.	

 Table 61. FPD Detector Parameters (Sheet 2 of 2)

## **Gas Flow**

These check boxes allow you to turn the flows on and off only. See Table 62 for details.

Table 62. FPD Flow Parameters

Parameter	Description
Air	Select the check box to switch on the air flow and enable the adjacent flow rate field. Enter a value in the range of 5-500 mL/min.
Hydrogen	Select the check box to switch on the hydrogen flow and enable the adjacent flow rate field. Enter a value in the range of 1-100 mL/min.

## Signal

Check the **Acquire data** box to enable the acquisition of the data. Select either the **Standard GC peaks** (> 1 s) or the **Fast GC peaks** (< 1 s) radio button option as required.

# **PDD Page**

To display this page click on the PDD Front/Back/Aux L/Aux R tab from the Instrument Setup view.

PDD Page is the method editor for the Front/Back/Aux L/Aux R Pulsed Discharge Detector module. See Figure 47.

Figure 47. Pulsed Discharge Detector (PDD) Page

Oven S/SL (front) PTV (back) PDD (fron	t) Run Table	
Detector Pulse generator on: 🔽 Temperature: 🔽 150 °C	Signal Acquire data: GC peak width: Standard (> 1 sec.): Fast (< 1 sec.):	ی د د

This page includes the following fields:

- Detector
- Signal

### Detector

Set the detector parameters in this field. See Table 63 for details.

Table 63. PDD Detector Parameters

Parameter	Description
Pulse generator on	Select the check box to turn on the pulse generator. This ignites the plasma discharge, which is done after stabilization and bakeout.
Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. In the field enter a temperature in the range 0-450 °C.

## Signal

Check the Acquire data box to enable the acquisition of the data.

Select either the **Standard GC peaks** (> 1 s) or the **Fast GC peaks** (< 1 s) radio button option as required.

# **GDI Page**

GDI Page is the method editor for the Front/Back/Aux L/Aux R Generic Detector Interface for third-party detector. See Figure 48

Figure 48. Generic Detector Interface (GDI) Page

File Edit Help	
Oven GSV (front) S/SL (back) GDI (front)	TCD (back) Run Table
Detector	Signal
Temperature: 🔽 150 °C	GC peak width:
Gas flow	Standard (> 1 sec.):
	Fast (< 1 sec.):
Gas 1:   ✓   30.0 mL/min	
Gas 2: 35.0 mL/min	
Gas 3: 40.0 mL/min	

**Note** On the right of Gas 1, Gas 2, and Gas 3, the type of gas (Air, Hydrogen, Nitrogen, Helium, Argon, or Argon/Methane) selected in the configuration page is indicated.

This page includes the following fields:

- Detector
- Gas Flow
- Signal

### Detector

Set the detector parameter in this field. See Table 64 for details.

Table 64. GDI Detector Parameter

Parameter	Description
Temperature	Select the check box to enable the adjacent field. This controls the temperature of the detector. In the field enter a temperature in the range 0-450 °C.

## **Gas Flow**

These check boxes allow you to turn the flows on and off only. See Table 65 for details.

#### Table 65. GDI Flow Parameters

Parameter	Description
Gas 1:	Select the check box to switch on the flow of the detector gas connected to <b>Gas 1</b> line, and enable the adjacent flow rate field. Set the value of the gas flow in mL/min according to the <b>Full</b> <b>Scale</b> value of the Gas 1 encapsulated flow restrictor.
Gas 2:	Select the check box to switch on the flow of the detector gas connected to <b>Gas 2</b> line, and enable the adjacent flow rate field. Set the value of the gas flow in mL/min according to the <b>Full</b> <b>Scale</b> value of the Gas 2 encapsulated flow restrictor.
Gas 3:	Select the check box to switch on the flow of the detector gas connected to <b>Gas 3</b> line, and enable the adjacent flow rate field. Set the value of the gas flow in mL/min according to the <b>Full</b> <b>Scale</b> value of the Gas 3encapsulated flow restrictor.

## Signal

Check the Acquire data box to enable the acquisition of the data.

