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Test Receiver SW – Free Version
User Manual
Document # 200641

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Approvals

Revision	Name	Title	Signature
02	Edward Li	General Manager	

Revision History

Revision	Date	Responsible Person	Description
01	Dec 8, 2017	Derek Soo	Initial Release
02	May 12, 2020	Derek Soo	Updated Release

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CONTACT

Edward Li, General Manager
 IRDI System Inc.
 edward.li@irdisystem.com


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DEFINITIONS AND ABBREVIATIONS

The following terms and/or abbreviations are used in this manual:

TABLE 1: ABBREVIATIONS

Term	Definition
IRDI	Infrared Data Interface – communications interface which uses infrared technology to transmit data.
SAE J2799	The SAE standard that defines the serial packets that are sent via infrared, from a fuel cell vehicle to a hydrogen station.

APPLICABLE DOCUMENTS

The following documents are recommended as reference material.

TABLE 2: REFERENCE DOCUMENTS

Document Reference	Document Title	Document Number
[1]	SAE J2799 technical information report	J2799

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1 SCOPE

This user manual provides an overview of the **Test Receiver Software**, used to read the IR communication at a hydrogen fueling station. This manual also includes a troubleshooting section.

2 INTRODUCTION

The **SAE J2799 standard** is a method of communicating information such as tank pressure and tank temperature from a hydrogen-powered vehicle to a hydrogen fueling station, during a fueling operation, using infrared. This communication is used to ensure that the hydrogen fueling is conducted in a controlled and safe manner.

3 REQUIREMENTS

This section provides the list of equipment needed.

TABLE 3: REQUIRED EQUIPMENT

Item	Part #	Description
1		Desktop or laptop computer, Windows 7 or higher
2	200504	Test Receiver Software
3	200545	USB adapter for IR Nozzle Receiver (Escha) with RS485 output
4	200327	IR Nozzle Receiver (ENR)

3.1 HARDWARE SETUP OVERVIEW

Figure 1 illustrates the hardware setup required.



FIGURE 1: OVERVIEW OF REQUIRED HARDWARE

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4 GETTING STARTED

The Test Receiver Software is a simple interface to test an IR Nozzle Receiver and to read IRDI data.

4.1 INSTALLING THE SOFTWARE

See Appendix A for software installation.

4.2 SOFTWARE QUICK START GUIDE

Figure 2 shows the test software interface when it is connected and running:

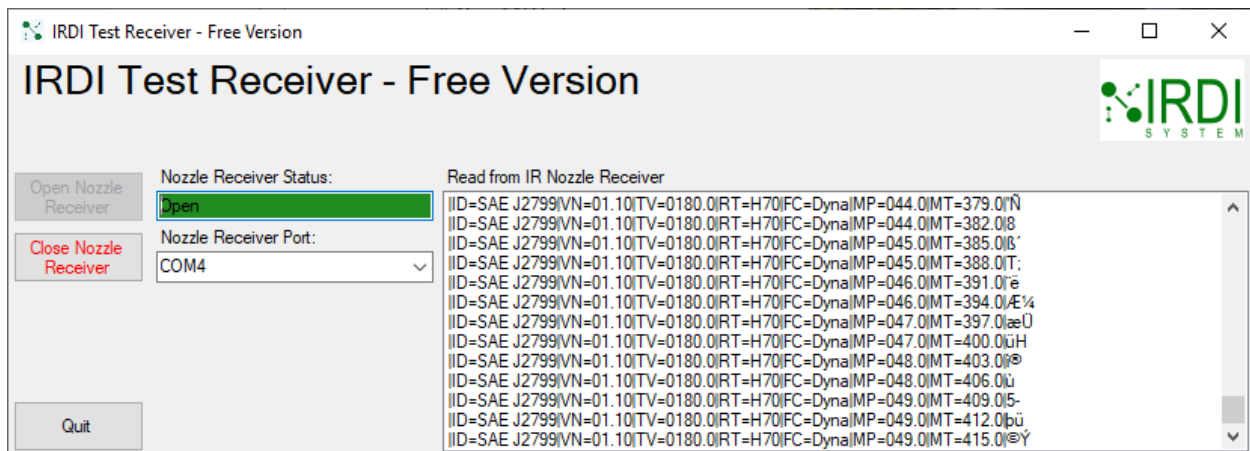


FIGURE 2: TEST RECEIVER SOFTWARE

Table 4 gives an overview of the features available:

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TABLE 4: TEST RECEIVER SOFTWARE FEATURES

Feature	Description
Open Nozzle Receiver	Searches USB port for a Nozzle Receiver. IF found, Nozzle Receiver Status indicator will show IR Nozzle: Connected and Ready
Close Nozzle Receiver	The light is on when the HHT is powered up.
Nozzle Receiver Status	Shows the current status of the Nozzle Receiver communications.
Nozzle Receiver Port	Indicates the virtual serial communications port resource occupied by the IR Nozzle Receiver.
Read from IR Nozzle Receiver	The ASCII text interpreted data received by the IR Nozzle Receiver.
Quit	Disconnect from IR Nozzle Receiver and close the Test Receiver Software.

