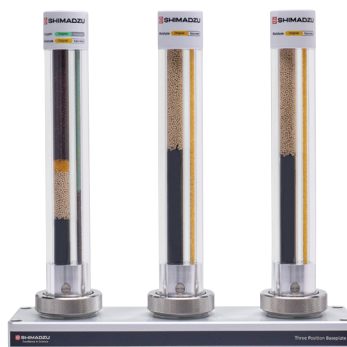


Handbook for Gas Chromatograph Accessories



Shimadzu Gas Chromatograph

Gas chromatographs require different peripherals and supplies depending on the analytical purpose, especially as it relates to gas management, flow line configuration, column installation, sample injection and data processing. This brochure introduces various accessories and supplies supported by Shimadzu GC instruments.



Nexis GC-2060 + AOC-30i/20s U (Option)

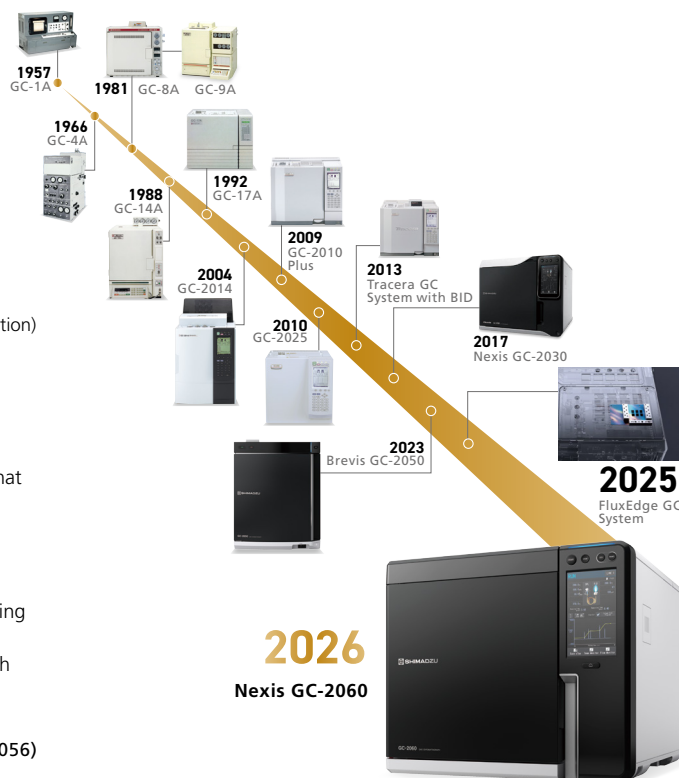
Gas Chromatograph Nexis GC-2060

The Nexis GC-2060 is the latest flagship gas chromatograph that sets a timeless standard built on 70 years of innovation.

It features a newly developed MMI for versatile injection and world leading FID and TCD detectors. With high expandability supporting up to two injectors, three injection units and four detectors, it enables multiple applications in a single space saving system.

As the culmination of Shimadzu GC technology, it delivers both reliability and innovation and serves as a trusted partner for advancing the industry.

(Detailed product brochure: C184-E056)



Brevis GC-2050 + AOC-30i (Option)

Gas Chromatograph GC-2050

"Smaller, simpler, and easier to use – without compromising performance." That's the demand from analysts. And that's why Shimadzu developed the Brevis GC-2050. This new space-saving GC delivers uncompromising analytical performance in a modern yet rugged design, easily meeting the analysis needs of laboratories in a range of industries.

(Detailed product brochure: C184-E050)



GC-2014 + AOC-20i (Option)

Gas Chromatograph GC-2014 Series

The GC-2014 offers high expandability and flexibility with the ability to mount multiple injectors and detectors. Available for both packed and capillary columns, it offers an excellent user interface with a large LCD, digital gas control and auto-diagnostics, and innovative technology for all injectors, detectors and flow controllers.

(Detailed product brochure: C184-E014)

Contents

	Description			P/N	Compatible Models					Remarks	Page
					GC-2060	GC-2050	GC-2030	GC-2014	GC-2010 Plus		
Sampling Device	Liquid injection-related equipment	Autoinjector	AOC-30i	221-86000-48	✓	✓	✓			Standalone	6
				221-86002-48	✓	✓	✓		For sampler		
			AOC-20i Plus	221-86003-58	✓	✓	✓	✓	✓	For AOC-30i/AOC-20s U	
		Barcode/2D Code Reader for AOC		221-85900-58	✓	✓	✓				
		Sample Cooling Fan		221-44995-91	✓	✓	✓	✓	✓		
		Long Turret		221-45622-91	✓	✓	✓	✓	✓	For AOC-20i series	
		Large Vial Holder		221-32949-01	✓	✓	✓	✓	✓		
		4mL Vial Holder, Sampler		221-45182	✓	✓	✓	✓	✓		
			Autosampler	AOC-20s U	221-86001-58	✓	✓	✓	✓	✓	
		Vial Cooling/Heating Unit	For 1.5 mL vial	221-85189-43	✓	✓	✓	✓	✓	For AOC-20s U	
			For 4.0 mL vial	221-85189-44	✓	✓	✓	✓	✓		
	Gas injection-related equipment	Auto Gas Injector	GI-30	221-89755-41	✓	✓	✓				7
			SPI-2030		222-31210-41/42			✓			
			SPI-U(1.0)		222-31210-43	✓	✓				
		Manual Gas Sampler	MG5-2030	221-78990-41	✓	✓	✓				
			MG5-2010	221-75363-41					✓		
			MG5-4	221-42574-02					✓	✓	
				221-42868-91							
			MG5-5	221-42576-41					✓	✓	
				221-42585-41							
	Headspace sampler-related equipment	HS-20 NX		225-41000-41/42/58	✓	✓	✓		✓		12
		HS-20 NX Trap		225-41001-41/42/58	✓	✓	✓		✓		
		HS-20 LT		225-22050-41/42/58	✓		✓	✓	✓		
		HS-10		221-76862-11	✓	✓	✓	✓	✓		
		Barcode Reader for HS-20		225-23340-41	✓	✓	✓	✓	✓		
		Needle		See text	✓	✓	✓	✓	✓		
		Sample Loop		See text	✓	✓	✓	✓	✓		
	Thermal desorption system-related equipment	TD-30		225-30600-58	✓	✓	✓		✓		13
		TD-30R		225-30700-58	✓	✓	✓		✓		
		Barcode Reader for TD-30		225-32325-41	✓	✓	✓		✓		
		Sample Tube		See text	✓	✓	✓		✓		
		Trap Tube		See text	✓	✓	✓		✓		
Injection Unit	Split/Splitless Injection Unit	SPL-U(1.0)		221-87500-58	✓	✓				8	
		SPL-U(1.0) Inert		221-87500-61	✓	✓					
		SPL-2030		221-77100-41/44			✓				
		SPL-2030 Inert		221-77100-62/65			✓				
		SPL-2010 Plus		221-73040-41/48					✓		
		SPL-2014		221-75046-41/44				✓			
	Multi-mode Injection Unit	MMI-U(1.0)		222-32350-58	✓					9	
	Wide-Bore Injection Unit	WBI-U(1.0)		221-87501-58	✓	✓				8	
		WBI-2030		221-78200-41/44			✓				
		WBI-2010 Plus		221-73041-41/48					✓		
		WBI-2014		221-75047-41/44				✓			
		WBI-2014 (AMC)		221-75038-41/44				✓			
	Single Packed Injection Unit	SINJ-U(1.0)		221-87548-58	✓	✓					
		SINJ-2030		221-85187-41/48			✓				
		SINJ-2014		221-75037-41/44				✓			
	Wide-Bore Capillary Column Attachment		See text	✓	✓	✓	✓				
	On-column/ Programmed Temperature Vaporization Injection Unit	OCI NX-U(1.0)		221-87502-58	✓	✓				10	
OCI-2030		221-78300-41/42/48			✓						
OCI-2030 NX		221-85800-41/42/48			✓		Not applicable for simple OCI insert				
PTV-U(1.0)		222-30160-58		✓							
PTV-2030		221-78350-41/42/48			✓						
OCI/PTV-2010		221-71042-41/44					✓				
Septum Nut		See text	✓	✓	✓	✓	✓		11		
Septum for Injection Port		See text	✓	✓	✓	✓	✓				
Column connection-related parts	Nut and Graphite Ferrule for Capillary Columns			See text	✓	✓	✓	✓	✓	14	
	Nut and Vespel Ferrule for Capillary Columns			See text	✓	✓	✓	✓	✓		
	Nut and ClickTek Ferrule for Capillary Columns			See text	✓	✓	✓	✓		15	
	Prex Tool			221-76547-43	✓	✓	✓		✓		
	Column Connection Parts			See text	✓	✓	✓	✓	✓	16	
	Packed Column Connections			See text	✓	✓	✓	✓	✓		
	UG-type glass-packed column connection parts			See text	✓	✓	✓				

	Description		P/N	Compatible Models					Remarks	Page
				GC-2060	GC-2050	GC-2030	GC-2014	GC-2010 Plus		
Column Oven	Cryogenic Valve Unit	CRG-U CO ₂	221-78900-43	✓						
		CRG-U LN ₂	221-80819-43	✓						
		CRG-2030 CO ₂	221-78900-41		✓	✓				
		CRG-2030 LN ₂	221-80819-41		✓	✓				
		CRG-2010 CO ₂	221-48703-91/42/48				✓	✓		
		CRG-2010 LN ₂	221-49588-91/42/48				✓	✓		
	Oven Light Unit		221-78939-41	✓		✓				
	Oven Insert		221-85807-41			✓				
	Column Hanger		222-32489	✓		✓	✓	✓	For one column	17
			221-47159	✓		✓	✓	✓	For one column	
			221-87290		✓					
			221-72849	✓		✓		✓	For two columns	
			221-70200				✓		For one column, vertical orientation	
	Exhaust Duct		221-80955-41	✓		✓				Can be connected directly to spiral duct.
			221-85232-41	✓		✓				
			221-87248		✓					
			221-70675-41				✓			
		221-47748-41					✓			
Flame Ionization Detector	FID-U(2.0)	222-32300-58	✓						Capillary/SUS packed/ Glass packed	18
	FID-2030	221-77200-41/44			✓					
	FID-U(1.0)	221-87503-58		✓						
	FID-2010 Plus	221-73345-41/42/48					✓			
	FID-2014 Single	221-75030-41/42/44/46				✓				
	FID Nozzle		See text	✓	✓	✓	✓	✓		
	FID Collector		See text	✓	✓	✓	✓	✓		
	SUS Packed Kit for FID-U (2.0)		222-32845-41	✓						
	FID Custom Kit for Packed Columns		221-85191-41		✓	✓				
	Capillary Adapter for DFID		221-33193-91				✓			
Thermal Conductivity Detector	STCD-U(1.0)	222-30950-58	✓	✓					Capillary/SUS packed/Glass packed	20
	TCD	—	Order it factory-installed in the GC main unit.							
SUS Packed Kit for STCD-U (1.0)		222-33350-41	✓	✓						16
Capillary Adapter for TCD		221-34012-91				✓				For PTCD-2030
		221-82865-42								
Barrier Discharge Ionization Detector	BID-U(1.0)	221-87507-58	✓	✓	✓				Capillary	20
	BID-2030	221-77700-41/44								
	BID-2010 Plus	221-76000-41/42/44			✓					
Helium Purifier	HP-2	221-75538-41/42	✓	✓				✓		
Jetanizer 2.0		222-33100-45	✓		✓			✓		
Jetanizer 1.0		222-32000-41		✓						
Polyarc	Standard	222-32100-41	✓	✓	✓				19	
		222-32200-41	✓	✓						
	Ultra	222-32200-43/46								
ECD Controller		221-87610-41	✓	✓	✓				For ECD-2010 Exceed U	
		221-77540-41/42							For ECD-2010 Exceed	
		221-77550-41/42			✓					
		221-47733-41/42					✓			
ECD Cell		221-75032-41/42/44				✓	✓	For ECD-2010 Plus	21	
ECD Flow Bypass Kit		See text	✓	✓		✓		For ECD-2014		
		221-49664-42			✓		✓	For ECD-2010 Exceed (does not need to be ordered for GC-2030)		
		221-49664-41					✓	For ECD-2010 Plus		
Sulfur Chemiluminescence Detector	SCD-2030	221-84085-41/58						✓	Capillary for installation on left side	
		221-84185-41/58			✓				Capillary for installation on right side	
Flame Photometric Detector	FPD-U(1.0)	221-87506-58	✓	✓	✓				Capillary/Grass packed	
	FPD-2030	221-77600-41/48							Capillary	
	FPD-2010 Plus	221-73334-41/42/48			✓				Capillary/Grass packed	
	FPD-2014	221-75031-41/42/44					✓	✓		
Interference Filter		See text	✓	✓		✓			22	
Photomultiplier Purge Kit	FPD-U(1.0)	222-81010-42	✓	✓	✓		✓	Capillary/Grass packed		
	FPD-2030	221-81010-41						Capillary		
	FPD-2010 Plus	221-72652-43			✓			Capillary/Grass packed		
	FPD-2014	221-72652-44					✓	✓		Glass packed

