

ASM 180 Series

POWERFUL AND SENSITIVE HELIUM LEAK DETECTORS



The ASM 180 Series Helium leak detectors

The ASM 180 Series: high performance helium leak detectors designed for the most sensitive applications.



The list of applications for which helium leak testing is or can be used includes a wide variety of systems large and small as well as conditions under which the leak tests are performed. They range from tiny parts to be tested at a work station to chambers of varying size that must be tested in various environments. Most of these applications required high sensitivity coupled with fast response time.

Meeting the challenge, Alcatel has designed a series of powerful leak detectors that consists of six different models built around a single, proven leak testing concept. Each model is fitted uniquely to a subset of the total list of applications based on the size and shape of the outer cabinet, the pumping capacity of its vacuum system, and the presence or absence of oil within the primary roughing pumps.

The ASM 180 series provides solutions which are particularly suitable for:

- Testing volumes up to 1000 liters without auxiliary pumping system.
- Testing parts of various volumes with a stand-alone leak detector.
- Pinpointing very small leaks in large installations.
- Detecting leaks as small as the 10^{-11} atm.cc/s range.
- Conducting high performance testing in space restricted area.
- Avoiding hydrocarbon contamination in a clean system or installation.
- Performing leak detection in a "clean room" environment.
- Having the convenience of a work surface.
- Easily integrating a leak detector in a production or test assembly.

The ASM 180 Series Helium leak detectors

A solution for a wide range of applications

The Alcatel ASM 180 series is extremely flexible and easy to operate. It provides automatic operation throughout the range from atmospheric sniffer tests, test of long gas lines or tubings, large gross leak mode and ultra sensitive vacuum fine leak test mode. It can be used for the test of components, systems or complete installations.

• Automotive industry

Air conditioning compressors, evaporators and lines, ABS valves and lines, air bags inflators and ignitors, fuel injectors, heat exchangers, gear boxes, shock absorbers, batteries, rims, sealed beam lamps and assemblies.

• Aeronautics - Aerospace

Test of satellites, fuel tanks, window seal systems, engine injection valves, pumps, hydraulic components, oxygen lines.

• Electrical

Lamps and tubes manufacture, photomultiplier tubes, high voltage relays, circuit breakers and transformers, underground cables and distribution systems, maintenance of power plants generators, heat exchangers.

• Semiconductor/Electronics

Hermetically sealed integrated circuits, liquid crystal displays, quartz displays, feedthroughs, captors, vacuum systems maintenance, gas panels and lines, mass flow controllers.

• Chemical and mechanical

Reservoirs and storage vessels, distillation columns, filters, vapor generators, transfer lines, ovens, controlled environments, vacuum systems, storage tanks, heat exchangers, freeze dryers, fire extinguishers.

• Refrigeration/Air conditioning

Compressors, evaporators, heat exchangers, lines, and dryers, complete systems.

• Packaging industry

Hermetic medical and pharmaceutical packaging, food containers, food and beverage cans, drums.

• Medical and Pharmaceutical

Catheters, blood filters, instrumentation, analyzers, hermetically sealed packaging, blister packs.

• Nuclear Physics/Research & Development

Particle accelerator vacuum and beam lines, cryogenic lines and vessels, vacuum valves and components, vacuum systems and instruments, high energy physics, accelerators, surface sciences.



Leak testing of vacuum valves with ASM 181 T



Leak testing of a 1000 liters chamber on a sputtering system with ASM 181 T2D+

The ASM 180 Series Helium leak detectors

General concept:
a family based on a single proven leak testing unit ...

