Refrigerant Identifiers
Fixed Gas Detectors
Gas Detection Control Units



Mentor Refrigerant Identifier Communications Manual for Mentor Portable and Fixed Identifiers







Status Scientific Controls Ltd

Hermitage Lane Industrial Estate Mansfield, Nottinghamshire NG18 5ER United Kingdom Tel: +44 (0) 1623 651381 www.status-scientific.com email: sales@status-scientific.com

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



CONTENTS

1	DESCRIPTION
2	INSTALLATION
3	CONNECTING TO A FIXED IDENTIFIER
3.1	LED Indicator3
3.2	USB Connector4
3.3	RS232 Connector4
3.4	12V DC Power Supply Connector5
4	CONNECTING TO A PORTABLE IDENTIFIER
5	RUNNING THE PC APPLICATION
5.1	Com Port Settings7
5.2	Connection8
5.3	Disconnecting9
6	SAE COMMANDS10
7	NON-SAE COMMANDS
7.1	Calibration12
7.2	Extended Commands13
8	DIAGNOSTICS
9	CONFIGURATION
10	PROGRAM17
11	TROUBLE SHOOTING
11.1	Connection to an identifier18
11.2	SAE Commands18

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



1 DESCRIPTION

This manual is to be used in conjunction with TD20/002 Fixed Refrigerant Identifier manual and TD20/001 Portable Refrigerant Identifier manual. It describes the protocol required for communicating with Automotive Air Conditioning equipment and using the Automotive Refrigerant Configurator Pro PC application which simulates the communications with Automotive Air Conditioning equipment.

The Mentor Automotive Refrigerant Configurator Pro PC application can be used with both the Portable and Fixed Automotive Refrigerant Identifiers manufactured by Status Scientific Controls Ltd.

It is a bespoke comprehensive PC software application that allows Service Unit manufacturers (and other suitably trained users) to test, calibrate and configure the identifiers during the production process.

This manual also covers the protocol required for communications between SAE J2843, SAE J2851 or SAE J3030 Automotive Air Conditioning Service equipment.

2 INSTALLATION OF THE PC APPLICATION

This is a Windows compatible application.

A copy of the application is available to approved customers.

The file is in .zip format.

Extract the files to a suitable folder on your PC and then run the **Setup.msi** file. This will install the application on your PC and place a shortcut icon on the desktop as shown below.



SCIENTIFIC

Fixed Gas Detectors Gas Detection Control Units

Refrigerant Identifiers

3 CONNECTING TO A FIXED IDENTIFIER

Either the USB or RS232 output of the fixed Mentor Refrigerant Identifier can be connected to the PC on which the application is installed.

If the RS232 connection is to be used, the PC will require to be fitted with an appropriate interface card such as PCI or PCI Express. Alternatively, an RS232 to USB adaptor can be used to allow connection to a USB port on the PC.

The Identifier will require to be powered from a 12V DC power supply.



Fixed Identifier Module Rear View

3.1 LED Indicator

The LED illuminates or flashes Red or Green indicating the state or process the identifier is in. See manuals TD20/001 and TD20/002 for more information.

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



3.2 USB Connector

.

The USB connector is a standard Type B socket.

3.3 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.

Alternatively, the user can construct additional cable sockets using the following "TE Connectivity" parts: -

Quantity 1 - Housing Part No. 172168-1. Quantity 6 – Solder Socket Part No. 770902-1.



• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



3.4 12V DC Power Supply Connector

The nominal 12V DC power supply for the identifier 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.



4 CONNECTING TO A PORTABLE IDENTIFIER

Connect a USB cable between the USB port of the computer and the USB Type A connector situated on the left-hand side of the Identifier (as viewed from the front).



• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



5 RUNNING THE PC APPLICATION

- 1. Connect the Identifier to the PC using either a USB or RS232 connection as described in sections 3 and 4.
- 2. Switch on the Identifier.
- 3. Run the application by clicking on the desktop shortcut. The screen will appear as shown.