	Description		P/N	Compatible Models					Remarks	Page	
				GC-2060	GC-2050	GC-2030	GC-2014	GC-2010 Plus			
Detector	Flame Thermionic Detector	FTD-U(1.0)	221-87508-58	✓	✓				Capillary	22	
		FTD-2030	221-77800-41/48			✓					
		FTD-2010 Plus	221-73332-41/42/48					✓			
		FTD-2014	221-75033-41/42/44				✓		Glass packed		
		FTD-2014C	221-75034-41/42/44				✓		Capillary		
FTD Collector Regeneration Kit			221-49079-91	✓	✓	✓	✓	✓			
Hydrogen Option Kit, AFC			221-87283-41	✓	✓	✓	✓	✓			
Hydrogen Option Kit, APC			221-87280-41	✓	✓	✓	✓	✓			
Supply Gas Shut-off Solenoid Valve Unit			221-70782-41				✓				
Accessories for Safety and Environmental Friendliness	Securement Parts	GC	221-78975	✓		✓			Hardware for fastening the GC unit to the instrument stand.	23	
			221-87606-41		✓						
			222-32938-41	✓					For right- and left-side fastening		
			221-61192				✓		For right-side fastening		
			221-61193				✓		For left-side fastening		
		SCD	221-84168			✓			For rear-side fastening		
		AOC-30i	221-86017-41	✓	✓	✓					
		AOC-20i	221-74090-43	✓	✓	✓		✓			
			221-74090-42	✓				✓			
		HS-20	225-23414-41	✓	✓	✓	✓	✓	For rear-side fastening		
	Vent Tube		221-77174-41	✓	✓	✓	✓	✓	5 m		
	Gas Utility	Air Generator	AGE-1000	221-74500-01	✓	✓	✓	✓	✓	Only compatible with FIDs	24
		Air Compressor	Oil-less Type	221-72380	✓	✓	✓	✓	✓	55/57 dB (A) at 50/60 Hz	
Oil-less, Quiet Type			042-70041-02	✓	✓	✓	✓	✓	47 dB		
Hydrogen Gas Generator		Precision Series	Refer to brochure	✓	✓	✓	✓	✓			
Super-Clean Gas Filter			See text	✓	✓	✓	✓	✓		25	
Filter Regulator			221-56748-01	✓	✓	✓	✓	✓		26	
Moisture Trap (Silica gel)			201-36688	✓	✓	✓	✓	✓			
Filter Joint			201-43969	✓	✓	✓	✓	✓			
Oxygen Trap			221-46985-91	✓	✓	✓	✓	✓			
Syringe for Cleaning			221-35641-91	✓	✓	✓	✓	✓			
Filter for Flow Controller			221-77580-42	✓	✓	✓					
			221-42559-92	✓	✓	✓	✓	✓			
			221-34121-94	✓	✓	✓	✓	✓	Additional filter for moisture		
Gas Selector			221-84916-41	✓	✓	✓				27	
Shimadzu M/G Type Joint			See text	✓	✓	✓	✓	✓		28	
Pressure Regulator for High-Purity Gas	PPR-N ₂	221-35999-01	✓	✓	✓	✓	✓				
	PPR-H ₂	221-35999-02	✓	✓	✓	✓	✓				
	PPR-He	221-35999-03	✓	✓	✓	✓	✓				
Gas Supply Tube			See text	✓	✓	✓	✓	✓			
Swagelok Adapter			221-25975-92	✓	✓	✓	✓	✓			
Needle Valve			221-57298	✓	✓	✓	✓	✓			
GC Fixing Bracket (Side)			222-32938-41	✓							

Sampling Device

Autoinjector/Autosampler AOC Series

The AOC-30i is a next-generation intelligent autoinjector with Sampler Navigator functionality that is packed with injection expertise. The skip function uses vial-sensing technology to increase throughput and help improve data integrity. The 30-vial sample capacity is large enough to handle most workflows, but can be expanded to 150 vials in combination with an AOC-20s U autosampler. Though the AOC-20i Plus offers exceptional cost-effectiveness for broad market appeal, it also features extensive functionality making it applicable for a variety of applications, such as for co-injecting derivatizing agents.



AOC-20s U

AOC-30i

AOC-20i Plus

(Detailed product brochure: C180-E096, C189-E021)

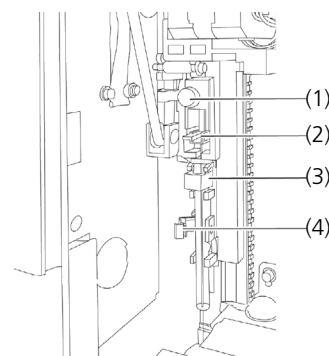
Consumables

These consumables are for both AOC-30i and AOC-20i Plus models.

They are used to fasten the syringe to the autoinjector.

If replacing a syringe, replacing the plunger holder is recommended.

#	Description	P/N	Remarks
(1)	Plunger Holder Screw	037-02759-56	-
(2)	Plunger Holder Black	222-30298-81	Set of 5, Syringe maintenance without removal
(2)	Plunger Holder	221-45177-91	Set of 5
(3)	Barrel Holder	221-45178-91	Set of 5
(4)	Barrel Clip	221-48989-91	-



Options

The 2D code reader reads the two-dimensional code or barcode affixed to sample vials and enters that data in the workstation. That improves traceability by eliminating errors from hand-writing information or manual data entry processes.

The sample cooling fan cools samples down close to room temperature.

A cooling/heating unit can be used to cool or warm samples to a temperature other than room temperature.

Cooling/heating units can control the temperature of sample vials to any temperature within the 0 to 60 °C range by circulating temperature-controlled liquid through the racks.

With AOC-20i Plus models, the number of sample, solvent, or liquid waste vials can be increased by installing expansion parts.

	Description	P/N	Remarks
AOC-30i/ AOC-20s U	Barcode/2D Code Reader for AOC	221-85900-58	Reads barcodes or 2D codes on labels affixed to vials.
AOC-20i	Sample Cooling Fan	221-44995-91	-
	Long Turret	221-45622-91	-
	Large Vial Holder	221-32949-01	1 case included standard
	4mL Vial Holder, Sampler	221-45182	1 case included standard
AOC-20s U	Cooling/Heating Unit for 1.5mL Vial	221-85189-43	-
	Cooling/Heating Unit for 4.0mL Vial	221-85189-44	-



(5) Barcode/2D Code Reader

Auto Gas Sampler GI-30

The Auto Gas Sampler is an automatic injection valve for introducing gas samples. It allows for automatic analysis with high injection reproducibility, ranging from inorganic gases containing atmospheric components to organic gases containing adsorbable components. The Sample IN connection is 1/16 inch. Optional features include a three-way solenoid valve for switching between two sample lines and purge piping to prevent atmospheric contamination during valve rotation.

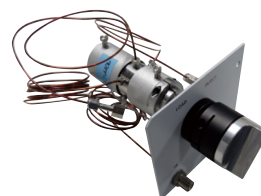
Description	P/N	Remarks
Three-Way Solenoid Valve	S222-30683-41	Valve for Switching Between Two Sample Lines
Gas Sample Selector VB-30-GS	S222-27937-11	Valve for Switching Between Six Sample Lines Note: Requires piping components for GI-30 and power cable
Valve Purge Piping	S222-30370-41	Purge to Prevent Atmospheric Contamination Note: AUX-APC (1ch) is required separately.
Vent Tube	S221-77174-41	Silicone Tube for Connecting Sample OUT to Local Exhaust System
Nut, P-207	S035-66243-01	Used for Installing Piping to Solenoid Valve
Ferrule, P-200	S035-66243-21	Used for Attaching Piping to Solenoid Valve
Pump (without Flowmeter)	222-32577-42	Used when the sample supply pressure is low.
Pump (with Flowmeter)	222-32577-41	Used when the sample supply pressure is low.
Silicone Rubber Tube	015-31350-02	Tube for connecting a gas sampling bag (OD 8.0 mm x ID 6.0 mm).
Gas Sampling Bag Connection Kit	222-32925-51	Reduces the risk of air contamination at the gas sampling bag connection point (φ6 mm outlet fitting).



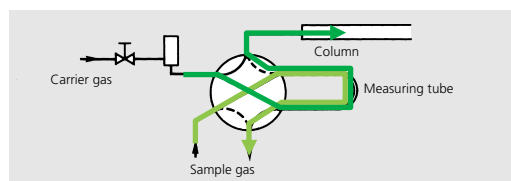
Gas Sampler MGS Series

These are manual injection valves for injecting gas samples. MGS-2030/2010 models include purged housing that reduces the amount of air leakage during switchover. The MGS-5 includes a valve that can switch between three sample quantity levels, whereas the MGS-2030/2010/4 models change the quantity by selecting a sample loop. The unit is connected between the sample injection unit and AFC unit, so the sample injection unit can continue to be used. A heating function is not included.

Connectors: Shimadzu MM type or 6 mm tubing joint



MGS-2010 Valve Unit



Description	P/N	Remarks
MGS-2030/ MGS-2010	Sample Loop	0.2 mL 225-21889-82 For high-concentration samples or adsorptive compounds.
		1 mL 225-21889-81 Standard loop for low- to medium-concentration samples. (Standard accessory)
		3 mL 225-22046-81 For large-volume sample injection.
	Tubing Joint	201-30254-91 For 5 mm I.D. rubber or vinyl tubing.
MGS-4/ MGS-5	Sample Loop	1 mL 201-42483-02 For high-concentration samples or adsorptive compounds. (Standard accessory)
		2 mL 201-42484 Standard loop for low- to medium-concentration samples. (Standard accessory)
		5 mL 201-42487 For large-volume sample introduction. (Standard accessory)
	Tubing Joint	201-30254-91 For 5 mm I.D. rubber or vinyl tubing. (Standard accessory)



Tubing joint

Sample Injection Unit

Split/Splitless Sample Injection Unit (SPL)

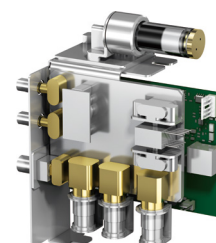
An AFC digital flow controller accurately controls split ratios and the flowrate and linear velocity through columns. The split analysis allows specifying a linear velocity suitable for separation, but that increases carrier gas consumption due to higher gas flowrates.

