

iTrans™ DS2 DOCKING STATION™

Installation • Operation • Wiring • Troubleshooting



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INDUSTRIAL SCIENTIFIC
CORPORATION

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Warnings and Cautionary Statements

CAUTION: Failure to perform certain procedures or note certain conditions may impair the performance of the monitor. For maximum safety and performance, please read and follow the procedures and conditions outlined below.

CAUTION: For safety reasons, this equipment must be operated and serviced by qualified personnel only.

Mission Statement

*Preserving human life on, above and below the earth
Delivering highest quality, best customer service ...
every transaction, every time*

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INTRODUCTION

1.1. Overview of the DS2 Docking Station™ System

The DS2 Docking Station™ is a device that is capable of communicating with the iTrans™ fixed point monitor. A single Docking Station™ can communicate to a maximum of 10 iTrans™ units. The Docking Station™ receives diagnostic, function test, and calibration information from each iTrans™ unit connected to it. The Docking Station™ also has the ability to initiate remotely a function test and / or calibration.



Figure 1-1. Typical DS2 Docking Station™

1.2. Specifications

Specifications for the DS2 Docking Station™ are listed below.

Table 1-1. Specifications for the DS2 Docking Station™

Item	Description
Enclosure	Cast aluminum, poly-bonded coating or 316 stainless steel. Both are explosion-proof, NEMA 4X, IP66 rated.
Dimensions	5.0 × 6.0 × 5.0 inches (127 × 153 × 129 mm)
Input Voltage	20-28 VDC operating range (24 VDC typical), 70 mA (nominal), 150 mA during warm up
Display	LCD Display

Signal Outputs	Digital	ModBus RTU: RS485 digital communication with ModBus RTU software protocol system at 9600 baud. Three- or four-wire system accommodates 10 iTrans™ devices in a bus configuration. Address selection through on-board 8-position DIP switch.
	Ethernet	10/100 Ethernet to Server (linear analog)
Temperature Range	-40° C ~ +75° C (-40° F ~ +167° F)	
Humidity Range	10% - 90% RH (non-condensing), typical	
Pressure	Atmospheric pressure ±10%	

1.3. Agency Approvals – CSA

The DS2 is certified by CSA, a NRTL laboratory, to the following United States and Canadian Standards:

- CAN/CSA C22.2 No. 0-M91 - General Requirements-Canadian Electrical Code, Part II
- CSA C22.2 No. 30-M1986 - Explosion-Proof Enclosures for Use in Class I Hazardous Locations
- CAN/CSA C22.2 No. 94-M91 - Special Purpose Enclosures
- CSA C22.2 No. 142-M1987 - Process Control Equipment
- CAN/CSA-E60079-0:02 - Electrical apparatus for explosive gas atmospheres – Part 0: General Requirements
- CAN/CSA-E60079-1:02 - Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosures “d”
- CAN/CSA-E60529:05 - Degrees of protection provided by enclosures (IP Code)
- UL No. 50, Eleventh Edition - Enclosures for Electrical Equipment
- UL No. 916, Third Edition - Energy Management Equipment
- UL No. 1203, Fourth Edition - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
- ANSI/UL 60079-0:02 - Electrical apparatus for explosive gas atmospheres – Part 0: General Requirements
- ANSI/UL 60079-1:02 - Electrical apparatus for explosive gas atmospheres – Part 1: Flameproof enclosures “d”

1.4. Special Instructions for Safe Use (EU)

The DS2 complies with relevant provisions, per listed standards, of European ATEX Directive 94/9/EC and EMC Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC, and is constructed with reference to published standards of Directive 72/23/EEC, to eliminate electrical risks.

