Operating Manual

AST-ID Integrated

Automotive Refrigerant Identifier

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1 Description

AST-ID Integrated Automotive Refrigerant Identifier is intended for use with a SAE J2843 or SAE J2851-certified automotive air conditioning service equipment to provide accurate identification of the refrigerant purity of R134a and R1234yf, either within storage cylinders or vehicle air conditioning units.

AST-ID is supported by a comprehensive PC software application that allows the service unit manufacturers to test and configure the identifiers during the production process.

The units are designed to be compatible with existing equipment and are available in either bezel mount or direct mount versions, as shown below.

Bezel mount version
505-203-G1

Direct mount version
505-204-G1

2 Scope of the Manual

This manual provides details on the correct and safe use of the AST-ID Integrated Refrigerant Identifier when used in automotive air system conditioning applications.

This manual is to be used in conjunction with the AST-ID Communications manual.

3 Safety Precautions

Working with refrigerants and mixtures of refrigerants is dangerous if the proper safety precautions are not followed. Please ensure anyone using AST-ID has read and understands the following precautions.

⚠ WARNING

Suitable safety glasses and gloves must be worn when working with refrigerants, as these can cause frostbite or loss of sight.

⚠ DANGER

R1234yf is considered mildly flammable. Make sure you are working in a well ventilated area with no open flames.

R134a and/or mixtures of other refrigerants may also be flammable.

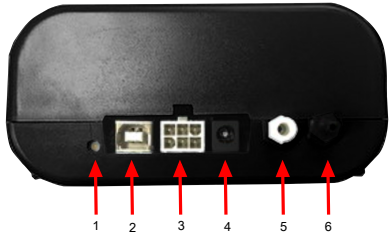
⚠ CAUTION

Ensure the vehicle engine is turned off and/or the keys are removed from the ignition before carrying out any sample tests.

⚠ CAUTION

Avoid breathing refrigerant and oil vapor.

4 Connections and Indicator



1	LED indicator
2	USB connector
3	RS232 connector
4	12 V(dc) power supply connector
5	Gas sample inlet
6	Exhaust

4.1 LED Indicator

The LED illuminates or flashes red or green depending on the state or process the identifier is in.

- During warm-up, the red LED is constant.
- After warm-up, the LED flashes.
- When the N command is issued, and all is healthy, the green LED continues to flash. If any kind of fault exists (low oxygen sensor output, the filter requires replacement, IR amplitudes are too low, or calibration is due), then the red LED flashes.
- When the C or W command is issued, the green LED is constant.
- If the zeroing fails, the red LED flashes, otherwise the green LED flashes.
- When the A command is issued, the green LED is constant.
- If the analysis has completed successfully, the green LED flashes. If the analysis does not complete, or the sample is not pure, then the red LED flashes.
- After the next N command is issued and all is healthy, the green LED continues to flash. If any kind of fault exists (low oxygen sensor output, the filter requires replacement, IR amplitudes are too low, or calibration is due), then the red LED flashes.

4.2 Connections

Connection to AST-ID is made via the following methods.

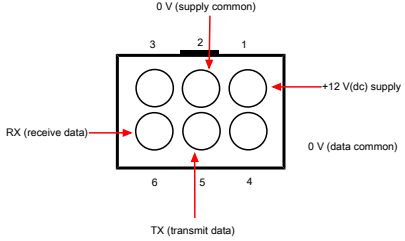
USB Connector

The USB connector is a standard type B socket.

RS232 Connector

The module is fitted with a 6-way plug from the "TE Connectivity®" Mini-Universal MATE-N-LOK® series mounted onto the internal circuit board.

Rear view of module RS232 connector



Power Supply Connector

The nominal 12 V(dc) power supply for AST-ID can either be provided as part of the RS232 cable using the connections shown above, or separately supplied via a 2.5 mm power jack plug, connected as shown below.

NOTICE

After applying the 12 V(dc) supply, wait two minutes before using AST-ID to allow the gas sensors to stabilize.

Gas Sample Inlet

The sample inlet is a female bulkhead luer ¼-28 UNF thread, 1/8 in. barbed connector.

NOTICE

AST-ID requires a stable flow rate for a minimum of 60 seconds to produce a successful analysis.

Exhausts

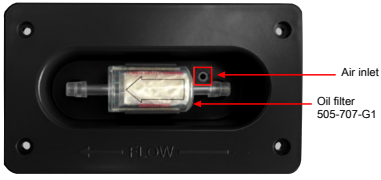
The exhaust outlet contains a small amount of refrigerant, so AST-ID must be positioned so the exhaust port is at a lower point than the air inlet.

⚠ CAUTION

Do not connect anything to the exhaust outlets.

5 Oil Filter & Air Inlet

Module Front View - Bezel Mount Version



Module Front View - Direct Mount Version

5.1 Oil Filter

Allowing oil into the gas sensing chamber of AST-ID causes damage and failure of the identifier, thereby invalidating the warranty.