Select either the **Standard GC peaks** (> 1 s) or the **Fast GC peaks** (< 1 s) radio button option as required.

# **Auxiliary Temperature Page**

Defines the temperature parameters of the external auxiliary temperature modules selected in the Instrument Configuration. See the example Figure 49.

Figure 49. Auxiliary Temperature Page

Oven PTV (front)	S/SL (back) NPD (front	) ECD (back)	TCD (aux right)	FID (aux left)
Valve oven		Auxilary tempera	ture control	
Valve Oven	□ <u>50</u> °C	Transfer Line 1:		50 °C
		Transfer Line 2:		50 °C

This page includes the following fields:

- Valve Oven Options
- Auxiliary Temperature Options

### **Valve Oven Options**

Options of **Valve Oven** are: Valve Oven, HT Valve Oven, Aux Column Oven, Aux Heater 3, Aux Heater 4, and Methanizer.

- Valve Oven Controls the temperature of the main oven for working at low temperature. Enter a value up to 200°C.
- **HT Valve Oven** Controls the temperature of the main oven for working at high temperature. Enter a value up to 300°C.
- Aux Column Oven Controls the temperature of the secondary oven. Enter a value up to 250°C.
- Aux Heater 3 Controls the temperature of the generic auxiliary heater 3. Enter a value up to 400°C.
- Aux Heater 4 Controls the temperature of the generic auxiliary heater 4. Enter a value up to 400°C.
- **Methanizer** Controls the temperature of the generic auxiliary heater 4. Enter a value up to 400°C.

## **Auxiliary Temperature Options**

Options of **Auxiliary Temperature Control** are: Transfer Line 1, Transfer Line 2, Aux Heater 1, and Aux Heater 2.

- **Transfer Line 1** Controls the temperature of the MS transfer line. Enter a value up to 400°C.
- **Transfer Line 2** Controls the temperature of a second MS transfer line. Enter a value up to 400°C.
- Aux Heater 1 Controls the temperature of the generic auxiliary heater 1. Enter a value up to 400°C.
- Aux Heater 2 Controls the temperature of the generic auxiliary heater 2. Enter a value up to 400°C.

## **Auxiliary Carrier Page**

Defines the carrier gas parameters of the auxiliary Carrier Gas modules. Up to six auxiliary carrier lines from **Carrier 1** to **Carrier 6** can be selected. See Figure 50.



Oven PTV (from	t) S/SL (bac	k) NPD (front) ECD (back)
Carrier 1	Carrier mode:	Constant Flow
Carrier 2	Carrier flow	
Carrier 3	Flow:	1.500 mL/min
Carrier 4		
Carrier 5		
Carrier 6		

Each carrier gas line includes the following field.

Carrier Mode

### **Carrier Mode**

Defines the auxiliary carrier gas control mode to use: Constant Flow, Constant Pressure, Programmed Flow, and Programmed Pressure. Each mode activates or deactivates the dedicated parameters.

• **Constant Flow** — Use this field to set up flow when the **Constant flow** carrier mode has been selected.

Select the **Flow** check box to enable the Flow field.

Enter a value in the range of 0.1-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.

• **Constant Pressure** — Use this field to set up pressure when the **Constant pressure** carrier mode has been selected.

Select the **Pressure** check box to enable the Pressure field.

Enter a value in the range of 5-1000 kPa (0.725-145 psi; 0.05-10 bar). If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

• **Programmed Flow** — Use this field to set up a flow program when **Programmed Flow** carrier mode has been selected. See Figure 51.

inguio on	riogram	mou o	unio	1101
Carrier flow				
Flow enable:			7	
Flow ramps			<del>\$</del> }	$\times$
Rate (mL/min²)	Flow (mL/min)	Hold T (min)	ime	
	1,500	1,00		

Figure 51. Programmed Carrier Flow

Select the Flow enable check box to enable the flow.

Enable the number of flow ramps required by clicking on the 🗘 button.

Conversely, to reduce the number of rows on display, click on the  $\bowtie$  button as necessary.