However, using the carrier gas saver function can reduce gas consumption by automatically reducing the gas flowrate whenever samples are not being analyzed.

The SPL-2030/SPL-U model is equipped standard with a ClickTek nut that enables single-step insert replacement and helps shorten downtime. The SPL-2030/SPL-U model with deactivated surfaces is also available for samples with highly adsorptive components, such as sulfur-based components.



SPL-2030



Flow Controller AFC-2030

Wide-Bore Injection Unit (WBI)

This capillary column injection unit is used to inject the total volume of samples through a column with a 0.53 mm internal diameter. Injecting larger sample volumes can increase sensitivity. A septum purge line on top of the injection unit reduces contamination and inhibits tailing of large peaks, such as for solvents.

Single Packed Injection Unit (SINJ)

This injection unit is for single flow line type packed columns.

It is used to prevent ghost peaks and contamination by using a specialized sample injection unit for a selective detector (such as an ECD). A capillary column with a 0.53 mm internal diameter can also be attached using a WBC attachment kit.

Dual Packed Injection Unit (DINJ)

This injection unit is for dual flow line type packed columns.

It is included standard with GC-2014 models for packed column analysis.

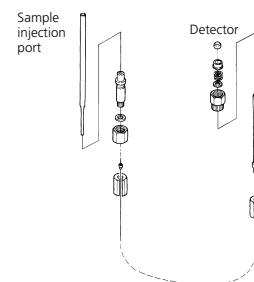
Dual flow lines enable chromatograms to be obtained while reducing baseline impacts during temperature-programmed analysis.

A capillary column with a 0.53 mm internal diameter can also be attached using a WBC attachment kit.

WBC Attachment Kits

These attachment kits are used for total sample volume injection through a 0.53 mm internal diameter capillary column attached to a packed injection unit.

Description	P/N	Applicable Models	Remarks
WBC Attachment Kit	221-29992-91	GC-2014	This kit is used to attach a 0.53 mm internal diameter column to a DINJ or SINJ unit and packed detector unit. Make-up gas must be supplied by a flow controller.
	221-29992-93	Nexis GC-2060 Nexis GC-2030 Brevis GC-2050	This kit is used to attach a 0.53 mm internal diameter column to SINJ and packed detector units.
WBC Adapter for DFID/DTCD	221-70952-91	GC-2014	This adapter is used to attach a 0.53 mm internal diameter column to a DFID or DTCD unit. It includes tubing for supplying make-up gas from the DAFC unit.



Multi-Mode Inlet Unit (MMI)

This is a sample gasification unit compatible with the following five analytical methods:

- Split / Splitless Injection (SPL)
- Programmed Temperature Vaporization Injection (PTV)
- Direct Injection(DIRECT)
- Large Volume Injection (LVI)
- Thermal Desorption / Extraction Injection (TD/TE)

Compared with conventional split / splitless inlet units (SPL), it offers high data compatibility. While maintaining compatibility with SPL, it can shorten maintenance-related downtime such as liner exchange and column cut from about 40 minutes to about 5 minutes.



Cooling options that improve analytical efficiency

Customers who mainly use SPL mode can analyze without a cooling option, but adding a cooling option can greatly shorten cooling time and improve analytical efficiency by reducing the time required for cooling from natural cooling for 15 minutes to pressurized air cooling for 5 minutes.

Cooling method	Usable temperature range	Description	P/N	Remarks
Compressed air	Room temp. +10°C to 450°C	Air Cooling Valve Kit for MMI	222-31653-41	Because a large amount of air is required (20 L/min), an air supply from a compressor is necessary. *When installing a new compressor, a separate piping kit (222-32638-41) and compressor (042-70040-14) are required.
Liquid nitrogen (LN2)	-160°C to 450°C	LN2 Cooling Kit for MMI	222-31654-41	Requires a liquid nitrogen supply system. *If the liquid nitrogen supply line is 1/4 inch, the adapter must be prepared by the customer.

Consumables by analytical method

For MMI-U (1.0), consumables such as septa are not included as standard. To begin operation, you must first purchase the Entry Kit (227-36713-01) *¹ and then prepare the consumables required for the analytical method you will use.

	Split / Splitless Injection (SPL)	Programmed Temperature Vaporization Injection (PTV)	Direct Injection (DIRECT)	Large Volume Injection (LVI)	Thermal Desorption	
					TD	Monotrap
Syringe	221-34618 Syringe 10uL			221-45243, 50uL (5pcs) 227-35037-01, 250uL (1pcs)	Not required.	
Septum	227-35511-01 Xtra LifeSeptum (25pcs)					
O ring ^{*2}	Included in the Entry Kit. For replacement purchases, use P/N 227-36712-01 (10 pcs). ²					
Liner ^{*2}	Included in the Entry Kit.		227-36703-01 (5pcs) ^{*2}	227-36704-01 (5pcs) ^{*2}	Common to the TD-30	Included in the Entry Kit.
Column ferrule	670-15003-03 Graphite vespel Ferrules (10 pcs), for 0.25 mm I.D. and 0.18 mm I.D. Columns 670-15003-04 Graphite vespel Ferrules (10 pcs), for 0.32 mm I.D. Columns 670-15003-05 Graphite vespel Ferrules (10 pcs), for 0.53 mm I.D. Columns					
Column nut	670-11009 Nut, SSNE16/012 (5 pcs)					

*¹ Includes Xtra Inert Split Liner (P/N 227-36700-01, pack of 5), Xtra Inert Splitless Liner (P/N 227-36701-01, pack of 5), and O-rings for MMI (P/N 227-36712-01, pack of 10).

*² The O-rings and inserts for the MMI are not compatible with the SPL-U. For details, please refer to the GC/GC-MS Glass Insert Selection Guide.

Capillary Column Adapters

Three types of capillary column adapters are available for the MMI-U.

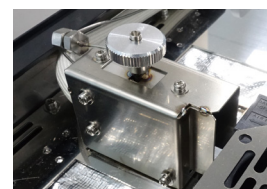
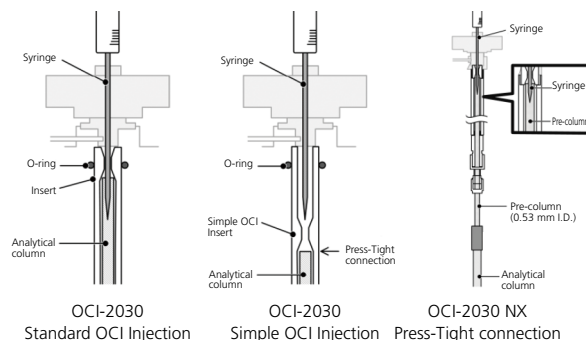
Description	P/N	Remarks
MMI-Adapter Kit for Graphite Ferrules	222-33084-41	Required when using graphite ferrules.
MMI-Adapter Kit for Standard I.D. Tubing	222-33083-41	Required when using standard I.D. tubing.
MMI-Adapter Kit for Graphite Vespel Ferrules	222-33082-41	Supplied as standard. Recommended for replacement when the inlet becomes contaminated by sample residues.

On-column Injection (OCI) Unit

On-column injection units are suitable for analyzing compounds with thermal instability (easily decomposed). A special syringe is used to inject the total volume of liquid sample directly into the column while the injection unit temperature is below the solvent boiling point, and then the injection unit is heated to vaporize the solvent for analysis. It can reduce decomposition or distillation phenomena (discrimination) within the injection unit.

If using a narrow-bore column or concerned about column contamination, a 0.53 mm internal diameter guard column (deactivated) can be connected by Press-Tight connectors. By using an easy OCI insert, a narrow-bore column can be used directly connected by Press-Tight connectors. OCI NX-U(1.0)/OCI-2030 NX models do not support easy OCI injection.)

For inserts for simplified OCI and parts to connect pre-column and main column, see Column Connection Parts (p. 15).



Programmed Temperature Vaporization (PTV) Injection Unit

Programmed temperature vaporization injection units are suitable for analyzing compounds with thermal instability (easily decomposed) because there is no distillation phenomenon (discrimination).

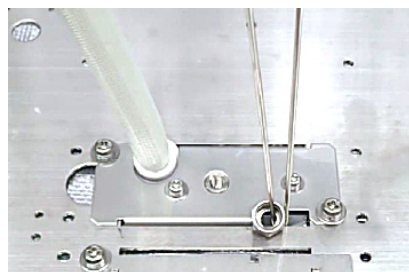
Programmed temperature vaporization (PTV) is an analysis method that injects liquid samples into the insert to enable both split and splitless methods.

Using an insert reduces column contamination.

It can also be used for high-sensitivity analysis by injecting a large sample volume and then concentrating the target components inside the injection unit by heating the solution to a temperature that only vaporizes the solvent and discharging the solvent via the split line.

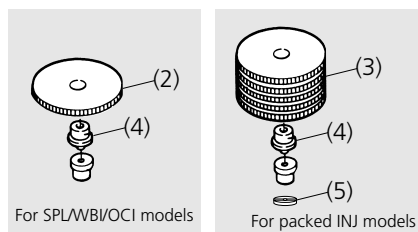
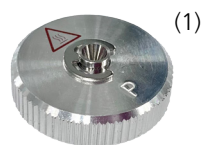
Splitter INJ SPI

This is a split-injection unit that can connect a gas sampler and column, serving as a replacement for standard split/splitless inlets. It is compatible with capillary columns with an inner diameter of 0.25 to 0.53 mm. The design minimizes air leakage and adsorption points in the sample flow path. This unit does not support manual injection using a gastight syringe.



Septum Nut

#	Description	P/N	Applicable models and remarks
(1)	Septum Nut	221-77117-41	Nexis GC-2060, Nexis GC-2030, Brevis GC-2050 Needle guide not necessary
(2)		221-87997-02	GC-2010 Plus (for SPL)
(3)		221-41286	GC-2010 Plus (for WBI/OCI), GC-2014, or GC-2025
(3)	Needle Guide	221-89210-02	Nexis GC-2060 (for packed INJ units) Nexis GC-2030 (for packed INJ units) Brevis GC-2050 (for packed INJ units) GC-2014 (for packed INJ units)
(4)		221-44584	Nexis GC-2060 (for packed INJ units) Nexis GC-2030 (for packed INJ units) Brevis GC-2050 (for packed INJ units)
(4)		221-44823-91	For GC-2010/2010 Plus, GC-2014, or GC-2025 Set of 2
(5)	Injection Port Spacer	221-22206	Nexis GC-2060 (for packed INJ units) Nexis GC-2030 (for packed INJ units) Brevis GC-2050 (for packed INJ units) GC-2014 (for packed INJ units)



Injection Port Septa

Description	P/N	Color	Features
Xtra Life Septum (25 pcs)	227-35511-01	Brown	Unique two-piece design ensures a leak-free seal and minimizes particulates generated from repeat injections. Ideal for trace-level analysis and lasts up to 10 times longer than standard septa. • Maximum temperature (INJ setting temperature): 400 °C
Premium Green Septum (50 pcs)	227-35004-01 Nexis GC-2060, Nexis GC-2030, Brevis GC-2050	Green	This low-bleed septum is heat resistant. It helps inhibit components bleeding even during high-sensitivity analysis. Made of crack-resistant material, it offers superior durability, sealing performance and solvent-resistance. • Maximum temperature (INJ setting temperature): 350 °C
Standard type (20 pcs)	201-35584 GC models other than the Nexis GC-2060, Nexis GC-2030, and Brevis GC-2050	White	General-purpose septum

Other Injection Port Septa

Description	P/N	Color	Features
HT Septum (20 pcs)	221-48398-91	Brown	• Suitable for high-sensitivity analysis at high temperatures • Maximum temperature (INJ setting temperature): 450 °C
LL Septum (20 pcs)	221-48972-91	Blue	• Suitable for high-sensitivity analysis • Maximum temperature (INJ setting temperature): 450 °C
Enduro Blue Septum (50 pcs)	221-75180	Light blue	• Low-bleed • Maximum temperature (INJ setting temperature): 350 °C

A low-bleed septum is not completely free of bleeding. The type of bleeding that occurs varies with the septum and results in different patterns on chromatograms. In the case of high-sensitivity analysis, it is necessary to select a septum whose bleeding will not occur at a point that interferes with the peak of the target compound. Conditioning for several hours between 120 °C and 200 °C after extraction with hexane may help to reduce bleeding. In the case of using a syringe for AOC, it is recommended to exchange the septum after about 100 injections. If the outside diameter of a needle of a gastight syringe is thick, it is recommended to exchange after about 50 injections.