There are four main areas of the page as shown below: -

Function Table Autonotive Refrigerant Configurator V11.00 0</

Connection & Settings

Commands Area

Message Area

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



5.1 Com Port Settings

Click on the Settings tab; the following box appears: -

	Settings ×						
Comm Settings	Firmwar	Firmware Settings					
Com Port Setting	IS						
Cor	Com Port: COM4 🗸 🔁						
Bau	d Rate:	9600	~				
Pr	Protocol: RS232 ~						
Encr	yption:	VDA Encryption ON	~				
		Cancel	Save				

Using the drop-down menus, choose the appropriate settings detailed below and then select **Save**.

Com Port: Select appropriate COM port (e.g. COM1 or COM3).

Baud Rate: Select 9600 or 115200 (USB only).

Protocol: Select USB or RS232.

Encryption: Choose one of the following: -

SAE Encryption OFF	SAE output provides individual gas readings as per SAE
SAE Encryption ON	J2912. Note that SAE J2912 specifies use of encryption.
VDA Encryption OFF	VDA output provides PASS/FAIL only.
VDA Encryption ON	(Fails if purity is below 95%)

(Note – it may be necessary to try various combinations **Port** and **Baud Rate** settings until you are able to successfully connect your PC to the Identifier).

If Data Encryption is selected, the output will be encrypted (using AES-256 algorithm) by the Refrigerant Identifier prior to transmission to the Service Unit. The Service Unit will therefore need to have the capability to de-encrypt the data.

TD20/003

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



If the settings have been successfully saved, the following typical messages are displayed.

 30/11/2018 15:40:16
 Selected Com Port : COM4

 30/11/2018 15:40:16
 Selected Baud Rate : 9600

 30/11/2018 15:40:16
 Selected Protocol : RS232

 30/11/2018 15:40:16
 Encryption Technique : VDA Encryption ON

 30/11/2018 15:40:16
 Settings Saved Successfully. Please Connect to Proceed...

Status: Not Connected

5.2 Connection

Click on Connect.

If the connection to the Identifier is successful, the following typical messages are displayed.

```
        30/11/2018 15:40:10
        Settings Saved Successibility. Please Connect to Proceed...

        30/11/2018 15:43:08
        Testing Connection...

        30/11/2018 15:43:09
        Opening Port...

        30/11/2018 15:43:09
        Command Sent : #P13

        30/11/2018 15:43:10
        Instrument Reply : ACK

        30/11/2018 15:43:10
        Instrument successfully Connected

        30/11/2018 15:43:10
        Ready...
```

Status: Connected

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



5.3 Disconnecting

Click on Disconnect.

If the Identifier is disconnected, the message "Instrument successfully disconnected" is displayed as shown in the last line of the message window.

 30/11/2018 15:43:00
 Testing Connection...

 30/11/2018 15:43:00
 Opening Port...

 30/11/2018 15:43:00
 Command Sent : #P13

 30/11/2018 15:43:10
 Instrument Reply : ACK

 30/11/2018 15:43:10
 Instrument successfully Connected

 30/11/2018 15:43:10
 Ready...

 30/11/2018 15:43:10
 Instrument successfully disconnected

 30/11/2018 15:43:10
 Ready...

 30/11/2018 15:44:21
 Instrument successfully disconnected

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



6 SAE COMMANDS

The **SAE Commands** states the communications protocol required for the Refrigerant Identifier to communicate with a recovery/recycle/recharge machine and the PC application. The SAE Commands tab allows the PC application to simulate the commands sent from a A/C Recharge Station in accordance with SAE Surface Vehicle Standard J2912.

This facility enables Refrigerant Identifier units to be tested both before and during service e.g. to assist in fault finding.