A replaceable, white, in-line oil filter is provided to minimize the risk of damage if oil enters the sampling hose. Periodic examination of the filter and sample hose is vital. If oil contamination is observed, further testing must cease until the filter and/or hose have been replaced.

The white filter has an activated dye medium that turns red when exposed to oil in the system. Both mount versions should be mounted with the arrow pointing up to minimize the risk of oil entering the sample hose.

NOTICE

Small red spots at the ends of the entry and exit tubes are not necessarily an indication of oil contamination. This may just be powder ink or dust due to the production processes of the filter.

Replacing the Oil Filter

NOTICE

Note the direction of the flow shown on the identifier or existing filter.

1. Pull the existing filter out of the retaining clip.
2. Carefully uncouple the black rubber tubing from both sides of the filter.
   ⇨ Do not allow the tubing to slip back into the unit.
3. Inspect the hose assemblies for signs of oil contamination.
4. Ensure the new filter is aligned in the correct direction of flow and install the tube ends onto the barbs of the new filter.
5. Carefully slide the filter and tubing back in place until the new filter is correctly seated into the retaining clip. Make sure that there are no kinks in the tubing.
   ⇨ Dispose of the old filter in an environmentally friendly manner. Replacement of the oil filter usually requires replacement of the sample hose.

5.2 Air Inlet

AST-ID draws ambient air through the inlet during the purging (zeroing) cycle that precedes the gas analysis. In the **Bezel Mount** version, the air inlet is located on the outside of the automotive air conditioning service unit to minimize the intake of refrigerant during the purging (zeroing) cycle.

The air inlet on the **Direct Mount** version is a barbed connector for use with a 2.5 mm internal diameter tubing. The tubing connected to the air inlet must route to a high position on the outside of the automotive air conditioning service unit to reduce the risk of accidental intake of refrigerant during the purging (zeroing) cycle and minimize water and dust ingress.

6 Communication Formats

AST-ID can communicate with the automotive air conditioning service unit with a USB or RS232 cable. The output format (VDA or SAE) can either be specified at the time of ordering, or configured by the user using the PC application "AST-ID Config Pro." This application also simulates a service unit to allow operation of the identifier to be fully tested.

The communications protocol options are as follows:

Protocol	Data Encryption	Output Format Options
USB	On or off	SAE or VDA pass/fail
RS232	On or off	SAE or VDA pass/fail

Please refer to the AST-ID Communications Manual for details.

If Data Encryption is selected, the output is encrypted using the AES-256 algorithm by AST-ID prior to transmission to the service unit. The service unit therefore needs to have the capability to de-encrypt the data.

6.1 SAE Gas Analysis Output

If the SAE output format has been set, the gas analysis data output is comprised of seven fields separated by a single space as shown in the two examples below. For clarity, the spacing below has been expanded.

R134a Mode

095.0	003.2	001.8	000.0	003.0	00000	00055
%R134a	%R1234yf	%R22	%HC	% Air	Status	Test #

In this example, (test #55), the sample contains 95% R134a, 3.2% R1234yf, 1.8% R22, and 3% air.

The status value '00000' signifies that no errors have occurred.

R1234yf Mode

008.0	090.0	000.0	002.0	002.0	00000	00056
%R134a	%R1234yf	%R22	%HC	% Air	Status	Test #

In this example, (test #56), the sample contains 8% R134a, 90% R1234yf, 2% HC, and 2% air.

The status value '00000' signifies that no errors have occurred.

6.2 VDA Gas Analysis Output

If the VDA output format has been set, the gas analysis data output is comprised of two 5-digit strings, representing PASS or FAIL, and the test number as follows: ###### ######

The first five digits are the test result, where 00000 = PASS, 99999 = FAIL.

The second five digits are the test number, e.g. 00057.

The operation of AST-ID Integrated is controlled automatically by the recovery/recycle/recharge machine using the protocol outlined in the AST-ID Communications Manual.

The refrigerant purity percentage indicated by this equipment includes the amount of air that may be in the refrigerant being tested, but the percentage of non-condensable gases (such as air, is an independent number.

If the refrigerant being tested is identified as contaminated, (for example, less than 98% pure R1234yf, any visual percentages being displayed of HFO-1234yf (R1234yf or HFC-134a (R134a outside the design certified value is informational and may not be accurate.

If the refrigerant in the sample contains less than 70% of the primary refrigerant, this may be displayed as zeroes in the analysis categories, indicating that the analysis has completed but the primary gas is less than 70% pure.

With the SAE gas analysis output, any hydrocarbons and/or R152a levels identified are displayed in the HC category.

6.3 Calibration

To ensure optimum accuracy and sensitivity of AST-ID, it is advisable to periodically re-calibrate the instrument against reference cylinders of 100% R1234yf and 100% R134a.