ClickTek Nuts (For Single-Step Replacement)

ClickTek nuts are included standard with SPL-2030, SPL-U(1.0), WBI-2030, WBI-U(1.0) models. They cannot be installed in other injection units.

Headspace Sampler HS-20 Series

With short transfer lines and patented isolation gas technology, HS-20 NX series headspace samplers reduce carryover to one-tenth the level of previous models and significantly increase laboratory productivity. The ability to overlap processing of up to 12 vials makes the samplers especially useful in fields that require high throughput. Featuring the world's only* electronically-cooled trap, the HS-20 NX Trap enables over ten times higher sensitivity than regular headspace analysis. The product line also includes an HS-20 Long Transfer Line (LT) model compatible with packed columns. The HS-10 is a low-cost entry model with stirring and overlapping functionality for outstanding cost-effectiveness.



Nexis GC-2060 + HS-20 NX (Loop model)

(Detailed product brochure: C180-E094)

* As of August 2021, according to a Shimadzu survey

Option

Description	P/N	Remarks
Barcode Reader for HS-20	225-23340-41	Reads barcode labels affixed to vials.

Needle for HS-20

Description	P/N	Remarks
Deactivated Needle	0.4mm ID 225-11238-41	For reducing surface area
	0.6mm ID 225-11238-43	Standard needle
	0.8mm ID 225-11238-44	Prevents clogging when measuring samples with precipitating salts
Acid-resistant Needle, 0.4mm ID	225-32168-42	For analyzing blood with acid added
Needle, 0.4mm ID	225-11238-42	Low-cost needle



HS-10 + GC-2060

(Detailed product brochure: C180-E081)

Sample Loop

Description	P/N	Remarks
Sample Loop	0.2mL 225-21889-82	For concentrated or adsorptive components
	0.4mL 225-21889-83	For volume compatibility with HSS-2/4 series models
	0.5mL 225-21889-85	For concentrated or adsorptive components
	0.8mL 225-21889-84	For volume compatibility with HSS-2/4 series models
	1mL 225-21889-81	For low to medium concentrations at standard volumes
	2mL 223-54697-04	For large injection volumes
	3mL 225-22046-81	For large injection volumes



Deactivated Needle, 0.4mm ID



Sample Loop 1mL

Other Consumables

Description	P/N	Remarks
Rotor, SSAC6WE	040-28090-50	Use this for temperature ranges not suitable for the SSAC6WT model. The upper limit is 225 °C at 400 psi
Clean GVF Socket, 6.0	225-41074-03	For ClickTek NX, Set of 10

Trap Tube for HS-20 and TD-30

Description	P/N	Remarks
Trap Tube TenaxTA	225-23328-41	For measuring C4 to C44 medium-to-high boiling components
Trap Tube Carboxen1000	225-23328-42	For measuring C2 to C16 low-to-medium boiling components
Trap Tube TenaxTA+ Carboxen1000	223-54144-92	For measuring working environments, including MeOH
Trap Tube TenaxTA+ Carboxen1000	223-54144-96	Universal model that supports low-to-high boiling points
Trap Tube Carboxen1000	223-54144-97	Similar properties to TenaxTA, but fewer decomposition products
Nut, 1/8-Inch	035-62902-01	1/8 Swagelok
SS-200 Sleeve Set	035-62972-02	1/8 Swagelok
Ferrule GV 1/8"	223-54423-91	For HS trap model and TD, set of 2

Other Consumables

Description	P/N	Remarks
Rotor, SSAC6WT	040-28090-25	This is the standard rotor. The seal material has a tendency to stick to the valve body at 150 °C or lower temperatures (250 °C or higher recommended).



Trap Tube TenaxTA



Rotor, SSAC6WT

Thermal Desorption System TD-30 Series

The TD-30 series was developed to offer solutions optimized for gas and material analysis applications. With no cold points along the sample path, it enables trace analysis of high-boiling-point components required for analyzing emission gases. The practical retrapping function supports a wide range of boiling points to reduce the risk of analytical losses when measuring atmospheric air or work environments. Functionality for automatically adding internal standard substances enables higher reproducibility than manual injection. An optional barcode reader can read barcodes printed on tubes. The series includes a TD-30 model with a 60-sample loading capacity and a TD-30R model with a 120-sample capacity and functionality for retrapping and adding internal standard substances. The series supports a wide variety of analysis applications, from R&D to quality control.



Nexis GC-2060 + TD-30

(Detailed product brochure: C146-E349)

Option

Description	P/N	Remarks
Barcode Reader for TD-30	225-32325-41	Reads barcodes from tubes labeled with a printed barcode.

Sample Tube

Description	P/N	Remarks
Trap Tube TenaxTA 130mg	223-57102-91	For measuring C4 to C44 medium-to-high boiling components and ideal for measuring indoor air or emission gases
Trap Tube TenaxGR 130mg	223-52284-91	Made of TenaxTA with graphite added for use in the semiconductor industry
Trap Tube TenaxTA 100mg+ Carboxen1000 50mg	223-52884-91	Universal model that supports low-to-high boiling points
Trap Tube Carboxen1000 100mg	223-57474-91	For measuring low-boiling components, such as hazardous air pollutants or working environments
Glass Tube	223-57119	For direct thermal desorption with the tube filled with plastic or other solid samples
Tube Cap	223-54617-41	Caps only for TD-20/30 series, set of 20



Trap Tube TenaxTA 130mg

Note: Shimadzu brand sample tubes are not barcoded. Barcoded sample tubes are available for Shimadzu TD from Sigma-Aldrich (Merck) or GL Sciences (CAMSCO).

Other Consumables

Description	P/N	Remarks
O-ring AS568A009 7075UP	036-15680-09	Heat resistant O-ring
O-ring PTFE coating	223-57166-91	For room temperature, for cap, set of 20

Column connection accessories

Parts for Connecting Capillary Columns

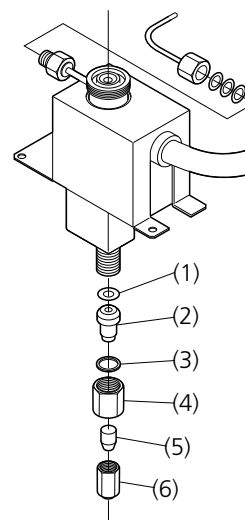
The parts used to connect capillary columns are determined based on the column's internal diameter, whether or not air ingress via the connector would affect analysis, and whether or not ClickTek connectors are used.

	Adapter	Graphite	Vespel	ClickTek
HS-20 NX	Split joint		✓	✓
HS (except HS-20 NX) or TD	Split joint		✓	
Sample Injection Units (when using SCD or GC-MS)	Vespel adapter		✓	
SPL/WBI	Capillary adapter (included standard)	✓	✓	✓
PTV	Capillary adapter (included standard)	✓		
OCI	Not necessary or Press-Tight connector			
SINJ	Stainless steel column adapter (included standard) or WBC adapter	✓		
DINJ	Stainless steel column adapter (included standard) or WBC adapter	✓		
SCD, GCMS	Vespel adapter		✓	
FID, TCD, BID, FPD, FTD, ECD	Capillary adapter (included standard)	✓		✓
PFID, PTCD	Stainless steel column adapter (included standard) or WBC adapter	✓		

Nuts and Graphite Ferrules for Capillary Columns

These are typical graphite ferrules. They are easy to use and somewhat reusable. They can be used at temperatures up to 450 °C. Due to oxygen permeability, they are not suitable for GC-MS systems or for analyzing target compounds that contain oxygen.

#	Description	P/N	Remarks
(1)	Gold Gasket	221-49065-91	Set of 5
(2)	Capillary Adapter	221-42998	-
-	Deactivated Capillary Adapter	221-82787-04	Deactivated
(3)	Back Washer	201-30051	-
(4)	Nut	201-30008	-
(5)	Ferrule, 0.5 mm	221-32126-05	For columns with O.D. up to 0.5 mm, set of 10
(5)	Ferrule, 0.5 mm Conditioning	227-35006-01	For columns with O.D. up to 0.5 mm, pre-aged, and suitable for temperature-programmed analysis, set of 10
(5)	Ferrule, 0.8 mm	221-32126-08	For columns with O.D. up to 0.8 mm, set of 10
(5)	Ferrule, 0.8 mm Conditioning	227-35009-01	For columns with O.D. up to 0.8 mm, pre-aged, and suitable for temperature-programmed analysis, set of 10
-	Column Nut with Slit	221-32705-84	For detector, set of 5
(6)	Column Nut without Slit	221-16325-81	For sample injection unit, set of 10



Nuts and Vespel Ferrules for Capillary Columns

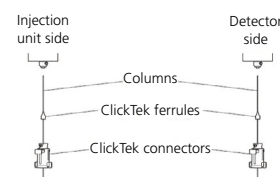
If air ingress via the connector could affect analysis, using Vespel ferrules with dedicated adapters/nuts is recommended. Additional tightening is required so they cannot be reused for any other column than the one to which it is initially tightened. Use them at temperatures up to 325 °C.

#	Description	P/N	Remarks
(2)	Capillary Adapter	225-10167-91	Adapter (for MS injection port), pre-washed
	Ferrule: GVF-004	670-15003-03	For 0.25 mm columns
(5)	Ferrule: GVF-005	670-15003-04	For 0.32 mm columns
	Ferrule: GVF-008	670-15003-07	For 0.53 mm columns
(6)	Column Nut, 1/16"	670-11009	Nut (for SCD/MS/HS/TD units), set of 5

Note: Not compatible with metal capillary columns

ClickTek Nuts and Ferrules for Capillary Columns

These parts enable easy tool-free connection/disconnection for compatible sample injection units and detectors. They are not oxygen permeable, will not generate debris, and will not adhere to the sample injection unit or detector. Use them at temperatures up to 350 °C.