Analyzer cell and associated:

Sensitivity

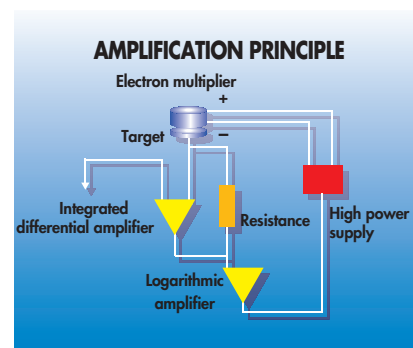
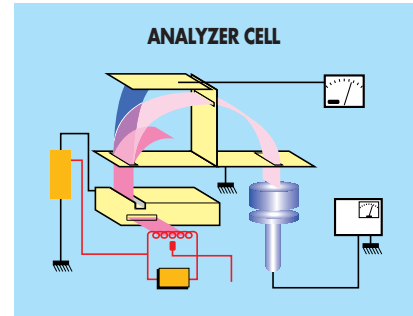
Amplification system for the mass spectrometer is the most critical part of a helium leak detector. The electronic current received by the target is extremely small ($\approx 10^{-15}$ amperes).

Alcatel has developed an original amplification system (patented) using an electron multiplier.

The Alcatel solution provides unmatched stability and sensitivity: minimum detectable signal of 5×10^{-12} atm.cc/sec Helium and a wide and continuous measurement via a LED bargraph display covering the full measurement range.

The Alcatel amplification system coupled with the Alcatel design magnetic deviation analyzer cell is a helium partial pressure captor recognized for its stability, sensitivity, ease of operation and low, simplified maintenance.

Alcatel with its high performance amplification technology, remains the reference for high sensitivity and high performance helium leak detection.



Electronics:

Automation

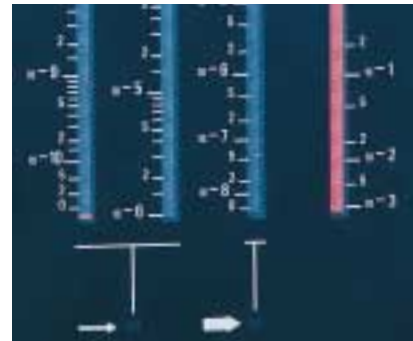
The ASM 180 series continues Alcatel's philosophy for reliability modular design, standardized components and simple easy to use controls and operation.

The ASM 180 electronics are central to this design philosophy and employ:

- a microprocessor to control and monitor test and safety parameters
- an integrated controller for start-up and main operation functions
- a multi-function command controller with continuous bargraph leak rate display and critical test mode status lamps for stationary and hand-held remote indications.



Hand-held remote control



User-friendly control panel

The ASM 180 Series Helium leak detectors

... and dedicated options to meet your specific requirements

The six models of the ASM 180 Series are built around a single proven leak testing concept:

Basic components:
- analyzer cell-
electronics



Dedicated options:
- outer cabinet -
pumping package



Your model designation
(to choose among a list of
6 different versions)

Outer cabinet



Compact cabinet: model 180

To operate in space restricted areas.

Console cabinet: model 181

Extended capability pumping speed suitable to a production environment.



Pumping package

Wet model: option "T"

These versions are equipped with a 20m³/h (15 cfm) Alcatel rotary vane mechanical pump and a Helium inlet pumping speed of 4.4 l/s enabling short test cycles, fast pumpdowns and response times.

Dry model: option "TD+"

An unique "DRY" leak detector offering including:

- 2 compact models
- a powerful console model.

These dry leak detectors are equipped with oil free pumps for ultra-clean applications.

Extended capabilities: option "2"

The console version allows extended capabilities models with unique roughing capacity and helium pumping speed up to 20 l/s.

The ASM 180 Series Helium leak detectors

Presentation of the range



Leak testing and verification of semiconductor fabrication vacuum components with ASM 180 TD+

Two compact models:

- ASM 180 T

Powerful leak detection system with a 20 m³/h (15 cfm) rotary vane oil sealed mechanical roughing pump, for individual and varied tests of volumes up to 50 liters without auxiliary pumping.

- ASM 180 TD+

Dry leak detector, with an unique high capacity oil-free frictionless dry pump combined with a molecular dry pump for contamination free leak detection of volumes up to 200 liters without auxiliary pumping.