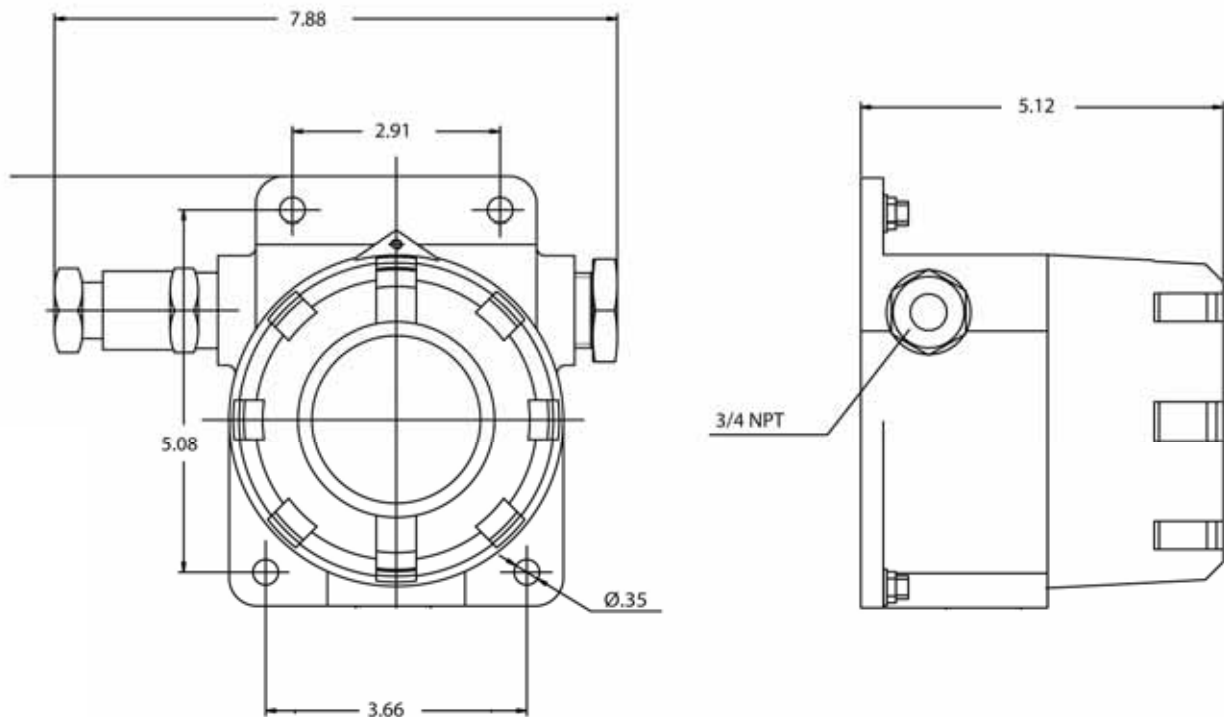
- EN 60079-0: Electrical apparatus for potentially explosive atmospheres – General requirements.
- EN 60079-1: Electrical apparatus for potentially explosive atmospheres – Flameproof enclosures ‘d’.
- EN 50270: Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen (for Type 2 [Industrial] Apparatus).

The DS2 EC type examination certificate is KEMA 08ATEX0127X (pending) and IECEx CSA08.006 (pending), with marking code EEx d IIB+H2 T5; - 40°C<Ta<75°C, Equipment Group and Category is II 2G. Notified body responsible for production quality assurance is SIRA, notified body No. 0518.

HARDWARE OVERVIEW

2.1. Main Electronics Unit (Housing)

The DS2 body is a cast aluminum housing that contains the electronics of the Docking Station™.



NOTE: Dimensions are in inches.

Figure 2-1. Details of DS2 Docking Station™

2.2. Sensor

A list of supported iTrans™ sensors and their corresponding ranges and resolutions is given in Table 2-1. Additional specifications are provided in section 1.2.