Description		P/N	Applicable Models	Remarks
ClickTek Starter Kit	AF	221-77144-08	Nexis GC-2060 (SPL/FID-U(2.0))	This kit is required for newly installing ClickTek connectors.
		221-77144-01	Nexis GC-2030 AF, Brevis GC-2050 (SPL/FID-U(1.0))	
		221-77144-04	GC-2010 Plus AF/2010 AF	
		221-77144-05	GC-2025AF	
	AT	221-77144-42	Nexis GC-2030 AT	
		221-77144-46	GC-2010 Plus AT/2010 AT	
	ATF	221-77144-43	Nexis GC-2030 ATF	
		221-77144-47	GC-2010 Plus ATF/2010 ATF	
	SPL	221-77144-11	Nexis GC-2060, Nexis GC-2030, Brevis GC-2050	This kit is for supporting ClickTek connectors with an SPL/WBI unit installed.
		221-77144-21	GC-2010 Series	
	FID	222-77144-60	Nexis GC-2060	This kit is for supporting ClickTek connectors with an FID unit installed.
		221-77144-12	Nexis GC-2030, Brevis GC-2050	
		221-77144-22	GC-2010 Series, GC-2025	
	BID	221-77144-53		This kit is for supporting ClickTek connectors with a BID unit installed.
	FTD	221-77144-57	Nexis GC-2060, Nexis GC-2030, Brevis GC-2050, GC-2010 Series	This kit is for supporting ClickTek connectors with an FTD unit installed.
	FPD	221-77145-15		This kit is for supporting ClickTek connectors with an FPD unit installed.
	ECD	221-77144-56	Nexis GC-2030, GC-2010 Series	This kit is for supporting ClickTek connectors with an ECDexceed unit installed.
		221-77144-58	Nexis GC-2060, Brevis GC-2050	
	STCD	221-77144-59	Nexis GC-2060, Brevis GC-2050	This is a kit for Click Tek compatibility when expanding the STCD.
ClickTek Ferrule	Without Holes	211-81162-00	-	Ferrule for blocking flow. (set of 6)
	0.43m	211-81162-01	-	ClickTek ferrules for columns with up to 0.25 mm I.D. (set of 6)
	0.50m	211-81162-02	-	ClickTek ferrules for columns with up to 0.32 mm I.D. (set of 6)
	0.73m	211-81162-03	-	ClickTek ferrules for columns with 0.45 to 0.53 mm I.D. (set of 6)
ClickTek Connector		221-77155-41	-	To connect multiple columns, two ClickTek connectors are required per column.
Prefix Tool for GC, ClickTek		221-76547-43	-	Tool used to fasten ClickTek ferrules to columns.

Column Connection Parts

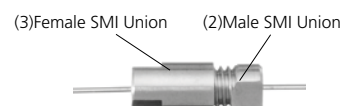
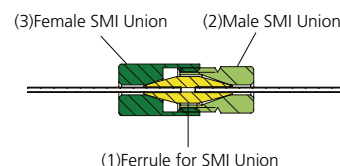
SMI Unions are characterized by low leakage, inertness, low dead volume and low heat capacity. Select appropriate components according to the inner diameter of the column to be connected.

- E 0.25mm i.d. column : 0.4* • E 0.32mm i.d. column : 0.5*
- E 0.53mm i.d. column : 0.8*

* Inner diameter of ferrule for SMI union (mm)

*For fused silica capillary columns only. Metal columns cannot be used.

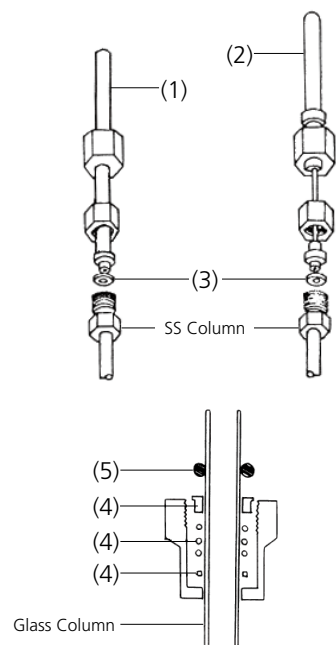
#	Description		P/N	Remarks
-	Press-Tight Connector		221-38102-92	For connecting 0.25 to 0.53 mm I.D. columns
(1)(2)(3)	SMI Union Kit	0.4 - 0.4	227-35024-01	Includes 5 ferrules, 2 pairs of unions, 1 connecting nut, and 1 pair of connecting tools
		0.4 - 0.5	227-35024-02	
		0.4 - 0.8	227-35024-03	
		0.5 - 0.5	227-35024-04	
		0.5 - 0.8	227-35024-05	
		0.8 - 0.8	227-35024-06	
(1)	Ferrule for SMI Union	0.4 - 0.4	227-35025-01	For replacement, set of 10
		0.4 - 0.5	227-35025-02	
		0.4 - 0.8	227-35025-03	
		0.5 - 0.5	227-35025-04	
		0.5 - 0.8	227-35025-05	
		0.8 - 0.8	227-35025-06	
(2)(3)	SMI Union	0.4 - 0.5 / 0.4 - 0.5	227-35026-01	For replacement, set of 5
		0.4 - 0.5 / 0.8	227-35026-02	
		0.8 - 0.8	227-35026-03	



Parts for Connecting Packed Columns

The parts used to connect packed columns are determined based on the type of column.

#	Description	P/N	Remarks
(1)	Stainless Column Adapter, SINJ	221-14087-92	For stainless steel columns and Nexis GC-2030/Brevis GC-2050/GC-2010 series models
	Stainless Column Adapter, INJ	221-14087-91	For stainless steel columns and GC-2014 models
(2)	Stainless Column Adapter, DET	221-43143-92	For stainless steel columns and Nexis GC-2030, Brevis GC-2050 (except TCD), GC-2010 Series models
		221-08882-91	For stainless steel columns and GC-2014 models (except TCD)
	Stainless Column Adapter, TCD	221-10079-93	For stainless steel columns and GC-2014 models (TCD)
(3)	Aluminum Gasket	201-35183-84	For stainless steel columns and high temperatures (250 °C or higher), 5 bags of 100 each
	Silicon Gasket	201-35184	For stainless steel columns used at less than 250 °C, set of 50
(4)	Glass Column Joint Set	222-31168-84	Glass column connection parts, set of 5
	Column Connector, TCD-2014	221-10078-92	For WBC and glass columns
(5)	Graphite Ferrule for Glass Columns	221-15563-91	For glass columns and high temperatures (250 °C or higher), set of 4
	TCD Sleeve Ferrule	221-10076-91	For TCD-2014 glass and stainless steel columns, set of 10
	O-ring Silicon	201-47614	For glass columns used at less than 250 °C, set of 20
	SUS column kit for STCD	222-33350-41	For SUS columns, Nexis GC-2060/Brevis GC-2050 (STCD)



UG-type glass-packed column connection parts

This is a part for connecting the UG-type glass-packed column*¹ to the Brevis GC-2050 or Nexis GC-2030.

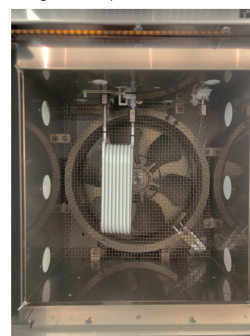
The adapter part varies depending on the detector used*². Please make sure to choose the correct one.

*¹ The UG-type glass-packed column is compatible with the Brevis GC-2050, Nexis GC-2030, and GC-2014. For purchase inquiries, please contact a Shimadzu distributor or Shimadzu GLC.

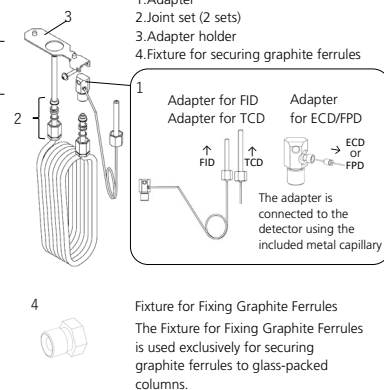
*² The adapter set for ECD/FPD uses components that have been treated for passivation. This set can also be used with FID and TCD.

Description	P/N	Remarks
Glass-packed adapter set for STCD/PTCD	222-31167-94	For glass columns, Nexis GC-2060, Brevis GC-2050, Nexis GC-2030
Glass-packed adapter set for FID	222-31167-96	For glass columns, Nexis GC-2060, Brevis GC-2050, Nexis GC-2030
Glass-packed adapter set for FPD/FID/STCD	222-31167-95	For glass columns, Nexis GC-2060, Brevis GC-2050, Nexis GC-2030
Glass-packed adapter set for ECD	222-33354-41	For glass columns, Nexis GC-2060 Nexis GC-2030/Brevis GC-2050

Connection of the UG-type glass-packed column to the GC-2050 (using the adapter set for ECD/FPD)



The glass-packed adapter set includes:
1. Adapter
2. Joint set (2 sets)
3. Adapter holder
4. Fixture for securing graphite ferrules



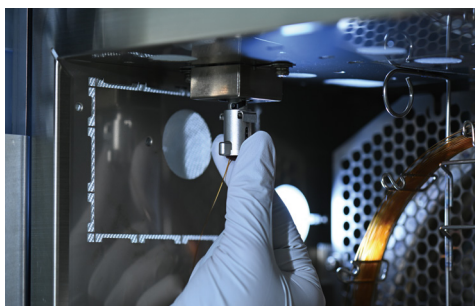
Column Oven Accessories

Cryogenic Valve Unit (CRG)

The CRG supplies refrigerant (liquified carbon dioxide gas or liquid nitrogen) to the GC for controlling the column oven temperature below room temperature. Refrigerant supply is controlled by switching an electromagnetic valve ON or OFF. Temperature is controlled to -50 °C if using liquified carbon dioxide as a refrigerant or to -99 °C if using liquid nitrogen. It is used for detailed analysis of hydrocarbons (DHA) or cryogenic separation of inorganic gases (argon, oxygen, etc.) as specified by ASTM and JIS standards. Placing the refrigerant container near the GC is recommended.

Oven Light

Illuminating the GC column oven interior makes it easier to see connections when routing the column to the injection port or detector. It helps prevent damage from hitting the column tip against objects.



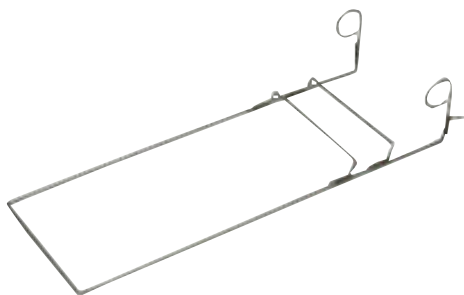
Oven Insert

The heating rate can be increased by installing an oven insert inside the column oven. Due to the shorter analysis times resulting from faster heating, the insert is used for applications such as simulated distillation (SimDis) gas chromatography and total petroleum hydrocarbons (TPH) analysis.

Note: Some restrictions apply regarding where the sample injection unit or detector can be installed and how many columns can be installed.

Column Hanger

These parts are used to secure columns inside the column oven. They can secure 1 to 3 columns, depending on the column shape.



Exhaust Duct

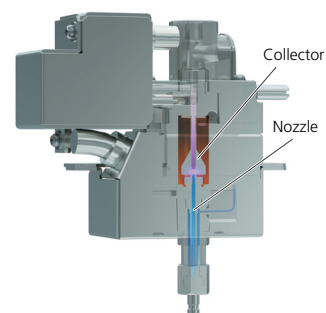
Due to the hot gases discharged from the back of the GC, the back of the GC must be kept a certain distance from any wall in order to prevent trapping heat. If the required space cannot be provided, install an L-shaped exhaust duct. If an exhaust duct that can be connected directly to a 100 mm diameter spiral duct is used, then the oven exhaust can be discharged directly into an exhaust ventilation system to minimize any increase in room temperature.



Detectors

Flame Ionization Detector (FID)

This general-purpose detector can detect almost all organic compounds (except formaldehyde and formic acid). Sensitivity to changes in temperature or gas flowrates is poor, but it offers high S/N ratios and a wide dynamic range, and is easy to use for a wide range of applications.



FID Nozzles and Collectors

If using an FID, better or more reliable analysis results can be obtained for some samples by replacing the nozzle or collector. The larger the nozzle bore diameter, the less prone it is to sample clogging and the more linear the results, but the lower the sensitivity. Nozzle designs are optimized for the main analytical target.