Four console models:

- ASM 181 T

Console model with a 20 m³/h (15 cfm) rotary vane mechanical roughing pump, for production, individual and varied tests of volumes up to 50 liters without auxiliary pumping. An enhanced pumpdown capability with 2 x 20 m³/h (2x15 cfm) rotary vane mechanical roughing pumps operating in parallel is proposed as an option for shortened roughing time, individual and varied tests of volumes up to 100 liters without auxiliary pumping.

- ASM 181 T2

Essentially the same as ASM 181 T but with enhanced high vacuum inlet pumping with an additional 100 l/s turbomolecular pump. To test large volumes up to 200 liters without auxiliary pumping. The most powerful leak detector.

- ASM 181 TD+

Console version of ASM 180 TD+. An enhanced pump down capability with 2 oil free frictionless dry pump operating in parallel is proposed as an option.

- ASM 181 T2D+

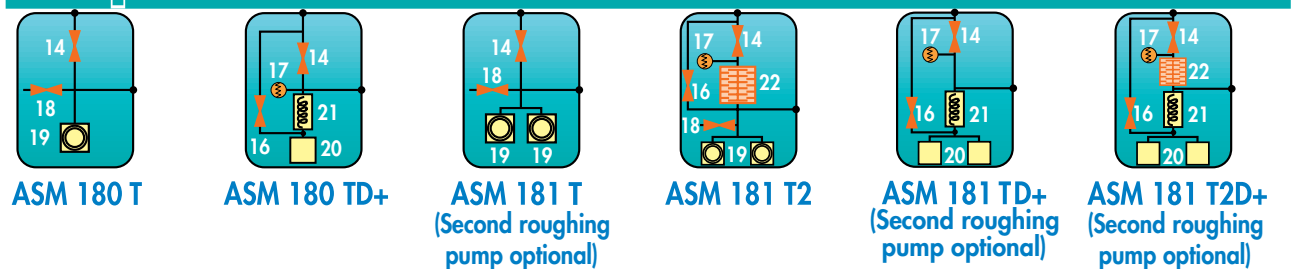
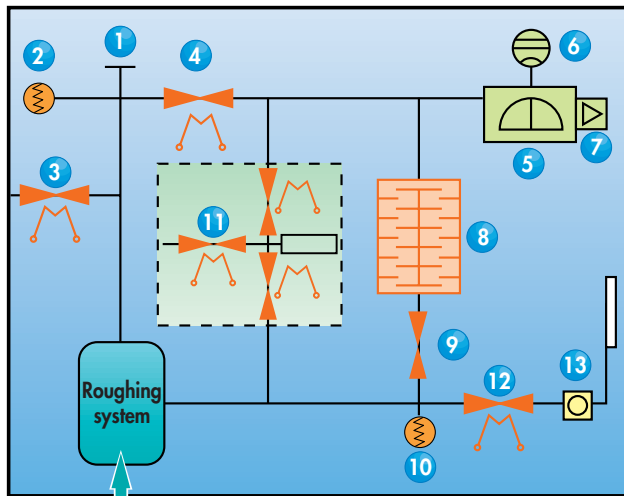
Dry leak detector, with enhanced pumping speed capabilities with a 100 l/s turbomolecular pump combined with the oil-free roughing package of the ASM 180 TD+. Enhanced oil-free pumpdown capabilities is proposed as an option with 2 frictionless dry pumps operating in parallel at high pressure for contamination free leak detection of volumes up to 1000 liters without auxiliary pumping.