The message area of the window displays the command issued when clicking on an icon. A corresponding reply from the Identifier should then appear in the message area as detailed in the following table. Please note that after powering the identifier, it ignores the first SAE command sent.

Icon Name	Command	Reply	Remark
		ACK	System OK
		Q	Request Calibration
			(Zero the gas sensors in
			ambient air)
System Check	N	F	Replace Oil Filter
System check		0	The Air sensor will
			expire soon
		NAZ	in warm up period or
		NAK	fault condition
Get Device (Identifier)	D	d#### (C/R)	e.g. d0353
Name			
Get Serial Number	В	b####### (C/R)	e.g. b0012345
Get Software Version	G	g#### (C/R)	e.g. Version 1.0 = g0100
Calibrate R1234yf	С	С	Zero the gas sensors in
			ambient air in
			preparation for a
		ACK	R1234yf analysis.
			Acknowledge when
		NAK	zeroing is complete or

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



Icon Name	Command	Reply	Remark	
			NAK for not ready or	
			fault.	
Calibrate R134a	W	С	Zero the gas sensors in	
			ambient air in	
		ACK	preparation for a R134a	
			analysis.	
			Acknowledge when	
		NAK	zeroing is complete or	
			NAK for not ready or	
			fault.	
		NAK	Not ready or fault – see	
			troubleshooting.	
		а	Analysing	
Analyse Sample	А	A data stream is received when analysis is		
, analyse sumple		completed followed by C/R.		
		This will either be encrypted or non-		
		encrypted according to the setting chosen		
		in section 5.1.	ſ	
Request Last 5 Tests	L	I	Analysis data from the	
		Followed by the	last 5 tests will be sent	
		data	out separated by a	
			Carriage Return.	
Filter was Replaced	R	r	Reset the Filter Counter	
Acknowledge Air	0	0	Air sensor warnings are	
Sensor Warning			suppressed for 5	
			readings.	
Acknowledge		ACK Reset the Filter C		
Negative (not ready)		NAK		
CUSTOM COMMAND	I			
Restore Backup	#X	ACK	ACK if function	
			successful or NAK if	
		NAK	unsuccessful.	

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



7 NON-SAE COMMANDS

7.1 Calibration

•	Automotive Refrigerant Configurator V1.1.0.0	- 0 ×
Connect Disconnect O Settings *		
SAE Commands Non SAE Commands Diagnostic Configuration Program		
Calibiration Extended Commands		
	Calibrate with R1234/f	
15/02/2018 11:45 Testing Connection 15/02/2018 11:45 Opening Port 15/02/2018 11:45 Command Sert. #P00 15/02/2018 11:45 Instrument Reply IACC 15/02/2018 11:45 Ready		
Status: Connected		×



This facility is for use by Status Scientific Controls personnel only.

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



7.2 Extended Commands

•	Automotive Refrigerant Configurator V1.2.3.0 – 🗆 🗙			
Connect Disconnect O Settings *				
SAE Commands Non SAE Commands Diagnostic Confi	guration Program			
Calibration Extended Commands				
h34401 💭 🕶 Select Time	16-08-2018 💭 🗙	Set Date & Time	Air Sensor was Replaced	
	System Restore	System Backup	R Source Replaced	
Nestore backup	System Restore	System backup	IN Source Replaced	
16/08/2018 13:42:59 Opening Port		Verbose		
16/08/2018 1342:59 Command Sent : #P10 16/08/2018 1343:00 Instrument Reply : ACK 16/08/2018 1343:00 Instrument successfully Connected 16/08/2018 1343:00 Ready 16/08/2018 1343:00 The COM Port COM1 removed.			~	
Status: Connected				

The Extended Commands tab provides six functions: -

Set Date & Time – clicking on the icon sends the date and time selected in the dropdown menus to the Identifier. The time and date can be adjusted using the 'Select Time' and 'Select Date' boxes.