Table 2-1. Sensor Types and Ranges

Sensor	Gas	Range/Resolution		
Combustible Gases (LEL)	Catalytic	0-100% LEL	in 1%	increments
	BBIR	BBIR is not supported by this system		
Hydrogen	H ₂	0-999 ppm	in 1 ppm	increments
Oxygen	O ₂	0-30% by vol.	in 0.1%	increments
Ammonia	NH ₃	0-200 ppm	in 1 ppm	increments (Div 2)
Carbon Monoxide	CO	0-999 ppm	in 1 ppm	increments
Carbon Monoxide/H ₂ Null	CO	0-999 ppm	in 1 ppm	increments
Hydrogen Sulfide	H ₂ S	0-500 ppm	in 1 ppm	increments
Sulfur Dioxide	SO ₂	0.2-99.9 ppm	in 0.1 ppm	increments (Div 2)
Hydrogen Cyanide	HCN	0.2-30 ppm	in 0.1 ppm	increments (Div 2)
Hydrogen Chloride	HCl	0.2-30 ppm	in 0.1 ppm	increments (Div 2)
Phosphine	PH ₃	0-1 ppm	in 0.01 ppm	increments (Div 2)
Nitrogen Dioxide	NO ₂	0.2-99.9 ppm	in 0.1 ppm	increments (Div 2)
Nitric Oxide	NO	0-999 ppm	in 1 ppm	increments (Div 2)
Chlorine	Cl ₂	0.2-99.9 ppm	in 0.1 ppm	increments (Div 2)
Chlorine Dioxide	ClO ₂	Not Supported		

2.3. System Architecture

The DS2 architecture is a network based system. The DS2 Docking Stations™ communicate to the Docking Station Server via an Ethernet connection. The DS2 Docking Station passes the information from the server to the iTrans™ fixed point monitors connected to it via ModBus RTU. Each DS2 Docking Station™ can have up to 10 iTrans™ connected to it.

INSTALLATION

Chapter

3

3.1. Introduction

The DS2 can be mounted in one of two ways. The unit can be wall-mounted using the wall mounting holes in the enclosure, or it can be mounted onto a column using U-bolts. Each of these options is discussed in this chapter. Be sure to review the installation considerations before mounting the DS2 Docking Station™.

3.2. Installation Considerations

Regardless of the installation type (wall mounting or column mounting), the DS2 should be installed at or near the location of the iTrans™ gas monitors it is communicating with.

IMPORTANT: The DS2 Docking Station™ must not be installed on vibrating or heat generating sources.

3.3. Wall Mounting

If your application is best addressed using a wall-mounted gas monitor, then use the four 8 mm mounting holes in the enclosure to secure the DS2 to an appropriate location on the wall. Refer to Figure 3-1.

3.4. Column Mounting

If your application is best addressed using a column-mounted gas monitor, then use the four 8 mm mounting holes and two U-bolts to secure the DS2 to an appropriately located segment of a target pipe or conduit. Refer to Figure 3-2.