The ASM 180 Series Helium leak detectors

General architecture

Structure of the ASM 180 series - Operational schematic

The ASM 180 series includes a modular design with adaptable pumping capacity



Basic analyzer concept :

1. Inlet port
2. Inlet pressure Pirani gauge
3. Inlet vent valve
4. Fine leak test valve
5. Helium analyzer cell (mass spectrometer)
6. Spectrometer triode pressure gauge
7. Helium signal amplification system
8. Turbo-Hybrid pump
9. Gross leak test valve
10. Turbo-Hybrid pump exhaust Pirani gauge

11. Internal calibrated leak with calibration valves
12. Sniffer (LDS) valve
13. Sniffer probe (LDS) connector

Modular roughing system :

14. Roughing valve
15. Dry roughing system gas purge
16. Dry roughing system bypass valve
17. Dry roughing system bypass gauge
18. Roughing system vent valve
19. 20 m³/h (15 cfm) oil sealed mechanical pump
20. 20 m³/h (15 cfm) DRY pump
21. 10 l/s molecular drag pump
22. 100 l/s turbomolecular pump

The ASM 180 Series Helium leak detectors

Characteristics allowing well adaptation in harsh environments (industry, clean rooms)

Rugged design

Alcatel's modular design, using robust components and strength provides an exceptional reliability in the most severe industrial application or environment.

Automatic protection integrates all safety controls to enable the instrument to withstand severe accidental air in-rushes and shocks due to the movement or transport as well as power failures and incorrect operations.

Modular design provides easy access to internal components.

System integration capability

The ASM 180 series can easily be integrated into industrial or process environments via the RS 232 interface, 13 discrete I/O and 1 analog output.



"DRY" leak detectors

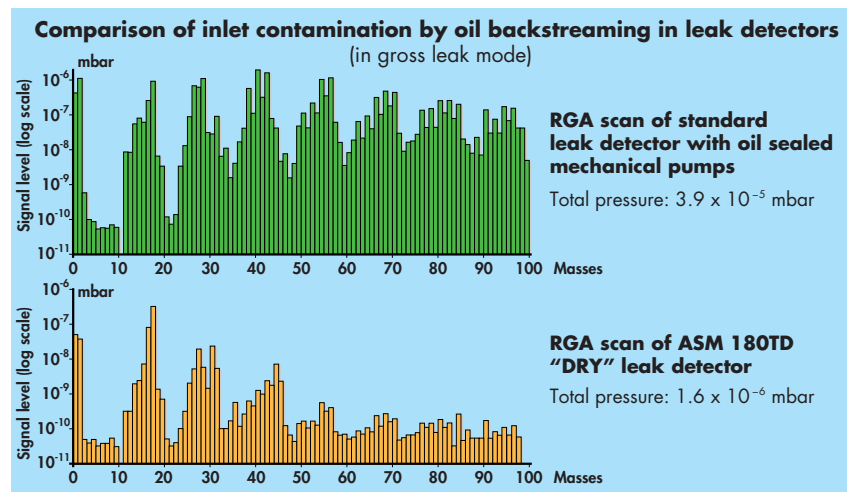
ASM 180 TD+, ASM 181 TD+ and ASM 181 T2D+ for oil-free leak detection

The Alcatel "DRY" leak detectors are without risk of hydrocarbon oil contamination of the test system or component.

It is the result of Alcatel's commitment for improving the capability and utilization of helium leak detection fitted to the most demanding and ultra-clean research in emerging semiconductor, medical, pharmaceutical, nuclear, specialty gas and chemical industries.

The Alcatel "DRY" leak detectors are ideally suited for:

- UHV and UCT environments
- high energy particle physics accelerators and experiments
- semiconductor manufacturing
- medical and pharmaceutical hermetic packaging
- ultra-pure gas manufacturing and handling systems