Air Sensor was Replaced – clicking on the icon sends a command to the identifier to register that a new air sensor has been fitted. This action changes the date fitted information within the Identifier and causes it to automatically turn on its internal pump and carry out a zero-air calibration. A management password is required.



Restore Backup – This function restores the Identifier to its factory configuration and is for use by Status Scientific personnel only. A management password is required.



System Restore – This function is password protected and removes all data from the Identifier and is for use by Status Scientific personnel only.

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



System Backup – This function is password protected and is for use by Status Scientific personnel only.

IR Source Replaced – This function is password protected and is for use by Status Scientific personnel only.

8 DIAGNOSTICS

The **Diagnostics** tab provides live technical information about the operational performance of the various sensors inside the Identifier and can be used by trained staff or members of the Status Scientific support team to diagnose performance issues with the instrument and provide recommendation upon the course of action to be taken if a fault develops.

٠		Automotive Refrigerant	Configurator V1.2.3.0		_ 🗆 ×	
Connect Disconnect	Connect ND Disconnect OS Settings *					
SAE Commands Non SAE Commands	AE Commands Non SAE Commands Diagnostic Configuration Program					
Span 1	Span 2	Span 3	Span 4	Pump ON	Pump OFF	
Zero Detector	Zero Oxygen Sensor	Span Oxygen Sensor	Filter Reset			
Page 1 Page 2 Page 3 Page 4 P	age 5 Page 6					
yf	1376					
134a	1484					
R22	1559					
HC	1248					
Gen	945	Amplitude				
Air	2030					
	Air ZUSU					
Toroazona Haupola Insurinent kepis stopping biognosis Process A Vanhane						
Torow2018 HADJW8 - Command Sent 3-1 Torow2018 HADJW8 - Command Sent 3-1						
16/08/2018 14:05:12 Command Sent 16/08/2018 14:05:12 Instrument Ren	16/08/2018 1405/12 Command Sent : #U					
16/08/2018 14:05:27 Instrument Repl	160/2/011 Hostic Industrient Reply: Starting Refresh Results Page Values					
16/08/2018 14:05:35 Instrument Repl	6/08/2018 14:05:35 Instrument Reply : Starting Refresh Amplitude Page Values					
Status: Connected				•		

 \triangle

This facility is for use by Status Scientific Controls personnel only.

Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



9 CONFIGURATION

The **Configuration** tab show the current configuration of the Identifier. It contains 9 individual menu tabs of which only the **Editable Fields** tab is available for the user to carry out changes. It provides a convenient way in which to set up the various user defined fields for example when setting up a new Identifier for its first use.

•	Automotive	Refrigerant Configurator V1.2.3.0		_ 🗆 🗙		
Connect Statings	v					
SAE Commands Non SAE Commands Diagnostic C	onfiguration Program					
Configuration Settings						
Editable Fields Device 1234yf R134a R22 HC	Oxygen Gen Engineer					
				<u>^</u>		
Power Save Time	15 Minutes ~	Baud Rate	9600 ~			
Date Format	DD MM YYYY ~	Analysis Format	SAE ~			
Printer Enable	Disable ~	Language	English v			
Name	FixO	Serial Number	0000009			
Filter Cycles	100	First Company Name	Status			
Second Company Name	Scientific	First Operator Name	R Royce			
Second Operator Name	E Ferrari	Third Operator Name	H Ford			
Vehicle ID	FG34 HIJ	Primary Test Gas	1234yf ~			
				~		
Get Configurations Set Configurations Clear Fields						
10/0/2016 14/0/2/ Instrument Repy 13/atring Retriest Results rage Values 1 16/B/2018 14/0/35 Instrument Rep/ 13/atring Refresh Amnitigue Pare Values 1						
16/08/2018 14:12:06 Instrument Reply : Starting Refresh Fractional Absorption Page Values						
16/08/2018 14/12/10 Instrument Reply: Starting Refresh Amplitude Page Values 16/08/2018 14/12/9 Instrument Reply: Stapping Diagnostic Process =						
16/08/2018 1421/59 Command Sent : #T						
10/08/2018 14:22:00 Instrument Reply: Diagnostic Pro-	tess stopped	× .		~		
Status Connected						

Selecting Get Configurations retrieves the current settings from the Identifier.