The initial row is displayed by default and cannot be hidden.

If you wish to disable the ramps temporarily, clear the **Flow enable** check box. This disables the Flow column and the program is ignored as shown in the graph, which becomes a horizontal line at zero flow rate. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are as follows:

- Rate Enter a value for the rate of flow rate change in the range of 0.001-100 mL/min<sup>2</sup>. This field is not available for the initial field of the program.
- Flow Enter a value for the constant flow rate field of the ramp in the range of 0.001-100 mL/min.
- Hold Time Enter a value for which the flow rate will be held. The range is 0.00-999.99 min.
- **Programmed Pressure** Use this field to set up a flow program when **Programmed Pressure carrier** mode has been selected. See Figure 52.

#### Figure 52. Programmed Pressure

-Carrier pressu	lite		
Pressure enable:			
Pressure rar	nps	÷	$\times$
Rate (kPa/min)	Pressure (kPa)	Hold Time (min)	
	100,00	1,00	

In this mode you can program an initial constant pressure rate field followed by up to three ramps.

Select the **Pressure enable** check box to enable the pressure.

Enable the number of pressure ramps required by clicking on the 🕈 button.

Conversely, to reduce the number of rows on display, click on the  $\times$  button as necessary.

The initial row is displayed by default and cannot be hidden. If you wish to disable the Pressure ramps temporarily, clear the **Pressure enable** check box. This disables the Pressure column, and the program is ignored as shown in the graph, which becomes a horizontal line at zero pressure. The values entered are preserved and may be reactivated by selecting the check box once more.

The parameters in the timetable are as follows.

- Rate Enter a value for the rate of pressure change in the range of 0.01-1000 kPa/min (0.001-145 psi; 0.0001-10 bar). This field is not available for the initial field of the program.
- Pressure Enter a value for the constant pressure field of the ramp in the range of 5-1000 kPa (0.725-145 psi; 0.05-10 bar).
- Hold Time Enter a time for which the pressure will be held. The range is 0.00-999.99 min.

# **Run Table Page**

You can use this page to set up detector, valve, and external events to occur at the Prep-run or during a run. Events displayed on the Run Table page are from selections made in the Run-Time Event screen on page 114. The page of Figure 53 is displayed.

Figure 53. Run Table Page

Oven	PTV (front)	6/SL (bac	k) NPD (front) E	ECD (bacl	<) TCD (aux right)	FID (au	(left) Aux. Tempera	tures	Aux. Carriers	Run Table
Time 0,00 0,00	Item ECD - Front External eve	ent #1	Action Autozero On		Add Modify Remove					
Initial va	alues	_		_		_			]	
Valve o	ven evt. 1 on:		Valve oven evt. 5 on:		External event 1 on:		External event 5 on:			
Valve o	ven evt. 2 on:	Γ	Valve oven evt. 6 on:		External event 2 on:		External event 6 on:			
Valve o	ven evt. 3 on:		Valve oven evt. 7 on:		External event 3 on:		External event 7 on:	Γ		
Valve o	ven evt. 4 on:	Γ	Valve oven evt. 8 on:	Γ	External event 4 on:	Γ	External event 8 on:	Γ		

This page includes the following fields:

- Initial Values
- Event Program Timetable
- Adding Events
- Modifying Events
- Removing Events
- Run-Time Event

## **Initial Values**

In this field you can activate the externally controlled devices set in External Event field. See also "Run-Time Event" on page 114 for details.

Select the option button to activate the associated fields.

### **Event Program Timetable**

Events are sorted into time order automatically. The table has three columns: Time, Item and Setting. See Table 66 for details.

	Table 6	6. Event	Program	Timetable
--	---------	----------	---------	-----------

Column	Description
Time	This shows the time in the run at which the event will take place.
Item	The Item column shows the event type and identifies the external event or valve number.
Action	This column indicates Action associated with the event, for example switching a lamp on or off.

### **Adding Events**

Click the **Add** button to view the "Run-Time Event" on page 114 dialog window. Run items you select from this dialog are added to the Event Program Timetable.