The ASM 180 Series Helium leak detectors

Main characteristics

MODELS	ASM 180T	ASM 180TD+	ASM 181T	ASM 181T2	ASM 181TD+	ASM 181T2D+
VERSIONS	Compact	Compact	Console	Console	Console	Console
Standard Roughing System	20 m ³ /h (15 cfm) oil sealed pump	25 m ³ /h (18 cfm) multistage Roots + 10 l/s MDP	1 or 2 x 20 m ³ /h (1 or 2 x 15 cfm) oil sealed pump	2 x 20 m ³ /h (2 x 15 cfm) oil sealed pump + 100 l/s TMP	1 or 2 x 25 m ³ /h (1 or 2 x 18 cfm) multistage Roots + 10 l/s MDP	1 or 2 x 25 m ³ /h (1 or 2 x 18 cfm) multistage Roots + 10 l/s MDP + 100 l/s TMP
High vacuum pump	130 l/s Hybrid pump	130 l/s Hybrid pump	130 l/s Hybrid pump	130 l/s Hybrid pump	130 l/s Hybrid pump	130 l/s Hybrid pump
*Smallest detectable signal at full pumping speed (atm.cc/s)	5.10 ⁻¹²	5.10 ⁻¹²	5.10 ⁻¹²	5.10 ⁻¹²	5.10 ⁻¹²	5.10 ⁻¹²
Helium signal reading range (atm.cc/s)	2.10 ⁻¹¹ to 1.10 ⁻¹	2.10 ⁻¹¹ to 1.10 ⁻¹	2.10 ⁻¹¹ to 1.10 ⁻¹	2.10 ⁻¹¹ to 1.10 ⁻¹	2.10 ⁻¹¹ to 1.10 ⁻¹	2.10 ⁻¹¹ to 1.10 ⁻¹
Helium pumping speed at Inlet port (l/s)	4.4	4.4	4.4	20	4.4	20
Cross-over pressure at inlet (mbar) (for Large Leak test mode)	6	6	6	6	6	6
Power consumption (kVA)	1.2	1.2	1.2 or 1.8	2.0	1.6 or 2.4	1.6 or 2.4
Width (mm / inch)	600 / 23.6	600 / 23.6	600 / 23.6	600 / 23.6	600 / 23.6	600 / 23.6
Depth (mm / inch)	410 / 16.1	450 / 17.7	730 / 28.7	730 / 28.7	730 / 28.7	730 / 28.7
Height (mm / inch)	450 / 17.7	460 / 18.1	885 / 34.8	885 / 34.8	885 / 34.8	885 / 34.8
Weight (kg / lbs)	80 / 176	96 / 212	125 / 275 or 155 / 341	155 / 341	155 / 341 or 185 / 407	155 / 341 or 185 / 407
Inlet port size (DN)	40	40	40	50	40	50

(*): according to AVS 2.1 and ISO 3530 standards.

The ASM 180 Series Helium leak detectors

Available options allowing extended adaptability

- 3 masses
- Metal seals
- Clean room compatible cover (on compact TD+ version)
- Alphanumeric control & display panel for extended capabilities
- Calibrated leaks
- Test chambers
- Protection of the control panel
- Gas line "bullet test" (on compact TD+ version)



Cleanroom compatible cover



Protection of the control panel



A complete range of calibrated leaks



Alphanumeric control and display panel with a test chamber

The ASM 180 Series Helium leak detectors

Available accessories allowing extended adaptability

DESCRIPTION	PART NUMBER
Long distance sniffer probe with 5 meters tube (16 ft)	072301
"ALSTAT" software (the RS 232 interface is available as standard)	785911
Transport cart (for compact version only)	072654
Foot pedal for cycle command (1.5 meters/5" cable)	100913
Printer 220V 50 Hz*	102873
Printer 115V 60 Hz*	103593
Printer 100V 50/60 Hz*	103594
Exhaust air stainless steel box for clean room compatible casing (ASM 180 TD+ only)	102867