By selecting **Set Configurations**, new data entered in the editable fields is programmed into the Identifier.

Clear Fields only removes the on-screen data within all fields, it <u>does not</u> clear the settings within the Identifier. The required field data must be entered before selecting **Set Configurations**.

Where data fields have a grey background, this indicates that they may not be relevant to the type of instrument connected to the PC, for example, the **Power Save Time** field would not be applicable to a fixed identifier built into and A/C Service Station that is continuously powered when in use.

Data within the following menu tabs can be viewed but not changed: -

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



Device 1234yf R134a R22 HC Oxygen General

Access to the **Engineer** tab content requires user authentication via a password and is for use by Status Scientific personnel only.

Activate Management Mode		
Security Code:	Cancel OK	

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



10 PROGRAM

The Program tab will enable Identifiers to be re-programmed with the latest firmware provided on the Status Scientific website.

•	Automotive Refrigerant Co	onfigurator v2.1.9.0 : Ma	nagement Mode	- 🗆 🗙		
Connect Disconnect	Settings •					
SAE Commands Non SAE Commands Firmware CRC Calculator	SAE Commands Non SAE Commands Diagnostic Configuration Program					
Program Identifier			Firmware Details			
Hex File :						
	Browse	Program				
Caution :						
Before Re-Programming Close All O	ther Applications (Adviseable).					
No Interruptions During Re-Program	No Interruptions During Re-Programming of the identifier.					
Progress :	na rogramming					
	0%					
30/11/2018 15:47:20 Settings saved sur 30/11/2018 15:47:22 Testing Connectio	cessiuny. Please connect to Proceed n			^		
30/11/2018 15:47:22 Opening Port 30/11/2018 15:47:22 Command Sent : #	P03					
30/11/2018 15:47:23 Instrument Reply : 30/11/2018 15:47:23 Instrument succes	ACK sfully Connected					
30/11/2018 15:47:23 Ready	*			~		
Status: Connected						

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



11 TROUBLE SHOOTING

11.1 Connection to an identifier

Problem /	Possible Cause	Remedy
Error Message		
Fail to connect instrument.	Incorrect COM setting	Select correct COM port, Baud Rate, Protocol & Encryption status.
Please check the port and connect again	Incorrect wiring configuration on RS232	Rectify connection faults.

11.2 SAE Commands

Problem /	Possible Cause		Remedy
Error Message			
After 'Calibrate R1234yf / R134a' is selected, identifier reply is NAK	1. 2.	Low flow rate Sensor outputs too low	Blocked air inlet, defective pump. Refrigerant gas has been sucked into air inlet, inlet or sample has been applied too early, place identifier in clean air and retry. Arrange for recalibration of Identifier.
After 'Analyze Sample' is selected, Identifier reply is NAK Analyze Sample	3. 4.	A healthy flow rate has not been detected for 60 second period. A valid air calibration	Investigate cause e.g. oil ingress, blocked sample line, sample pressure too high or low.
Failed or error code 00005		has not been performed within last 10 minutes.	Perform zero cycle.
	5.	Air sensor requires replacement.	Replace air sensor.
	6.	Identifier requires recalibration.	Arrange for recalibration of Identifier.
	7.	Air calibration process has failed.	Investigate cause e.g. oil ingress, blocked sample line. Contact Status Scientific or local distributor.

• Refrigerant Identifiers •

• Fixed Gas Detectors • Gas Detection Control Units •



8.	Sensor outputs too	
	low.	

If you find any of the above remedies do not resolve the issues, please contact either Status Scientific Controls Ltd or your Mentor distributor