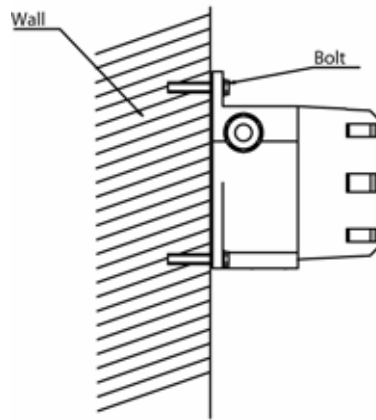


Figure 3-1. Mounting the DS2 Docking Station™ on a Wall

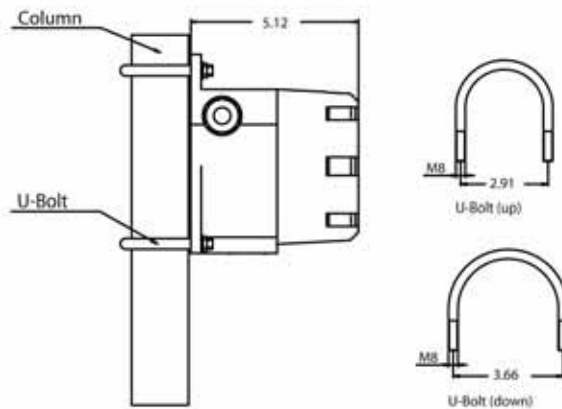


Figure 3-2. Mounting the DS2 Docking Station™ on a Column Using U-Bolt

SYSTEM WIRING

Chapter

4

4.1. Introduction

This chapter outlines the steps required for wiring the DS2 Docking Station™ to the Ethernet Network as well as the iTrans™ fixed point monitor. These steps include the following:

- Wiring Preparation
- Alarm Relay Wiring
- ModBus Interface Wiring
- Sensor Wiring
- Power and Output Wiring

Each of these steps is outlined in the sections that follow.

IMPORTANT: Perform all wiring in accordance with local electrical codes and local authorities having jurisdiction.

IMPORTANT: DC signal and AC power should not be run in the same conduit.

NOTE: All field wiring colors are arbitrary (unless provided by ISC).

4.2. Wiring Preparation

1. Collect the appropriate types and lengths of wire.
 - For Ethernet, use standard CAT 5E, shielded cable. 100 Meters max
 - For digital ModBus signal and power, use a minimum of five-conductor #18 AWG insulated and shielded cable.
 - Ensure that enclosure is grounded
2. Power down the unit.
3. Unthread the windowed top from the housing.

4. Gently pull out the electronics module and place it safely to the side of the unit.
5. Thread control, signal and power wires into the housing.
6. Shielding from either the controller or remote sensors should be bonded to the enclosure screw located inside the DS2.

IMPORTANT: Use of this product in areas where it may be subject to large amounts of electromagnetic interference may affect the reliable operation of this device and should be avoided.

NOTE: For classified locations, a “poured” wire seal must be installed within 18 inches of the main unit for both power entry and remote sensors.

NOTE: Remove power from the DS2 before making any wiring connections.

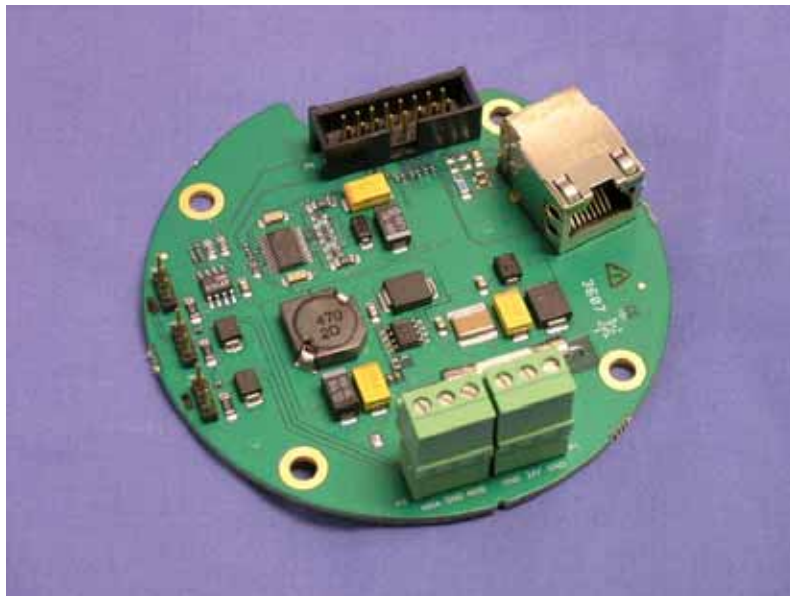


Figure 4 1. Power Board for DS2 (Main Unit)

4.3. Power and Output Wiring (J1)

Connect the DS2 power and signal wires to the appropriate wiring terminals as follows.