* the ADC option is recommended to get all benefits of the printer



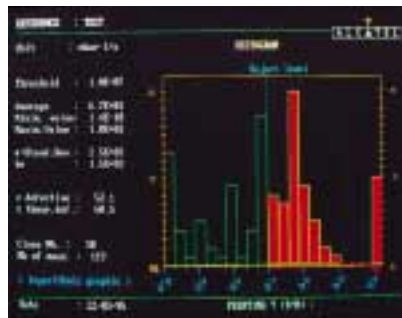
Long distance sniffer



Helium spray probe



Transport cart



ALSTAT statistical software

The ASM 180 Series Helium leak detectors

Ordering information

ASM 180 T

A					S	P					0
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Leak detector		Autocalibration with built-in temperature compensated calibrated leak (RS 232 + 13 I/O as a standard features).
ASM 180 T		
Code	A	

Masses			3 masses (3). This option allows the leak detector to detect masses 2, 3 and 4.
Helium	3 Masses		
Code	0	3	

Seals for vacuum module			The leak detector can be provided with: Elastomer seals (for the high vacuum as well as the inlet bloc) as standard (E) or with metal seals for specific applications (M).
Elastomer	Metal		
Code	E	M	

Seal at the spectrometer			This seal assures that the mass spectrometer is leak tight. It can be made of : Special elastomer and can be re-usable (E) or made of special soft metal (L). The elastomer seal is the standard configuration.
Reusable	Metal (Lead)		
Code	E	L	

Control panel cover			Hinged, locking Plexiglas cover which protects the control panel located on the leak detector.
Without	With		
Code	0	1	

Operator interface					
Standard	A.D.C.*	Auto. test chamber small model**	Auto. test chamber medium model**	Auto. test chamber large model**	
Code	S	A	T	P	G

Remote control unit			
3.5 m/10 ft	7 m/20 ft	25 m/75 ft	
Code	1	3	7

Main power supply						
115V - 60Hz	220V - 50Hz	240V - 50Hz	220V-50/60Hz	100V-50/60Hz	200V-50/60Hz	
Code	1	2	3	4	5	6

Main power cable type					
U.S.A.	France/Germany	U.K.	Italy	Switzerland	
Code	1	2	3	4	5

* A.D.C. - Alphanumeric Display and Control panel (A).
Used to control a test sequence automatically, to signal the test results on LEDs and to display the helium signal.
Includes a RS 232 interface for controlling a printer.

** Automatic test chambers (integrating the ADC) :
- Hemispherical test chamber Ø 72 mm, depth 31 mm, with start of cycle contact (T)
- Cylindrical test chamber Ø 85 mm, depth 68 mm, with start of cycle contact (P)
- Cylindrical test chamber Ø 160 mm, depth 100 mm, with start of cycle contact (G)

The ASM 180 Series Helium leak detectors

Ordering information

ASM 180 TD+

C 0

	Leak detector	Autocalibration with built-in temperature compensated calibrated leak (RS 232 +13 I/O as a standard features).
Code	C	

	Masses	3 Masses (3). This option allows the leak detector to detect masses 2, 3 and 4.
	Helium 3 masses	
Code	0 3	

	Seals for the vacuum module	The leak detector can be provided with Elastomer seals (for the high vacuum as well as the inlet bloc) as standard (E) or with metal seals for specific applications (M).
	Elastomer	Metal
Code	E	M

	Seal at the spectrometer	This seal assures that the mass spectrometer is leak tight. It can be made of special elastomer and can be re-usable (E) or made of special soft metal (L). The elastomer seal is the standard configuration.
	Reusable	Metal (Lead)
Code	E	L

	Control panel cover	Hinged, locking Plexiglas cover which protects the control panel located on the leak detector.
	Without	With
Code	0	1

	Detection option	Gas line "bullet test" (G). This option allows to leak test long gas lines with very small diameter. Using an ultra clean purge gas such as nitrogen as a carrier gas, the line is maintained in a viscous regime to allow fast response time.
	Standard	Gas line
Code	S	G

	Operator interface				
	Standard	A.D.C.*	Autom. test chamber small model**	Autom. test chamber medium model**	Autom. test chamber large model**
Code	S	A	T	P	G