It is recommended that re-calibration is carried out at least every five years. The calibration procedure can be provided by request. For more information, contact INFICON using the contact details provided on the back cover.

7 Specifications

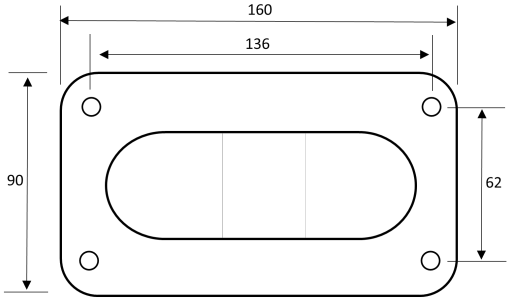
Refrigerants and other vapors identified	R134a and R1234yf
Design standard	SAE J2927 and SAE J2912
Operating pressure	22 - 174 psi (1.5 - 12 Bar)
Sample type	Vapor only
Sample volume	Less than 5 grams per test
Operating temperature range	10 - 49°C (50 - 120°F)
Sensor type	NDIR - non-dispersive infrared
Power rating	12 V(dc)
Air sensor lifetime	5 years
Warm-up time	2 minutes after power on
Test cycle time (purge and test)	140 seconds
USB communications	USB 3.0
Serial port communications	RS232
Stored test results capability	Maximum of 5 tests
Weight	Direct mount - 1.04 lb. (0.47kg) Bezel mount - 1.38 lb. (0.63kg) Boxed weight - 2.20 lb. (1.00 kg)
Approvals	SAE J2927, CE, EMC, UL 61010
Certifications	CE, UKCA, ROHS, ISO 900:1:2015 Certified to meet SAE J2912

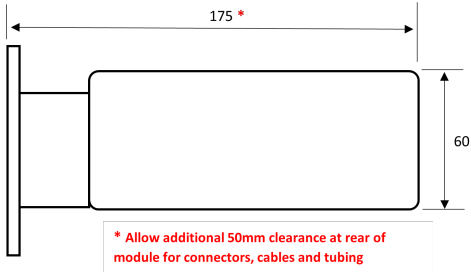
8 Dimensional Data

NOTICE

The measurements in the dimensional drawings shown below are in mm.

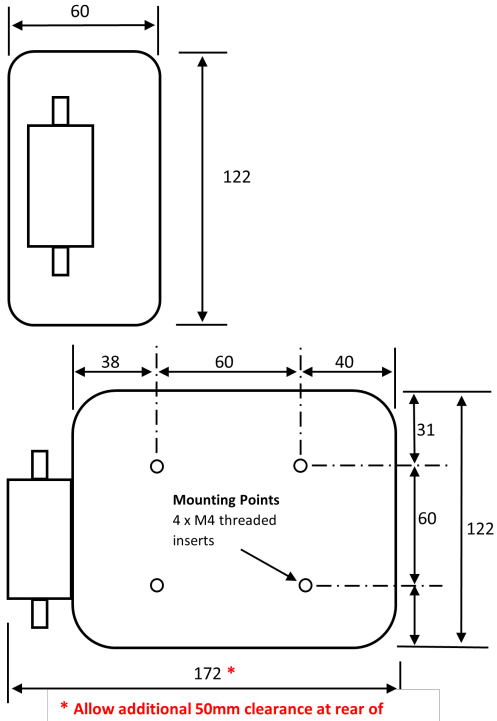
Bezel Mount Version





*** Allow additional 50mm clearance at rear of module for connectors, cables and tubing**

Direct Mount Version



9 Spare Parts & Accessories

Description	Part number
Sample hose with oil restrictor	505-701-G1
Oil filter	505-707-P1
Oxygen (air) sensor w/ cable and connector	505-709-P1

Please contact INFICON for service, repair and spare parts.

10 Warranty and Liability-Limitation

INFICON warrants your instrument to be free from defects of materials or workmanship for one or two years (depending on region) from the date of purchase. INFICON does not warrant items that deteriorate under normal use, including batteries, sensors, and filters. In addition, INFICON does not warrant any instrument that has been subjected to misuse, negligence, or accident, or has been repaired or altered by anyone other than INFICON. INFICON liability is limited to instruments returned to INFICON, transportation prepaid, not later than thirty (30) days after the warranty period expires, and which INFICON judges to have malfunctioned because of defective materials or workmanship. INFICON liability is limited to, at its option, repairing or replacing the defective instrument or part. This warranty is in lieu of all other warranties, express or implied, whether of MERCHANTABILITY or of FITNESS FOR A PARTICULAR PURPOSE or otherwise. All such other warranties are expressly disclaimed. INFICON shall have no liability in excess of the price paid to INFICON for the instrument plus return transportation charges prepaid. INFICON shall have no liability for any incidental or consequential damages. All such liabilities are EXCLUDED.

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