### **Modifying Events**

Click the **Modify** button to edit a selected run item listed in the Event Program Timetable.

### **Removing Events**

Select an item in the Event Program Timetable. Click the **Remove** button to remove the selected run item from the run table.

# **Run-Time Event**

The Run-Time Event window is displayed when the **Add** button is selected.

There are four types of events: detector, valve oven, external, and aux carrier.

## **Event Time**

Select either the **Prep Run** or **Run Time** option button. When you select the Prep Run option button, the time field is disabled.

Select the Run Time option button to enable the adjacent field. Enter the time at which the event is to occur in the range of 0.00-999.99 min.

Figure 54. Run-Time Event Window.

Run-Time Event 🛛 🛛	Run-Time Event
Event time Prep-run C Run time: 0.00 min	Event time Prep-run Run time: 000 min
Event Event type: Detector Detector: NPD - Front	Event Event type: Detector Detector: NPD - Front
Action: Autozero 💌	Action: Autozero
OK Cancel	OK Cancel

### **Event**

Select the event type among Detector, Valve Oven, External, and Aux Carrier.

Refer to:

- Detector Event
- Valve Oven Event
- External Event
- Aux Carrier Event

#### **Detector Event**

Select **Detector** to activate the associated fields. In the Detector field, choose the detector to which the event is to be applied. This selection enables the action appropriate to the type of detector.

Run-Time Event	×	
Event time	1	
Prep-run		
C Run time: 0.00 min		
Event	1	
Event type: Detector		
Detector: NPD - Front		
Action: Autozero 💌		
OK Cancel		

The actions are summarized in Table 67.

Table 67. Detector Event Options

Option	Details	Settings
Autozero	Applies to all detector types.	Select this option to zero the detector output at the given time.
Neg. Polarity	Applies to TCD only. The entry will invert the polarity at the given time.	On or Off
Source Current	Applies to NPD only. The entry will change the source current at the given time.	On or Off

### **Valve Oven Event**

Select **Valve Oven** to activate the associated fields. In the Valve Oven field, set the condition of the desired valve controlled into the Valve Oven module.

Rı	In-Time Event	×
	Event time	
	C Prep-run	
	Run time:	0.00 min
	Event	
	Event type:	Valve Oven 💌
	Number:	1
	Valve type:	Switching 🗨
	Setting:	Off
OK Cancel		

The option are summarized in Table 68.

Table 68. Valve Oven Event Options

Option	Details
Number	Select the number of the valve in the range of 1-8.
Valve type	Select Sampling or Switching according to the valve type.
Setting	Set the event to On or Off.

### **External Event**

Select **External** to activate the associated fields. In the External field, set the default condition for up to eight externally controlled devices.

Rı	In-Time Event	
	Event time	
	○ Prep-run	
	Run time:	0.00 min
	Event	
	Event type:	External
	Number:	1
	Setting:	0n 💌
OK Cancel		

The options are summarized in Table 69.

#### Table 69. External Event Options

Option	Details
Number	Select the number of the external event in the range of 1-8.
Setting	Set the event to On or Off.

**Note** When the chromatograph is in Standby mode, each device will return to the default condition set here. The option selected is visualized and enabled in Initial Values field.

#### **Aux Carrier Event**

Select **Aux Carrier** to activate the associated fields. In the Aux Carrier field, set the default condition for up to six auxiliary carrier lines.

Run-Time Event	
Event time	
C Prep-run	
Run time:	0.00 min
Event	
Event type:	Aux Carrier 💌
Number:	1
C Carrier off	
C Pressure:	5.00 kPa
Flow:	0.100 mL/min
OK	Cancel

The options are summarized in Table 70.

Table 70. Aux Carrier Event Options

Option	Details
Number	Select the number of the auxiliary carrier line in the range of 1-6.
Carrier off	Check this radio button to turn off the auxiliary carrier of the selected line.
Pressure	Check this radio button to set the desired pressure for the auxiliary carrier of the selected line.
Flow	Check this radio button to set the desired flow for the auxiliary carrier of the selected line.