	Cover	U.C.T. - Ultra Clean Technology (C) Front and rear covers and frame in stainless steel. Compatible with a connecting accessory for the extraction of cooling air through an airtight tube.
	Painted	U.C.T.
Code	P	C

	Remote control unit		
	3.5 m/10 ft	7 m/20 ft	25 m/75 ft
Code	1	3	7

	Main power supply					
	115V - 60Hz	220V - 50Hz	240V - 50Hz	220V-50/60Hz	100V-50/60Hz	200V-50/60Hz
Code	1	2	3	4	5	6

	Main power cable type				
	U.S.A.	France/Germany	U.K.	Italy	Switzerland
Code	1	2	3	4	5

* A.D.C. - Alphanumeric Display and Control panel (A).
Used to control a test sequence automatically, to signal the test results on LEDs and to display the helium signal. Includes a RS 232 interface for controlling a printer.

** Automatic test chamber (integrates the ADC):
- Hemispherical test chamber Ø 72 mm, depth 31 mm, with start of cycle contact (T)
- Cylindrical test chamber Ø 85 mm, depth 68 mm, with start of cycle contact (P)
- Cylindrical test chamber Ø 160 mm, depth 100 mm, with start of cycle contact (G)

The ASM 180 Series Helium leak detectors

Ordering information

ASM 181 T

D							P				0
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Leak detector		Autocalibration with built-in temperature compensated calibrated leak (RS 232 + 13 I/O as a standard features).
ASM 181 T		
Code	D	

Masses			3 Masses (3). This option allows the leak detector to detect masses 2, 3 and 4.
Helium 3 Masses			
Code	0	3	

Seals for the vacuum module			The leak detector can be provided with : Elastomer seals (for the high vacuum as well as the inlet bloc) as standard (E) or with metal seals for specific applications (M).
Elastomer	Metal		
Code	E	M	

Seal at the spectrometer			This seal assures that the mass spectrometer is leak tight. It can be made of : Special elastomer and can be re-usable (E) or made of special soft metal (L). The elastomer seal is the standard configuration.
Reusable	Metal (Lead)		
Code	E	L	

Control panel cover			Hinged, locked Plexiglas cover which protects the control panel located on the leak detector.
Without		With	
Code	0	1	

Detection option			40 m ³ /h (R) : adds another 20 m ³ /h roughing pump during pump down (total capacity : 40 m ³ /h or 29.2 cfm).
Standard	40 m ³ /h		
Code	0	R	

Operator interface					
	Standard	A.D.C.*	Autom. test chamber small model**	Autom. test chamber medium model**	Autom. test chamber large model**
Code	S	A	T	P	G

Remote control unit			
	3.5 m/10 ft	7 m/20 ft	25 m/75 ft
Code	1	3	7

Main power supply						
	115V - 60Hz	220V - 50Hz	240V - 50Hz	220V-50/60Hz	100V-50/60Hz	200V-50/60Hz
Code	1	2	3	4	5	6

Main power cable type						
	U.S.A.	France	U.K.	Italy	Switzerland	Germany
Code	1	2	3	4	5	6

*A.D.C. - Alphanumeric Display and Control panel (A).
Used to control a test sequence automatically, to signal the test results on LEDs and to display the helium signal.
Includes a RS 232 interface for controlling a printer.

** Automatic test chambers (integrating the A.D.C. :
- Hemispherical test chamber Ø 72 mm, Depth 31 mm, with start of cycle contact (T)
- Cylindrical test chamber Ø 85 mm, Depth 68 mm, with start of cycle contact (P)
- Cylindrical test chamber Ø 160 mm, Depth 100 mm, with start of cycle contact (G)

The ASM 180 Series Helium leak detectors

Ordering information

ASM 181 T2

E				S	P				0
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	Leak detector	Autocalibration with built-in temperature compensated calibrated leak (RS 232 + 13 I/O as a standard features).	
	ASM 181 T2		
Code	E		