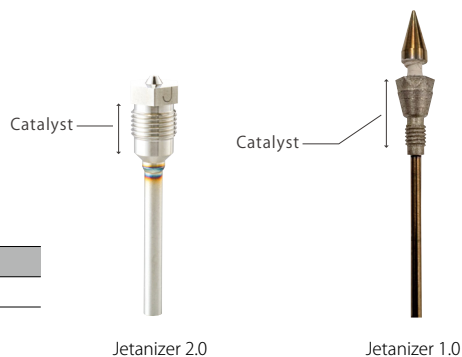
Applicable Models	Description	P/N	Remarks
Nexis GC-2060	Nozzle, Capillary, $\varnothing 0.3$	222-33539-43	This standard nozzle is used for capillary columns.
	Nozzle, Capillary, Inert, $\varnothing 0.3$	222-32680-43	This inert nozzle is effective for highly adsorptive samples.
	Nozzle, Capillary, Inert, $\varnothing 0.5$	222-32680-45	Recommended for highly adsorptive samples and applications where nozzle clogging may occur.
	Nozzle, Capillary, Inert, $\varnothing 0.8$	222-32680-48	Recommended for highly adsorptive samples and for analyses using solvents with large vapor expansion volumes, such as water.
Nexis GC-2030 Brevis GC-2050	Nozzle, Capillary, $\varnothing 0.3$	221-75597-03	This standard nozzle is used for capillary columns.
	Nozzle, Capillary, $\varnothing 0.5$	221-75597-05	It is used to measure a wide range of concentrations via a capillary column with a 0.53 mm I.D.
	Nozzle, Capillary, $\varnothing 0.8$	221-75597-08	It is used if the hydrogen flame is prone to extinguishing when analyzing aqueous or other solutions via a capillary column or if the nozzle is prone to clogging when analyzing high-boiling components.
GC-2010 Series GC-2025	Nozzle, Capillary, $\varnothing 0.3$	221-48258-91	This standard nozzle is used for capillary columns.
	Nozzle, Capillary, $\varnothing 0.5$	221-48258-92	It is used to measure a wide range of concentrations via a capillary column with a 0.53 mm I.D.
	Nozzle, Capillary, $\varnothing 0.8$	221-49373-91	It is used if the hydrogen flame is prone to extinguishing when analyzing aqueous or other solutions via a capillary column or if the nozzle is prone to clogging when analyzing high-boiling components.
Nexis GC-2060	Nozzle, Packed, $\varnothing 0.5$	222-32635-05	This standard nozzle is used for packed columns.
	Nozzle, Packed, $\varnothing 0.8$	222-32635-08	For analyses using solvents with large vapor expansion volumes, such as water.
Nexis GC-2030 Brevis GC-2050	Nozzle, Packed, $\varnothing 0.5$	221-85179-41	This standard nozzle is used for packed columns.
	Nozzle, Packed, $\varnothing 0.8$	221-85179-42	It is used if the hydrogen flame is prone to extinguishing when analyzing aqueous or other solutions via a packed column.
GC-2014	Nozzle, Packed, $\varnothing 0.5$	221-70162-95	This standard nozzle is used for packed columns.
	Nozzle, Packed, $\varnothing 0.8$	221-70162-96	It is used if the hydrogen flame is prone to extinguishing when analyzing aqueous or other solutions via a packed column.
GC-2014	Nozzle, Capillary, $\varnothing 0.3$	221-70162-93	It is used for high-sensitivity measurements using a capillary column.
	Nozzle, Capillary, $\varnothing 0.5$	221-70162-92	This standard nozzle is used for packed columns.
	Nozzle, Capillary, $\varnothing 0.8$	221-70162-94	Recommended for aqueous samples prone to flame extinguishment and for analyses of high-boiling compounds that may cause nozzle clogging.
GC-2010 Series	Nozzle, Packed, $\varnothing 0.5$	221-48885-91	This standard nozzle is used for packed columns.
Nexis GC-2060	Collector, FID-U(2.0)	222-30817-42	
	Collector for CS ₂ , FID-U(2.0)	222-32890-41	Recommended for analyses using highly corrosive solvents, such as carbon disulfide (CS ₂).
Nexis GC-2030	Collector, FID-2030	221-72322-95	
	Collector, Wide, FID-2030	221-72322-96	Used with an FID nozzle collector kit.
Brevis GC-2050	Collector, FID-U(1.0)	221-87525-41	
	Collector, Wide, FID-U(1.0)	221-87659-41	Used with an FID nozzle collector kit.
GC-2010 Series GC-2025	Collector, FID-2010/2025	221-72322-91	
GC-2014	Collector, FID-2014	221-81021-41	
Nexis GC-2030 Brevis GC-2050	FID Custom Kit for Packed Columns	221-85191-41	It is used to connect a packed column to an FID-2030/FID-U(1.0) detector.
GC-2014	Capillary Adapter for DFIDs	221-33193-91	It is used to connect a capillary column to an FID-2014 detector.



Jetanizer

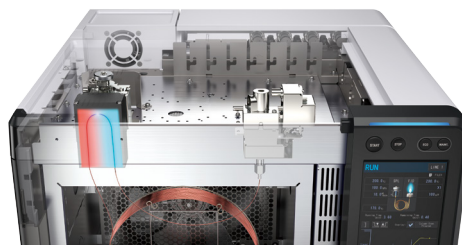
Jetanizer is a compact FID nozzle-type methanizer, with a reduction catalyst packed inside the FID nozzle. It efficiently converts CO and CO₂ into CH₄ through reactions with hydrogen, enabling high-sensitivity detection with the FID. The device can be easily installed by simply replacing the existing FID nozzle, requiring no additional power and offering a cost-effective solution.

Product Name	P/N	Applicable Models
Jetanizer 2.0	222-33100-45	Nexis GC-2060
Jetanizer 1.0	222-32000-41 (Old Part Number: 222-30364-41)	Nexis GC-2030, Brevis GC-2050



Polyarc

Polyarc is a post-column reactor that converts organic compounds into methane molecules. By using this unit, all molecules can be detected as methane, providing a uniform response. This improves the sensitivity of compounds with functional groups that cause sensitivity reduction and reduces the time-consuming calibration process.



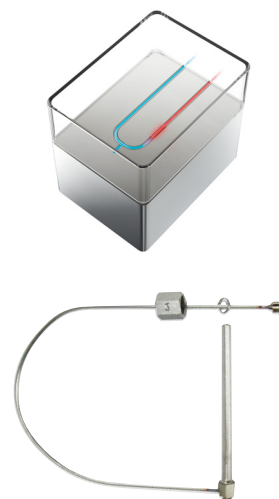
Product Name	P/N	Applicable Models / Notes
Polyarc 100/120V	222-32100-43 (Old Part Number: 222-30455-03)	Nexis GC-2030
Polyarc 200/240V	222-32100-46 (Old Part Number: 222-30455-04)	
Polyarc	222-32100-41 (Old Part Number: 222-30455-01)	Nexis GC-2060, Brevis GC-2050
Polyarc Ultra 100/120V	222-32200-43 (Old Part Number: 222-30455-07)	Nexis GC-2030
Polyarc Ultra 200/240V	222-32200-46 (Old Part Number: 222-30455-08)	
Polyarc Ultra	222-32200-41 (Old Part Number: 222-30455-05)	Nexis GC-2060, Brevis GC-2050
Polyarc Installation Kit	222-30453-41	This is a kit for installing the Polyarc onto GC

Thermal Conductivity Detector (TCD)

Featuring simple construction and operability, this general-purpose detector should be able to detect all substances with a thermal conductivity that is different from the carrier gas.

It is mainly used to detect inorganic gases or components without FID detection sensitivity. Because it is a non-destructive detector, it can be connected in series with other detectors.

Helium is primarily used as the carrier gas. (N_2 or Ar is used to analyze He or H_2 .)

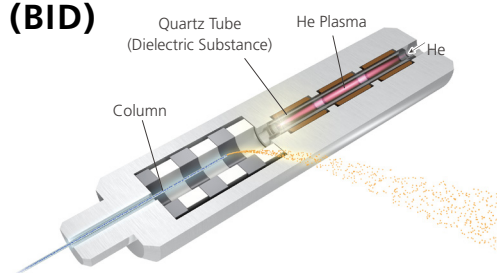


Capillary Adapter for TCD

This is used to supply make-up gas, such as via a split tube connected to a packed column injection port. It is used to connect a capillary column to a packed column TCD unit.

Barrier Discharge Ionization Detector (BID)

BIDs enable detecting every compound except Ne (neon) and He, which is plasma gas, with high sensitivity (ppm). Therefore, BIDs enable analyses of CO , CO_2 and light hydrocarbons simultaneously with high sensitivity, while these mixed gas samples require multiple detectors using conventional analytical methods.



Helium Purifier HP-2

This purifier can purify helium supplies with up to 10 ppm impurities (equivalent to a G2 helium cylinder) to achieve a purity level of up to 10 ppb impurities.

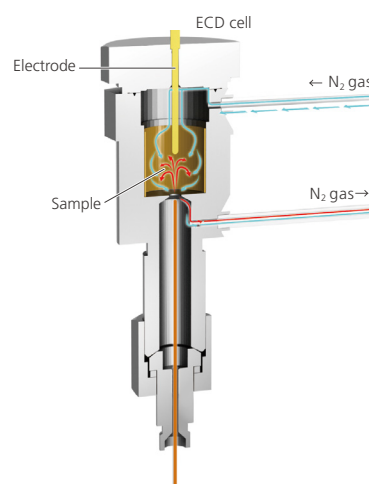
That means it can supply helium for BID units that require a minimum 99.9999 % purity.

It can purify helium at flowrates up to 1000 mL/min.



Electron Capture Detector (ECD)

ECDs provide extremely high selective sensitivity to halogen and nitro compounds by using a radioisotope. They offer especially high sensitivity for chlorinated compounds, enabling detection at the picogram quantity level, making them ideal for the trace analysis of chlorinated pesticide residues. To ensure a stable baseline, supply gas (especially nitrogen) must be free of oxygen.



Applicable GC Models	Nexis GC-2060/Brevis GC-2050 (ECD-2010 Exceed U)	Nexis GC-2030 (ECD-2010 Exceed)	GC-2010 Plus (ECD-2010 Exceed)	GC-2010/2010 Plus (ECD-2010 Plus)	GC-2014 (ECD-2014)
ECD Control Unit*	221-87610-41	221-77540-41/42	221-77550-41/42	221-47733-41/42	221-75032-41/42/44
ECD Cell	221-87505-58	221-77510-41	221-77510-41	221-72002-91	221-72001-91

Note: Due to the need for radioactive material management, the ECD cell is sold separately.

ECD Flow Bypass Kit

Equipped as standard on the Nexis GC-2060, Nexis GC-2030 and Brevis GC-2050. It is an option (photo on the right) for the GC-2010 series. Gas continues to flow into the ECD cell even when the power is turned off, allowing the baseline to stabilize quickly when the power is turned on.



Sulfur Chemiluminescence Detector (Nexis SCD-2030)

This selective high-sensitivity detector measures the sulfur content in samples based on its chemiluminescence.

It enables about one order of magnitude higher sensitivity than FPD detectors that selectively detect sulfur compounds in a similar way; however, it differs from FPD detectors in that sensitivity is linearly proportional to sample concentration. (FPD sensitivity is quadratically proportional to concentration.) SCD detectors also offer similar molar sensitivity, which enables sulfur compounds to be measured with the same relative sensitivity regardless of their structures.

That characteristic means that a calibration curve for a different compound can be used to determine an approximate concentration, even for compounds without a standard sample available.

