AFDAU T-1
Aerial Firefighting Data Acquisition Unit
Installation Manual

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This product manufactured by AMS is warranted to be free of defects in workmanship or performance for 2 years from the date of installation by an authorized AMS installer. This warranty covers the cost of all materials and labour to repair or replace the unit but does not include the cost of transporting the defective unit to and from AMS or its designated warranty repair centre, or of removing and replacing the defective unit in the aircraft. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alteration or repairs.

THIS WARRANTY IS VOID IF THE PRODUCT IS NOT INSTALLED BY AN AUTHORIZED AMS INSTALLER. If the product registration card is not completed and returned to AMS, the product will be warranted from the date of the purchase invoice or tax receipt.

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Important Notice

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Log of Revisions

Revision	Date	Change Notes
1	2 Oct 2020	Initial Revision
2	6 Oct 2020	Moved duplicate Drop Type heading from Section 1.3.5 to Section 1.3.6.
3	18 Oct 2020	Added installation wiring diagrams, connector pinout description, mechanical diagrams and troubleshooting section.
4	13 Nov 2020	Added Landing Gear Stowed/Deployed discrete. Updated AFDAU Config Tool instructions.
5	23 Nov 2020	Changed RS232 Port 2 pin labels to the correct pin labels on Diagrams 1A and 1B
6	1 Jun 2021	Added Helitak Tank PLC interface description and wiring diagram. Added fixed wing additive type select wiring diagram. Corrected RS232 Labels in connector pinout table. Added caution note the Take Off/Landing description.
7	22 Sept 2021	Added CAUTION note regarding dual bucket system wiring in Section 2.2.3. Added Hover Start/Stop event details. Added Onboard Systems C40 indicator interface description and wiring diagram. Added Flightcell DZMx modem interface description and wiring diagram. Corrected Relay pin outs in Section 8 wiring diagrams. Corrected connector reference of MSI-150XM from J2 to J1. Added Asset Type configuration instructions.
8	16 Feb 2022	Corrected MSI150XM Pinout Table from pin 26 to pin 8 on the AFDAU-T1. Corrected MSI150XM Connector ID. Updated Helitak Wiring diagram to align with Helitak wiring diagram pinouts and connectors. Helitak Comm module Caution added to sensor section. Expanded note to include Windows 11 compatibility. Corrected pinout description in drawing 3C.
9	29 May 2022	Updates due to AFDAU-T1 firmware release V1.3. Added pump on/off event details. Added fill start event description. Added v2viewer application event previews. Updated configuration tool interface instructions to included expanded tool functionality. Updated C40 wiring diagram and interface table to show correct shield grounding. Added further details in structural mounting requirements. Updated troubleshooting guide with further actions.

Cautions and Notes

The following information boxes are used to draw the installers attention to specific facts relevant to the information being presented.

⚠️	**CAUTION** **IMPORTANT INFORMATION THAT IMPACTS INSTALLATION DESIGN**

ℹ️	**NOTE** **Additional context to assist with installer decision making**

Table of Contents

1 Description

1.1 Introduction

This manual is written for the AFDAU-T1 with firmware v1.3 or later. The firmware version and information contained in this manual is subject to change without notice. For current information, service bulletins and service information letters about the AFDAU-T1, visit www.airbornemissionsystems.com or email sales@ams-aus.com.

This manual provides a description of the AMS AFDAU-T1 Aerial Firefighting Data Acquisition Unit and instructions for installation to fixed- and rotary-wing aircraft.

Before commencing installation of the AFDAU-T1 please ensure this installation manual has been read and the requirements understood.

1.2 Description

The AFDAU-T1 is an aerial firefighting data acquisition unit with onboard data processing capabilities allowing real time event detection and transmission. Refer to Section 1.3 for a detailed list of real time events that the AFDAU-T1 can detect and transmit.

The AFDAU-T1 has six (6) open/ground input pins and six (6) internal relay inputs. The internal relay inputs can be individually configured for ground or power switching.

These inputs can be used to enable real time detection of:

- Engine on/off state,
- Airborne/ground state,
- Container (Bucket/Tank/Hopper) open state,
- Premix Type, Additive Type and Additive Pump On state
- Container type, and
- Landing gear stowed/deployed (for seaplane float landing/take-off detection)
- Tank Fill Pump On/Off

The AFDAU-T1 can be interfaced with the following gauging systems to enable real time detection of fill start, fill stop, drop start and drop stop volume events:

- Onboard Systems Load Weigh System w/ C39 Indicator,
- Onboard Systems Load Weigh System w/ C40 Indicator,
- MSI Sky Weigh System w/ MSI-150XM Indicator,
- MSI Sky Weigh System w/MSI-1 Indicator,
- Reabe Aircraft Improvement True Quantity Gauge, or
- Helitak Tank Control PLC.