- | | |
|--------------|---|
| 24 V: | Connect 24 VDC (20-28 VDC) supply power |
| GND: | DC return |

NOTE: Use supplied green conductor for enclosure ground. Public 485 GND is to be used for ModBus digital ground.

4.4. iTrans™ Wiring

Connect the DS2 to the iTrans™ to the appropriate wiring terminals as follows.

- 485B:** to 485B on iTrans™
- 485A:** to 485B on iTrans™
- GND:** to SIG GND on iTrans™

NOTE: Shielding from either the DS2 or iTrans™ should be bonded to the enclosure screw located inside the iTrans™.

NOTE: Use #18 AWG shielded cable for remote sensors. Maximum distance is 300 meters

4.6. DS2 Wiring

The DS2 is connected to the Ethernet network via the RJ11 connector on the board. Shielded Cat 5E cable should be used.

NOTE: A maximum of 10 iTrans™ can be connected to one Docking Station™. The maximum distance from the Docking Station™ to the farthest iTrans™ should not exceed 300 meters.

NOTE: It is recommended that industrial grade switches be used for network connections in the field.

4.5. Wiring Conclusion

Once wiring is complete, place the DS2 electronics module back in the housing by pressing the standoff banana jacks into the mating plugs. Be careful not to pinch any of the wiring. After the module is in place, secure the windowed top back on the housing and power up the unit.

OPERATION

Chapter

5

5.1. Initial Start-up

Once power is applied (20-28 VDC), the DS2 is operational. The LCD display powers up, and the system enters a start-up period. During this start-up period, the DS2 identifies the iTrans™ that are connected and then enters normal operation.

NOTE: Upon initial power up, if the Docking Station™ is not communicating to the server, an “Unavailable Server” error will appear. Refer to the DS2 User Manual for more information.

During normal operation, messages will be displayed on the LCD indicating which iTrans™ monitor the DS2 is communicating with. If the DS2 is performing a function such as bump testing, this information will also be displayed.

The DS2 Docking Station™ will communicate with up to 10 iTrans™ units. Each DS2 Docking Station™ will need to be set up via the DSSAC software to tell it which iTrans™ are connected to it. The ID is the ModBus address of the iTrans™. To set the ModBus address on the iTrans™, please refer to the iTrans™ User Manual.