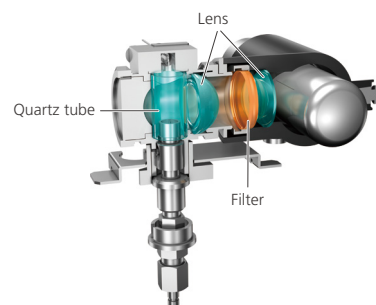
It is ideal for analyzing sulfur compounds in natural gas or gasoline or trace flavor components in beverages.



Description	P/N	Remarks
SCD Consumables Set	222-33070-41	Includes one outer tube, one inner tube, and all necessary consumables.
Ozone Scrubber Set	221-84384-41	Ozone scrubber is pre-filled.
Ozone Scrubber Filter	221-84142-41	-
DAU-20 Maintenance Kits	221-82894-50	Pump maintenance kit

Flame Photometric Detector (FPD)

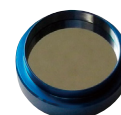
The characteristic light emitted from the combustion of sulfur or phosphorus compounds is selected with an optical filter and detected by a photomultiplier to permit selective detection. FPDs are now extensively used for determination of malodorous compounds such as hydrogen sulfide and methyl sulfide, and determination of residual phosphoric pesticides.



Interference Filter

Use an appropriate filter (sold separately) for your detection target. Three types, for detecting sulfur, phosphorus, and tin, are available.

#	Description	P/N	Remarks
(1)	FPD Filter for S, 2030	221-80888-01	For Nexis GC-2030
(2)	FPD Filter for P, 2030	221-80888-02	
(3)	FPD Filter for Sn, 2030	221-80888-03	
(4)	FPD Filter for S, 2010	221-73354-01	For GC-2010 Series
(5)	FPD Filter for P, 2010	221-73354-02	
(6)	FPD Filter for Sn, 2010	221-73354-03	
-	FPD Filter for S, 2014	221-46310-01	For GC-2014
-	FPD Filter for P, 2014	221-46310-02	
-	FPD Filter for Sn, 2014	221-46310-03	



(1) Filter for S



(2) Filter for P



(3) Filter for Sn



(4) Filter for S



(5) Filter for P



(6) Filter for Sn

Photomultiplier Purge Kit

The service life of expensive photomultipliers can be extended by reducing the amount of helium or other gases entering the photomultiplier to prevent deterioration. The kit is useful for installing a detector that uses helium (FID or FTD) or for simultaneously installing an FPD.

Note: A photomultiplier purge kit is not included standard with FPD-2030 detectors.



Flame Thermionic Detector (FTD)

This selective high-sensitivity detector detects compounds that contain nitrogen or phosphorus by ionizing the compounds and detecting alkali metal ions in a hydrogen flame. (FPD detectors offer higher selectivity for phosphorus compounds.)

It does not respond to inorganic nitrogen compounds. These detectors can be used for analyzing organic phosphorus compounds or organic nitrogen compounds, such as residual pesticides.

FTD Nozzles and Collectors

Description	P/N	Remarks
Nozzle, Capillary, FTD-2030/2010Plus/2014C	221-48258-91	For FTD-U(1.0), FTD-2030, FTD-2010 Plus, FTD-2014C models
Nozzle, Packed, FTD-2014	221-70162-92	For FTD-2014 models using a packed column
Nozzle, Capillary, FTD-2014	221-70162-93	For FTD-2014 models using a capillary column
Collector Bead (capillary)	221-71513-91	For FTD-U(1.0), FTD-2030, FTD-2010 Plus, FTD-2014C models
Collector Bead (packed)	221-18704-91	For FTD-2014
Collector Bead (pesticides)	221-42512-91	For FTD-2014. Collector for packed analysis suitable for pesticide analysis
FTD Collector Regeneration Kit	221-49079-91	For FTD-U (1.0), FTD-2030, FTD-2010 Plus, FTD-2014C models A kit for reusing an FTD collector with reduced sensitivity by adding an alkaline source.
FTD Collector Regeneration Adapter	221-70846-91	Using an FTD collector regeneration kit improves productivity.

Safety and Environmental Accessories

Hydrogen Carrier Gas Kit

As a safety measure for hydrogen use, we offer a lineup of hydrogen sensors, hydrogen safety options, and more. The hydrogen sensor enables early detection of potential hydrogen leaks inside column ovens and switches to a safe standby mode. It also shuts OFF the main power supply if the hydrogen leak rate increases to prevent accidents.

The hydrogen safety option controls the hydrogen flow rate and hydrogen supply pressure in case a column isn't connected or the flow controller fails. This optional product ensures safer user of hydrogen carrier gas.



Supply Gas Shut-off Solenoid Valve Unit

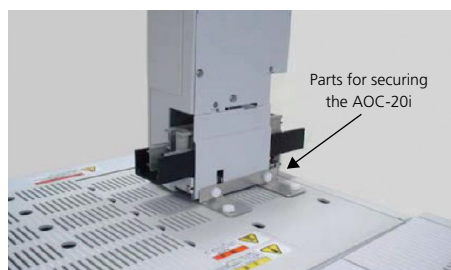
This Solenoid Valve Unit is connected to the detector's supply gas (hydrogen, air). It not only can shut off the supply gas according to instrument power supply or system ON/OFF operation, but also enables automatic startup and shutdown after analysis ends.

Note: Not applicable for FID.



Parts for Securing Instruments

Securing the instrument with these parts can reduce the risk of the instrument tipping over or falling. GC, SCD, and HS units are secured to a table or stand. AOC units are secured to the top of a GC unit.



Vent Tube

If a hazardous gas or hydrogen gas is discharged from the split vent or detector vent, use this silicone rubber tube (6 mm I.D. and 8 mm O.D.) to exhaust the gas into a local exhaust system.



Gas Utility

Air Generator AGE-1000

This purifier can purify air supplies with up to 100 ppm impurities to achieve a purity level of up to 100 ppb impurities.

That enables high-sensitivity capillary FID analysis equivalent to using high-purity air supplied from a gas cylinder.

With a maximum air flowrate of 1000 mL/min, it can supply air for two FIDs.

Note: For the AGE-1000, use an oilless air compressor to supply air with microparticles and water moisture removed, such as by using an air filter regulator and silica gel.



(Detailed product catalog: C184-E029)

Air Compressor

This supplies compressed air with no oil mist for supplying air as auxiliary gas for FID, FPD, or other instruments. In addition to the standard model (55 to 57 dB), a quiet model (47 dB) is available. The recommended flowrate when connected to a GC is 2.5 L/min. It can reliably supply up to four FIDs. However, the actual maximum number of units depends on the given combination, due to differences in the air flowrate required for different detectors. If used for an FTD, the baseline will not stabilize and the specified performance level cannot be guaranteed.

When using the MMI-U, an air compressor (0.2LE-8SB or equivalent) is required.



Standard Compressor
(0.2LE-5SB)



Quiet-type Compressor
(PO-0.4LESN)

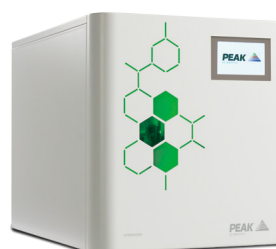
H₂ Generator

This compact hydrogen gas generator generates hydrogen by water electrolysis of an ion-exchange membrane.

By simply supplying purified water, this unit can conveniently generate high-purity water by electrolysis.

However, the purified water supply must be deionized to a specific resistance of 1.0 MΩ·cm or higher.

Description	Output Flowrate	Output Pressure
Precision SL (100 mL/min)	100mL/min	Constant 689/486 kPa
Precision SL (200 mL/min)	200mL/min	
Precision (100 mL/min)	100mL/min	Up to 689 kPa
Precision (200 mL/min)	200mL/min	
Precision (300 mL/min)	300mL/min	
Precision (450 mL/min)	450mL/min	



Precision



Precision SL
(Space-saving type)

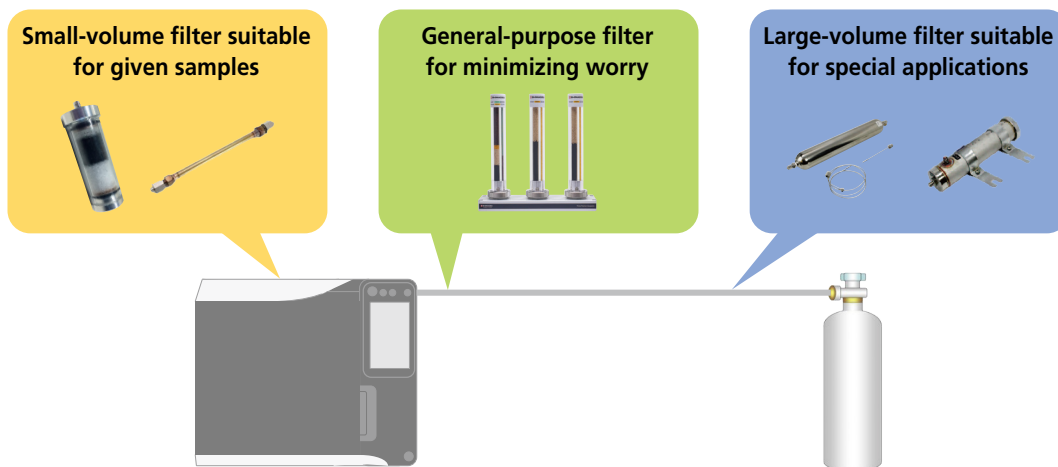
Gas Filter

If a gas supplied to the GC contains impurities, the impurities could damage the column or detector or cause detrimental effects to analytical results.

Though supplying high-purity gas is important, impurities can also be introduced from the flow lines or other sources between the gas cylinder and GC. Installing an appropriate gas filter can help maximize performance from instruments and ensure reliable analysis.

For split analysis, the split sample flows that bypass the flow controller can cause valve problems. Selecting a suitable filter for the given sample can help ensure worry-free operation in such cases.

Application	Impurities	Effects
Column	Oxygen/moisture	Shortens life of liquid phases. Large impact on polar columns and during high-temperature analysis
FID	Hydrocarbons/moisture	Elevates baseline and increases noise.
TCD	Oxygen	Shortens filament life.
BID	Oxygen/nitrogen	Causes plasma ignition failure. Elevates baseline and decreases sensitivity.
FPD	Hydrocarbons/moisture	Elevates baseline and increases noise.
ECD	Oxygen	Decreases linearity and sensitivity.



Super-Clean Gas Filter

These filters can purify supplied gas to 99.9999 % or higher purity levels by adsorbing and removing impurities (such as organic components, moisture, and oxygen) in the gas. They can help reduce analytical instrument downtime by preventing column deterioration due to oxygen, preventing ghost peaks and baseline fluctuations, eliminating excessive detector noise, and so on.

#	Description	P/N	Remarks
(1)	Shimadzu Gas Filter Kit for GC-FID/FPD	227-37036-01	3 ports for FID, FPD, FTD, or SCD units
-	Shimadzu Gas Filter Kit for Compressed Air	227-37036-02	3 ports for FID units with compressor air supplies
-	Shimadzu Carrier Gas Filter Kit	227-37034-02	1 port for carrier gas (TCD or ECD detector gas)
-	Shimadzu Carrier Gas Filter Kit (Helium Replaced)	227-37034-03	1 port for BID units
-	Shimadzu Makeup Gas Filter Kit for Separate Makeup Gas	227-37034-01	1 port for make-up gas (FID, FTD, or ECD) if carrier gas is not used as detector gas
-	Shimadzu Carrier Gas Filter	227-37037-01	-
-	Shimadzu Carrier Gas Filter (Helium Replaced)	227-37037-05	-
-	Shimadzu Makeup Gas Filter	227-37037-02	-
-	Compressed Air Gas Filter	227-37037-03	-
-	Gas Filter Kit	227-37038-01	-
-	Compressed Air Gas Filter Kit	227-37038-02	-
-	O-ring for Base Plate	227-37031-02	-



Check Valve
The base plate keeps gas flow blocked unless a filter is installed.