The AFDAU-T1 will generate event messages that will appear on TracPlus Pro 3 and v2viewer live map software when interfaced with the serial port of the following modems:

- TracPlus RockAIR,
- TracPlus v2track, or
- Flightcell DZMx (Platform 3 and 4 only)

FEATURE	DESCRIPTION
POWER LED	Indicates that the unit is receiving power, this LED is supplied by an internal 5VDC bus. This LED is a steady green when system is operating normally. No LED indication could mean no airframe power supply to the P1 Main connector, or an internal fault with the power supply system.
STATUS LED	The STATUS LED indicates the following: **OFF:** No power supply, or internal fault **ON STEADY:** The unit is in a bootloader mode during initial boot up phase or while installing firmware **SLOW PULSE:** Indicates that the unit is operating normally **FAST PULSE:** Indicates that the unit is transferring data to or from a PC during a firmware or configuration read/write operation. **HEARTBEAT:** Indicates a corrupt configuration, the unit is in a suspended operation state until a new configuration is written using the AFDAU-T1 Configuration Tool.
P1 MAIN CONNECTOR	Main I/O connector
PROGRAMMING PORT	Used to connect to a PC running the AFDAU-T1 Configuration Tool.

1.3 Events

1.3.1 Engine Start / Stop

Refer to Section 2.2.1 for details on interfacing an Engine start/stop sensor. When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

ENGINE	
Start	**Stop**
⏻ 30 Sep 2020 11:50:26 local 4 days ago 34° 02' 24.4" S 150° 41' 13.6" E 0 kn @ 246 ft 000.0° T	⏻ 30 Sep 2020 12:10:32 local 4 days ago 34° 02' 24.5" S 150° 41' 13.6" E 0 kn @ 240 ft 000.0° T

Application: v2viewer

ENGINE	
Start	**Stop**
27 Apr 2022 11:07:24 **AFDAU Event** 27 Apr 2022 11:07:21 I/O: Engine On (GPS)	27 Apr 2022 11:13:46 **AFDAU Event** 27 Apr 2022 11:13:43 I/O: Engine Off (GPS)

1.3.2 Take-off / Landing

Refer to Section 2.2.2 for details on interfacing a Take-off/Landing sensor. When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

AIRBORNE	
Take-off	**Landing**
↗ 30 Sep 2020 11:55:38 local 4 days ago 34° 02' 24.3" S 150° 41' 13.6" E 0 kn @ 240 ft 000.0° T	↘ 30 Sep 2020 12:08:03 local 4 days ago 34° 02' 24.5" S 150° 41' 13.6" E 0 kn @ 240 ft 000.0° T

Application: v2viewer

AIRBORNE	
Take-off	**Landing**
27 Apr 2022 11:07:27 **AFDAU Event** 27 Apr 2022 11:07:25 I/O: Takeoff (GPS)	27 Apr 2022 11:13:00 **AFDAU Event** 27 Apr 2022 11:12:58 I/O: Landing (GPS)

1.3.3 Water Take-off / Landing

Refer to Section 2.2.8 for details on interfacing a Take-off/Landing sensor. When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

AIRBORNE	
Water Take-off	**Water Landing**
Not implemented	Not implemented

Application: v2viewer

AIRBORNE	
Water Take-off	**Water Landing**
Not implemented	Not implemented

1.3.4 Hover Start / Hover Stop (Rotary-Wing Only)

When the AFDAU-T1 is configured for a rotary-wing airframe and connected to a modem, it will process hover start and stop messages. For modem connection information refer Section 2.2.11. When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

HOVER	
Hover Start	**Hover Stop**
13:16:37 local 7 hours ago 33° 41' 46.9" S 149° 51' 57.9" E 0 kn @ 3606 ft 000.0° T	13:17:00 local 7 hours ago 33° 41' 47.6" S 149° 51' 59.5" E 24 kn @ 3648 ft 116.0° T

Application: v2viewer

HOVER	
Hover Start	**Hover Stop**
Not displayed	Not displayed

1.3.5 Pump On / Off

Refer to Section 2.2.9 for details on interfacing a Pump On/Off sensor. When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