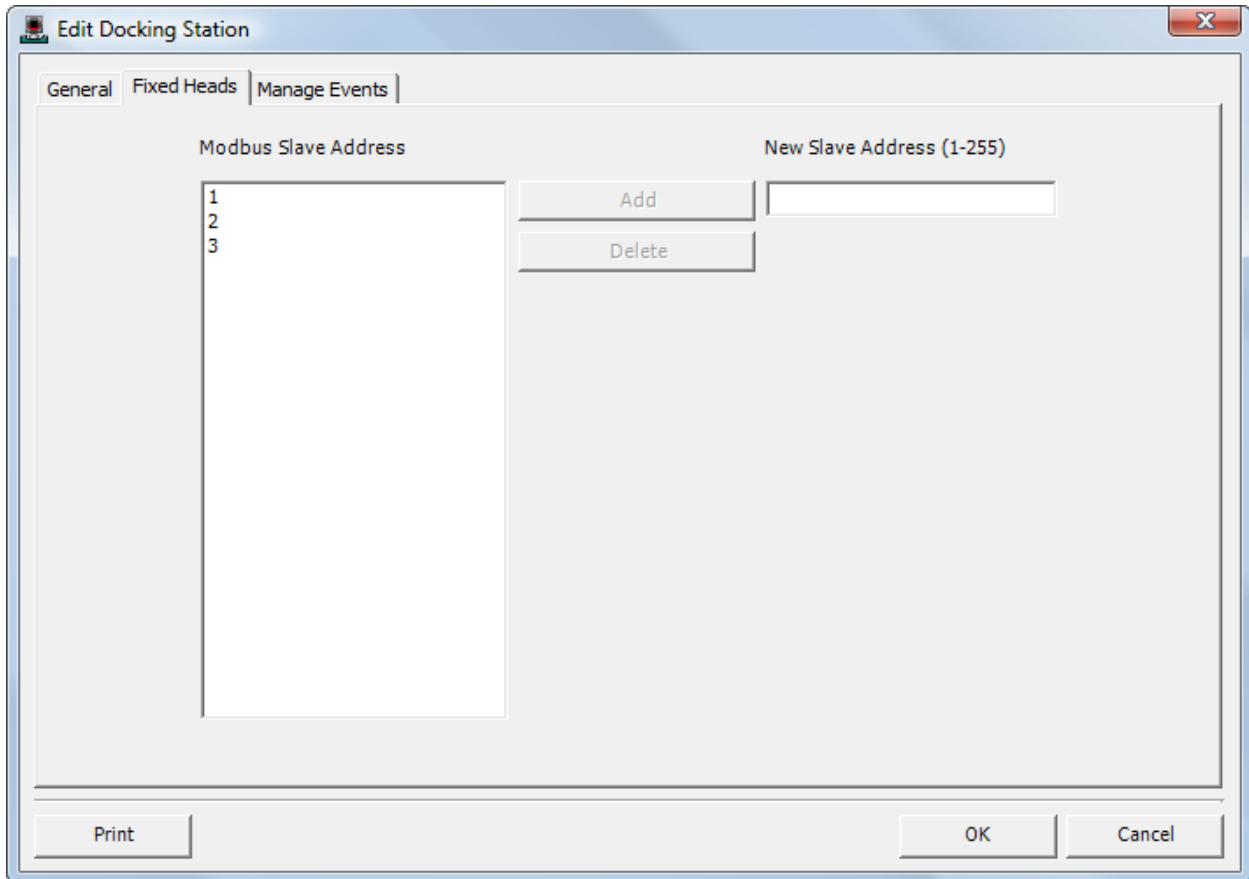
At any time, if the Docking Station™ needs to be rebooted, an internal reset switch can be activated using the magnet wand supplied with the iTrans™. With the lid still securely fastened to the unit, place the magnet over the Industrial Scientific logo to reboot the Docking Station™.

5.2. DSSAC Setup

After initial installation, the DS2 will need to be set up through the DSSAC software. This setup is required to identify which ModBus devices are communicating to each DS2, the calibration gas associated with each iTrans™, and the calibration gas (for combustible sensors only).