	Masses		3 Masses (3). This option allows the leak detector to detect masses 2, 3 and 4.
	Helium	3 Masses	
Code	0	3	

	Seals for vacuum module		The leak detector can be provided with : Elastomer seals (for the high vacuum as well as the inlet bloc) (E) or with metal seals for specific applications (M).
	Elastomer	Metal	
Code	E	M	

	Seal at the spectrometer		This seal assures that the mass spectrometer is leak tight. It can be made of : Special elastomer and can be re-usable (E) or made of special soft metal (L). The elastomer seal is the standard configuration.
	Reusable	Metal (Lead)	
Code	E	L	

	Control panel cover		Hinged, locking Plexiglas cover which protects the control panel located on the leak detector.
	Without	With	
Code	0	1	

	Operator Interface		A.D.C. - Alphanumeric Display and Control panel (A) Used to control a test sequence automatically, to signal the test results on LEDs and to display the helium signal. Includes a RS 232 interface for controlling a printer.
	Standard	A.D.C.	
Code	S	A	

	Remote control unit		
	3.5 m/10 ft	7 m/20 ft	25 m/75 ft
Code	1	3	7

	Main power supply					
	115V - 60Hz	220V - 50Hz	240V - 50Hz	220V-50/60Hz	100V-50/60Hz	200V-50/60Hz
Code	1	2	3	4	5	6

	Main power cable type					
	U.S.A.	France	U.K.	Italy	Switzerland	Germany
Code	1	2	3	4	5	6

The ASM 180 Series Helium leak detectors

Ordering information

ASM 181 TD+ and ASM 181 T2D+

									P						0
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Leak detector		
	ASM 181 TD+	ASM 181 T2D+
Code	J	K

Autocalibration with built-in temperature compensated calibrated leak (RS 232 +13 I/O as a standard features).

Masses		
	Helium	3 masses
Code	0	3

3 Masses (3). This option allows the leak detector to detect masses 2, 3 and 4.

Seals for the vacuum module		
	Elastomer	Metal
Code	E	M

The leak detector can be provided with Elastomer seals (for the high vacuum as well as the inlet bloc) as standard (E) or with metal seals for specific applications (M).

Seal at the spectrometer		
	Reusable	Metal (Lead)
Code	E	L

This seal assures that the mass spectrometer is leak tight. It can be made of special elastomer and can be re-usable (E) or made of special soft metal (L).
The elastomer seal is the standard configuration.

Control panel cover		
	Without	With
Code	0	1

Hinged, locking Plexiglas cover which protects the control panel located on the leak detector.

Roughing system		
	Standard	50 m ³ /h
Code	S	T

50 m³/h (T) : adds another roughing pump during pump down (total capacity : 50 m³/h or 36 cfm).

Operator interface					
	Standard	A.D.C.*	Autom. test chamber small model**	Autom. test chamber medium model**	Autom. test chamber large model**
Code	S	A	T	P	G

Remote control unit			
	3.5 m/10 ft	7 m/20 ft	25 m/75 ft
Code	1	3	7

Main power supply						
	115V - 60Hz	220V - 50Hz	240V - 50Hz	220V-50/60Hz	100V-50/60Hz	200V-50/60Hz
Code	1	2	3	4	5	6

Main power cable type						
	U.S.A.	France	U.K.	Italy	Switzerland	Germany
Code	1	2	3	4	5	6

* A.D.C. - Alphanumeric Display and Control panel (A).
Used to control a test sequence automatically, to signal the test results on LEDs and to display the helium signal.
Includes a RS 232 interface for controlling a printer.

** Automatic test chamber (integrates the ADC):
- Hemispherical test chamber Ø 72 mm, depth 31 mm, with start of cycle contact (T)
- Cylindrical test chamber Ø 85 mm, depth 68 mm, with start of cycle contact (P)
- Cylindrical test chamber Ø 160 mm, depth 100 mm, with start of cycle contact (G)