(Detailed product catalog: C180-E083)

Filter Regulator

For high-sensitivity analysis, this regulator reduces baseline fluctuations caused by compressor pressure pulsation or supplied pressure fluctuations when using a central piping system.

It also removes water and contaminant particles from gas supplies. It can be used repeatedly by manually discharging collected substances.



Filter Joint

This is a sintered filter in the form of a union joint. Its ability to remove foreign matter is useful for connecting to new pipes or other situations where cleanliness is not ensured.



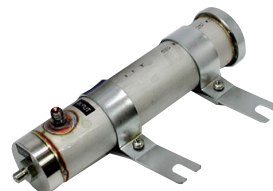
Syringe for Cleaning

An M-type joint is included on the tip of 10 mL syringes. This tool is useful when cleaning the interior of flow lines with solvent.



Moisture Trap (Silica gel)

This absorbs moisture contained in gas supplies. If air from a compressor or other gas with high moisture levels is supplied, installing a filter regulator upstream from this moisture trap is recommended. Part of the silica gel will become discolored around the replacement period.



Oxygen Trap

This trap can reduce the oxygen content in gas supplies to a 0.1 ppm level, with a capacity for absorbing about 2.5 L of oxygen. Reliability decreases if oxygen gets inside the ECD. Therefore, it is recommended that an oxygen trap be installed in the carrier and make-up gas lines. If a column prone to degradation by oxygen is used, it can also be helpful to install the trap in the carrier gas line.



Filter for Flow Controller

This filter protects the flow controller (AFC) from contamination by samples discharged into an SPL split line or purge line. SPL-2030/SPL-U filters can be replaced by hand.

High visibility enables determining the filter contamination level at a glance.

Installing an additional filter is recommended if using aqueous solvents or discharging large quantities of sample from the split line.

#	Description	P/N	Remarks
(1)	Filter, Split Line	221-77580-42	Split line for Nexis GC-2030 and Brevis GC-2050 models
(2)	Filter, Split/Purge Line	221-42559-92	For adding a hydrocarbon filter to split or purge lines
(3)	Filter, Carrier Line	221-34121-94	For adding a moisture filter to the carrier line



(1) Filter, Split Line



(2) Filter, Split/Purge Line



(3) Filter, Carrier Line

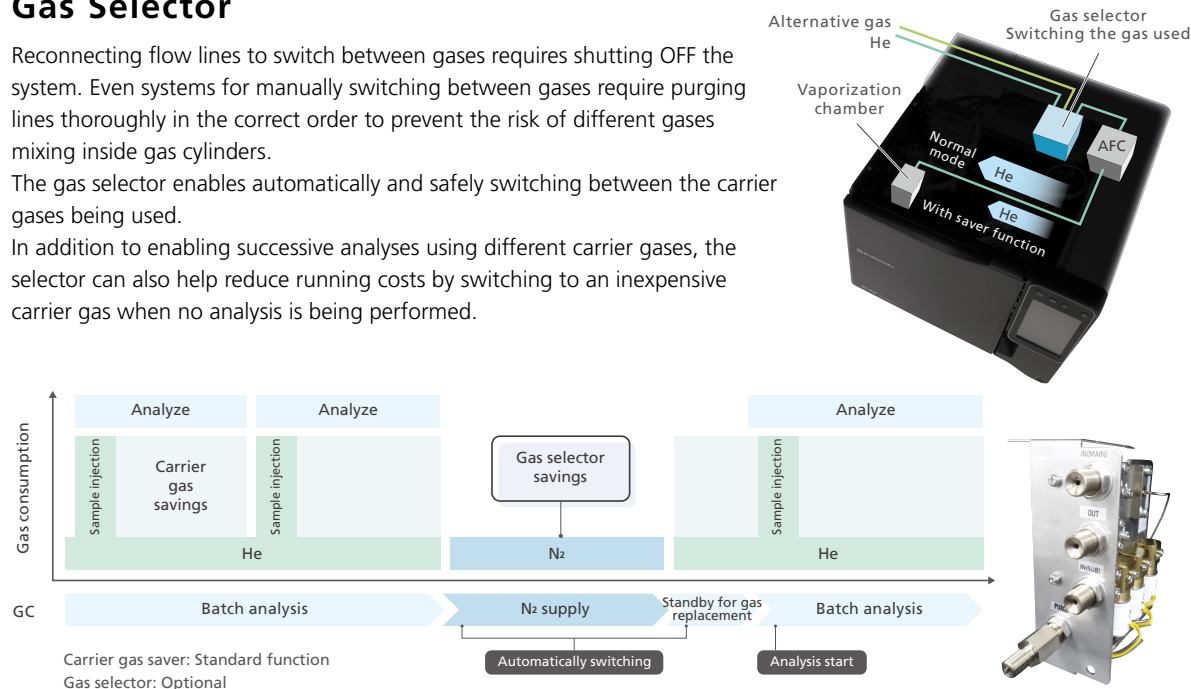
Operating Parts

Gas Selector

Reconnecting flow lines to switch between gases requires shutting OFF the system. Even systems for manually switching between gases require purging lines thoroughly in the correct order to prevent the risk of different gases mixing inside gas cylinders.

The gas selector enables automatically and safely switching between the carrier gases being used.

In addition to enabling successive analyses using different carrier gases, the selector can also help reduce running costs by switching to an inexpensive carrier gas when no analysis is being performed.

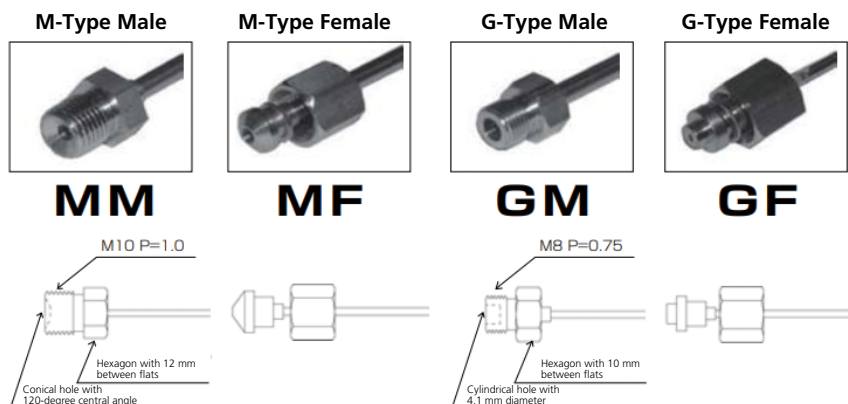


Shimadzu M/G Type Joint

M and G-type tubing joints are used in Shimadzu chromatography systems.

Both types are connected by inserting a nipple into a socket welded (or soldered) to the ends of tubing and tightened by screwing a nut included with the nipple onto the male socket threads.

The M-type, fastened by crimping metal surfaces together (metal-to-metal contact), is mainly used for external gas chromatograph connections (such as for supplying gas to the flow controller). The G-type is tightened against a silicone or aluminum gasket in the joint. It is mainly used for internal gas chromatograph connections (such as to connect tubing or stainless steel columns to the sample injection unit).



Description	P/N	Remarks
Pipe, MF-MM, 2m	221-26171-20	MF-MM tubing. Used to extend tubing length.
Pipe, MF-MM, 5m	201-48069-50	MF-MM tubing. Used to extend tubing longer distances. Requires using a socket for connections.
Socket	201-30219	MM-MM socket. Used to connect MF tubes.
Pipe, MM-LMF	221-73356-91	MM-MF tubing with left-hand threads. Used to convert from MF (right-hand threads) to left-hand threads.
Pipe, MF-MM-MF, 1m	221-72658-91	Pre-cleaned MF-MM-MF tubing. Used to connect tubing splits/branches.

Pressure Regulator for High-Purity Gas PPR Series

For high-sensitivity analysis, in addition to the purity of gases used, contaminants originating from the pressure regulator can also cause problems. PPR series pressure regulators release extremely low contamination levels, making them ideal for high-sensitivity analysis. PPR series pressure regulators feature an air purge valve for purging any air trapped during cylinder replacement before supplying air.



PPR-He



Inlet Gasket, PPR

Description	P/N	Remarks
PPR-N ₂	221-35999-01	For nitrogen, air, or argon (blue) with right-handed threads on the cylinder side and gas tubing side
PPR-H ₂	221-35999-02	For hydrogen (red) with left-handed threads on the cylinder side and gas tubing side
PPR-He	221-35999-03	For helium (yellow) with left-handed threads on the cylinder side and right-handed threads on the gas tubing side
Inlet Gasket, PPR	221-35999-11	-

Gas Supply Tube

This stainless steel tube has a 3 mm outer diameter and 2 mm internal diameter. It is used to connect the pressure regulator and the flow controller on the gas chromatograph.

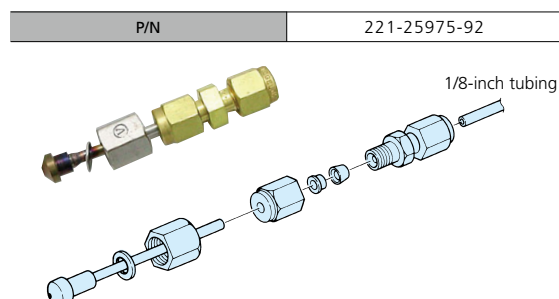
Description	P/N	Remarks
Gas Supply Tube, 2.5m	201-48067	Right-handed threads on pressure regulator side and GC side
Gas Supply Tube, 5m	201-48067-05	
Gas Supply Tube, 10m	201-48067-10	
Gas Supply Tube, 15m	201-48067-15	
Hydrogen Supply Tube for Carrier, 2.5m	221-18990-25	Left-handed threads on pressure regulator side and right-handed threads on GC side
Hydrogen Supply Tube for Carrier, 5m	221-18990-50	
Hydrogen Supply Tube for Carrier, 10m	221-18990-00	
Hydrogen Supply Tube for Detector, 2.5m	221-73474-25	
Hydrogen Supply Tube for Detector, 5m	221-73474-50	Left-handed threads on pressure regulator side and GC side
Hydrogen Supply Tube for Detector, 10m	221-73474-00	



Gas Supply Tube, 2.5m

Swagelok Adapter

This adapter is used to connect 1/8-inch O.D. stainless steel tubing to a Shimadzu M-type joint (also includes a Swagelok joint).



Needle Valve

This valve is used to adjust the gas flowrate. The adjustment range for nitrogen gas with an inlet pressure of 300 kPa is 0 to 0.7 L/min. Shimadzu M-type joints are used on both inlet and outlet ends.

P/N	221-57298
-----	-----------



MEMO

MEMO



Shimadzu Corporation

www.shimadzu.com/an/

For Research Use Only. Not for use in diagnostic procedures.

This publication may contain references to products that are not available in your country. Please contact us to check the availability of these products in your country.

Company names, products/service names and logos used in this publication are trademarks and trade names of Shimadzu Corporation, its subsidiaries or its affiliates, whether or not they are used with trademark symbol "TM" or "®".

Third-party trademarks and trade names may be used in this publication to refer to either the entities or their products/services, whether or not they are used with trademark symbol "TM" or "®".

Shimadzu disclaims any proprietary interest in trademarks and trade names other than its own.

The contents of this publication are provided to you "as is" without warranty of any kind, and are subject to change without notice. Shimadzu does not assume any responsibility or liability for any damage, whether direct or indirect, relating to the use of this publication.