5.2.1 Assigning ModBus Addresses to Docking Stations™

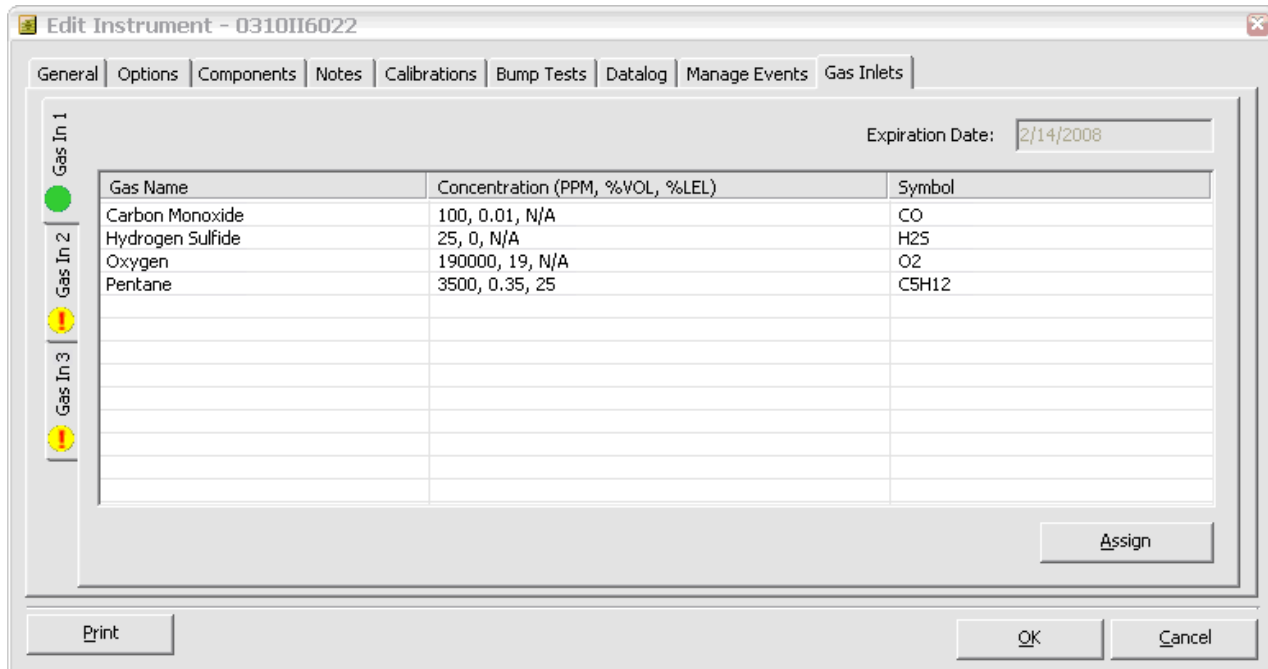
To associate a ModBus address to a Docking Station™, select the appropriate Docking Station™ from the list within the DSSAC software. Once selected, choose the “Fixed Heads” Tab.



This tab will display the ModBus addresses for the fixed units that the Docking Station™ is configured to communicate with. The user controls which fixed heads that Docking Station™ communicates with by adding or removing the ModBus addresses of those units from this list. For each iTrans™, make sure the dip switch settings for the ModBus address correspond to the addresses in this tab. For more information on assigning ModBus addresses to the iTrans™, please refer to the iTrans™ user manual.

5.2.2 Assigning Gas Cylinders to iTrans™

To assign calibration gas cylinders to an iTrans™ unit select the appropriate iTrans™ from the instrument list within the DSSAC software. Once selected, choose the “Gas Inlets” tab.



When the iTrans™ is set up to work with the Docking Station™, the relays become dedicated to gas delivery. The Low Alarm Relay is associated to Gas Inlet 1, High Alarm Relay is associated to Gas Inlet 2, and the Fault Relay is associated with Gas Inlet 3. Gas Inlet 1 should be used for calibration gas for sensor 1, Gas Inlet 2, for sensors 2, and Gas Inlet 3 for zero air for purging and zeroing sensors in an area with a background of gas.

To assign calibration gas cylinders to an iTrans™ unit, the cylinder of gases can be selected from the drop down list of pre-programmed Industrial Scientific cylinders of gas. For more information on assigning cylinders of gas, please refer to the DS2 User Manual.

5.2.3 Assigning Gas Type for Combustible Sensors ONLY

For combustible sensors, a gas type must be selected for the calibration gas. This setting can be found under the components tab for the iTrans™. Once the sensor is selected from the Components tab, the following screen will be seen:

Serial Number: 38944641036

Type: Oxygen Sensor

Part Number:

Manufacturer: Alphasense

Install Date: 1/19/2007

Position: 1

Setup Date:

Enabled:

Alarm Low: 19.5 (% VOL)

Alarm High: 22.5 (% VOL)

Alarm STEL: (% VOL)

Alarm TWA: (% VOL)

Calibration Gas: Oxygen - O2

Gas Concentration: 20.9 (% VOL)

Loop High Scaling:

OK Cancel

In the Calibration Gas drop-down, select the combustible gas that will be used for calibration. For example, if 25% LEL Pentane is going to be used, select Pentane from this list, and then enter the concentration (25% LEL) in the Gas Concentration field.