PUMP	
On	**Off**
Not Implemented	Not Implemented

Application: v2viewer

PUMP	
On	**Off**
27 Apr 2022 11:28:21 **AFDAU Event** 27 Apr 2022 11:28:18 I/O: Pump On (GPS)	27 Apr 2022 11:28:31 **AFDAU Event** 27 Apr 2022 11:28:28 I/O: Pump Off (GPS)

1.3.6 Fill Start

The AFDAU-T1 will detect a Fill Start event when the volume reported by the interfaced gauge of the selected container (refer Section 2.2.7), such as bucket, tank or hopper, increases substantially in a fashion characteristic of a fill of that type of container. For this event to be detected, a volume gauge input must be connected to the AFDAU-T1 and properly configured (refer Section 2.2.10).

The following additional data will be sent with the Fill Start event message:

Container Type

The container type can be one of two attributes:

1. TANK
2. BUCKET

On single container aircraft, the container type is automatically detected and will reflect the container on which the fill event was generated.

On dual container (bucket and tank) rotary-wing aircraft the container type is selected via a Container Select discrete input (refer Section 2.2.7).

When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

FILL START
Not displayed

Application: v2viewer

FILL START
27 Apr 2022 11:12:27   **AFDAU Event**   27 Apr 2022 11:12:23   Fill Start Container type: Bucket (GPS)

1.3.7 Fill/Fill Stop

The AFDAU-T1 will detect a Fill/Fill Stop event when the selected container (refer Section 2.2.7), such as bucket, tank or hopper, volume stabilises. For this event to be detected a volume gauge input must be connected to the AFDAU-T1 and properly configured, refer Section 2.2.10

The following additional data will be sent with the Fill/Fill Stop event message:

Volume

This is the volume of water in the container at the end of the fill operation, being either picking up, or pumping in. This value is in litres.

Product Type

The product type message can be one of four attributes:

1. WATER
2. GEL
3. FOAM
4. RETARDANT

The product type defaults to WATER if no premix or additive inputs are detected or connected. A Premix Type (refer Section 2.2.6) discrete input can be used to switch between WATER and RETARDANT filled.

If an active Additive Pump On (refer Section 2.2.6) discrete input is detected before the fill occurs, the product type is set to either FOAM or GEL depending on the state of the Additive Select (refer Section 2.2.5) discrete input. If no Additive Select input is connected when the Additive Pump On is detected the product type defaults to FOAM.

If the additive is added after the Fill/Fill Stop event, the AFDAU-T1 will send any injection of additive that may happen enroute to the drop site with the Drop Start message, see Section 1.3.8. This would result in the Fill/Fill Stop message product type being WATER and the Drop Start message product type being either FOAM or GEL.

Container Type

The container type can be one of two attributes:

3. TANK
4. BUCKET

On single container aircraft, the container type is automatically detected and will reflect the container on which the Fill/Fill Stop event was generated.
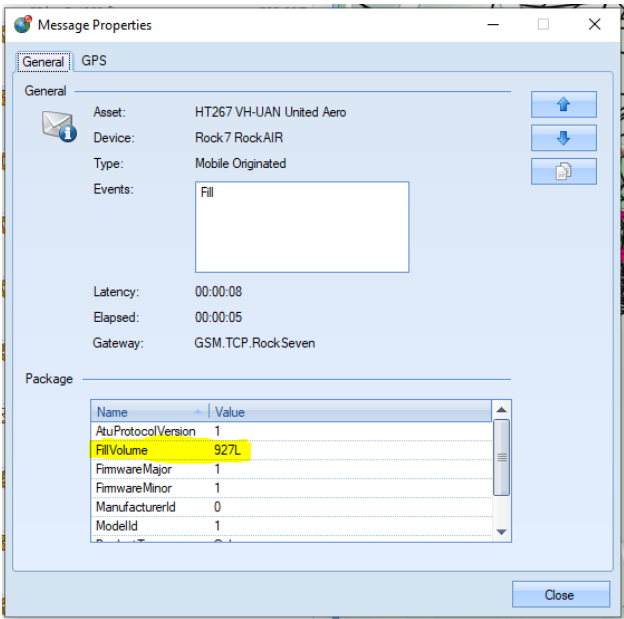
On dual container (bucket and tank) rotary-wing aircraft the container type is selected via a Container Select (refer Section 2.2.7) discrete input.
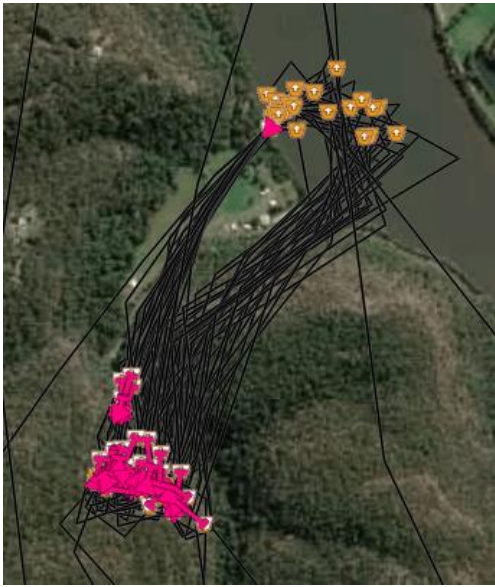
When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