Table 5 outlines typical usage of Test Receiver Software:

TABLE 5 : TEST RECEIVER SOFTWARE TYPICAL USAGE

Feature	Description
STEP 1	Install the Test Receiver Software on a computer, as per Appendix A.
STEP 2	Plug in IR Nozzle Receiver to PC using the supplied USB adapter cable.
STEP 3	Run the Test Receiver software.
STEP 4	Press the “ Open Nozzle Receiver ” button - the Nozzle Receiver Status should indicate “ IR Nozzle: Connected & Ready ”.
STEP 5	If any IRDI data is being received, the green Rx LED on the USB adapter cable will flash and the ASCII interpreted data will be displayed.
NOTE	To disconnect from IR Nozzle Receiver and Close the Test Receiver Software, Press “Quit”.

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Troubleshooting should errors appear:

- Ensure secure and correct wiring connections.
- Verify Serial Port has been automatically installed.
- Ensure nothing is obstructing line-of-sight between IR Nozzle Receiver and IRDI Transmitter.
- Open IR Nozzle Receiver to run again.
- If no data is displayed, it could be the result of a defective IR Nozzle Receiver.

4.3 SOFTWARE DETAILS

Test Receiver Software allows the user to examine IRDI Data Packets sent from a Hydrogen Surface Vehicle (Transmitter) to be received by a Pressurized Hydrogen Dispenser (Nozzle). The message format is defined by the SAEJ2799 standard.

This section provides a simplified description of the IRDI data packets and tools for troubleshooting.

4.3.1 Infrared Data Messages

The user can receive these messages via a user-supplied infrared data receiver, and can view these messages using Test Receiver Software.

Each infrared data message is a text string of fixed length, with a fixed set of fields, as per the following example:

```
|ID=SAE J2799|VN=01.10|TV=0180.0|RT=H70|FC=Halt|MP=004.0|MT=044.0|ũÃ
```

The vertical lines (“|”) in the above string separate the individual fields that make up the infrared data message. Each field begins with the field identifier (e.g. “TV”), followed by the “=” symbol and the numeric value assigned to that field (e.g. “0180.0”). For example, in the above message, TV (tank volume) has the value 0180.0, which means that the tank volume is 180 l (litres).

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The meaning of each field in the infrared data message is as follows:

TABLE 6 : INFRARED DATA MESSAGE FIELDS



Field Identifier	Definition	Range of Values
ID	Name of the communication protocol – in this case, SAE J2799	SAEJ2799
VN	Version number of the communications protocol	00.00 – 99.99
RT	Receptacle type – style of hydrogen receptacle used on the vehicle	H25, H35, H50 and H70
TV	Tank volume – the volume of the hydrogen tank in the vehicle	0000.0 – 5000.0 litres
FC	Fill command – indicates the type of hydrogen fill in progress, or the reason for the fill's termination	DYNA, STAT, HALT and ABORT
MP	Measured pressure – the pressure reading of the hydrogen tank in the vehicle	000.0 – 100.0 MPa
MT	Measured temperature – the temperature reading of the hydrogen tank in the vehicle	16.0 – 425.0 K
OD	Optional data – any characters, up to a total of 16, as defined by the customer; used to transmit customer-specific information	Any characters, NOT INCLUDING the “ ” ASCII character or the “\$7C” hexadecimal character
ũÄ	Checksum (CRC)	Varies depending on the checksum (CRC)

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Appendix A: INSTALLING USB DEVICE DRIVERS


Install the IR Nozzle Receiver USB adapter device drivers by doing the following:

TABLE 7: ENABLE AUTOMATIC DRIVER INSTALLATION

Action	
STEP 1	Start up the computer and ensure internet connectivity.
STEP 2	Open Devices and Printers by clicking the Start button  , and then, on the Start menu, clicking Devices and Printers .
STEP 3	Right-click the name of your computer, and then click Device installation settings .
STEP 4	Click Yes, do this automatically (recommended), and then click Save changes. 
STEP 5	If you're prompted for an administrator password or confirmation, type the password or provide confirmation. If Yes is already selected, click Cancel to close the dialog box.
STEP 6	Insert IR Nozzle Receiver USB adapter into PC USB port.
STEP 7	Drivers should install automatically. (may take several minutes)
NOTES	If driver download fails, the USB driver installer can be downloaded and installed manually from: http://www.ftdichip.com/Drivers/CDM/CDM21224_Setup.zip

Verify that IR Nozzle Receiver USB adapter device is inserted to the PC USB port correctly and enumerated by Windows.

TABLE 8: VERIFY IR NOZZLE RECEIVER DEVICE DRIVER INSTALLATION

Action	
STEP 1	Open Device Manager by clicking the Start button  , and then, type "devmgmt.msc" in the search box, and then press ENTER.
STEP 2	Expand device in the computer's device tree labelled: "Ports (COM & LPT)".
NOTES	IR Nozzle Receiver should appear as: "USB Serial Port (COM12)" (or similar)

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INSTALLING THE IR NOZZLE RECEIVER TESTER PROGRAM

To install the IR Nozzle Receiver Tester program, do the following:

TABLE 9: COPY TEST RECEIVER SOFTWARE TO THE TEST PC

Action	
STEP 1	Copy the two program files to a new folder on the computer. The two files are needed to run the IR Nozzle Receiver Tester program. (IRDIFreeTestReceiver.exe and IRDIFreeTestReceiver.exe.config)
STEP 2	To run the TestReceiver program, double-click on the “ IRDIFreeTestReceiver.exe ” application.
NOTES	Recommended: Right-click on the “ IRDIFreeTestReceiver.exe ” application and select “Create Shortcut”. Copy the shortcut to the desktop.