5.2.4 Manage Events Tab

The Manage Events Tab for both the Docking Stations™ as well as the instruments allows users to force events instantly. When forcing events such as calibrations or bump tests for the iTrans™, there may be a delay ranging from a few seconds, to a few minutes before the event will start. This time depends on how many instruments are connected to the Docking Station™ as well as if the Docking Station™ is performing any other functions.

TROUBLESHOOTING AND MAINTENANCE

6.1. Introduction

There is zero maintenance required on the DS2 Docking Station™. If a problem occurs with the module, please contact Industrial Scientific Corporation. A service technician will be able to assist you. Prior to opening the enclosure, the unit must be powered down. If located in a hazardous area, the area must be declassified prior to opening the enclosure.

A magnetic reset switch is located on the face of the DS2 Docking Station™ behind the Industrial Scientific Logo. This switch can be activated using the magnet supplied with the Docking Station™ or iTrans™. Place the magnet over the logo to activate this switch and reboot the Docking Station™. The magnetic reset switch can be activated with the enclosure lid in place.

Located next to the LCD display is a mini-DB9 connector. This connector is used by Industrial Scientific service personnel to troubleshoot any problems that may occur with the unit.

Consult the *Administrators Guide to the DS2 Docking Station™* for more information on troubleshooting and installing the DSS and DSSAC software.

Consult the *iTrans™ Manual* for installation and maintenance of the iTrans™. This manual also includes information regarding the setting of ModBus addresses for each iTrans™.

WARRANTY

Chapter

7

7.1. Warranty

Industrial Scientific fixed system products are warranted to be free from defects in material and workmanship for a period of eighteen (18) months from the date of shipment, or one (1) year from the date of first use, whichever occurs first, except where otherwise stated in writing in Industrial Scientific literature accompanying the product.

The above warranty does not include sensors, pumps, or filters, all of which are warranted to be free from defects in material and workmanship for one year from the date of shipment, except where otherwise stated in writing in Industrial Scientific literature accompanying the product. In addition, Industrial Scientific warrants the Infrared sensor used to monitor LEL Methane to be free from defects in material and workmanship for a period of sixty-six (66) months from the date of shipment, or five (5) years from the date of first use, whichever occurs first, except where otherwise stated in writing in Industrial Scientific literature accompanying the product.

7.2. Limitation of Liability

Industrial Scientific makes no other warranties, either expressed or implied, including, but not limited to the warranties of merchantability or fitness for particular purpose.

Should the product fail to conform to the above warranty, buyer's only remedy and Industrial Scientific's only obligation shall be, at Industrial Scientific's sole option, replacement or repair of such non-conforming goods or refund of the original purchase price of the non-conforming goods. In no event will Industrial Scientific be liable for any other special, incidental or consequential damages, including loss of profit or loss of use, arising out of the sale, manufacture or use of any products sold hereunder whether such claim is pleaded in contract or in tort, including strict liability in tort.

It shall be an express condition to Industrial Scientific's warranty that all products be carefully inspected for damage by buyer upon receipt, be properly calibrated for buyer's particular use, and be used, repaired, and maintained in strict accordance with the instructions set forth in Industrial Scientific's product literature. Repair or maintenance by non-qualified personnel will invalidate the warranty, as will the use of non-approved consumables or spare parts. As with any other sophisticated product, it is essential and a condition of Industrial Scientific's warranty that all personnel using the products be fully acquainted with their use, capabilities and limitations as set forth in the applicable product literature. Buyer acknowledges that it alone has determined the intended purpose and suitability of the goods purchased. It is expressly agreed by the parties that any technical or other advice given by Industrial Scientific with respect to the use of the goods or services is given without charge and at buyer's risk; therefore, Industrial Scientific assumes no obligation or liability for the advice given or results obtained.

SPECIFICATIONS SUBJECT TO CHANGE