Application: TracPlus Pro 3

FILL
⬆ 17 Sep 2020 14:17:50 local   17 days ago 33° 25' 24.5" S   150° 59' 36.1" E 19 kn @ 922 ft   306.0° T

FILL VOLUME

TYPICAL DISPLAY OF FILL MESSAGES	
FIXED WING	**ROTARY WING**

Application: v2viewer

FILL	
27 Apr 2022 11:12:41	**AFDAU Event**
27 Apr 2022 11:12:27	Fill: Water 1786L Container type: Bucket (GPS)

FILL VOLUME	
27 Apr 2022 11:12:41	**AFDAU Event**
27 Apr 2022 11:12:27	Fill: Water 1786L Container type: Bucket (GPS)

1.3.8 Drop Start

In order to detect a Drop Start event the AFDAU-T1 must first detect an active Container Door Open discrete input (refer Section 2.2.3). When the Container Door Open discrete input becomes active the AFDAU-T1 monitors the container volume for a start of substantive flow of the contents to generate a Drop Start event.

A volume gauge input must be connected to the AFDAU-T1 and properly configured, refer Section 2.2.10

The following additional data will be sent with the Drop Start event message:

Drop Type

The drop type can be one of three attributes:

1. SPLIT
2. FULL
3. NOT APPLICABLE

In some tank and hopper configurations where the drop type can be pre-selected and this information is streamed to the AFDAU-T1 via a data bus connection, this value will reflect either SPLIT or FULL.

In all other cases this value will be NOT APPLICABLE. Due to the advanced algorithms employed by the AFDAU-T1, the drop type can be detected in real-time during the drop and will be reported as part of the Drop Stop event message, see Section 1.3.9

Coverage

Currently transmits a 0. Please contact technical support if further details are required.

Height AGL

Currently transmits a 0. Provisional attribute for future interface to Radalt Systems. Please contact technical support if further details are required.

Product Type

The product type message can be one of four attributes:

1. WATER
2. GEL
3. FOAM
4. RETARDANT

The drop product type defaults to the product type filled unless an active Additive Pump On (refer Section 2.2.6) discrete input is detected before the drop occurs. If an Active Pump On is detected, the product type is set to either FOAM or GEL depending on the state of the Additive Select (refer Section 2.2.5) discrete input. If no Additive Select input is connected when the Additive Pump On is detected the product type defaults to FOAM.

Drop Pair ID

The ID of the drop pair. This value is unique to each Drop Start and Drop Stop pair to help agencies match each drop start and stop event. This value is sequential for each drop and resets when the AFDAU-T1 is restarted.

Container Type

The container type can be one of two attributes:

1. TANK

2. BUCKET

On single container aircraft, the container type is automatically detected and will reflect the container on which the fill event was generated.

On dual container rotary-wing aircraft the container type is selected via a Container Select (refer Section 2.2.7) discrete input.

Application: TracPlus Pro 3

DROP START
17 Sep 2020 14:16:35 local   17 days ago 33° 25' 09.8" S   150° 59' 28.0" E 25 kn @ 974 ft   026.0° T

Application: v2viewer

DROP START	
27 Apr 2022 11:13:40	**AFDAU Event**
27 Apr 2022 11:13:38	Drop Start-Full Product type: Water Container type: Bucket (GPS)

1.3.9 Drop Stop

Once a Drop Start event has been detected the AFDAU-T1 monitors the flow of contents from the container until there is an end of substantial flow to generate a Drop Stop event.

A volume gauge input must be connected to the AFDAU-T1 and properly configured, refer Section 2.2.10

The following additional data will be sent with the Drop Stop event message:

Drop Volume:

This is the volume of water that has been dropped from Drop Start to Drop Stop. This value is in Litres.

Drop Type

The drop type can be one of three attributes:

1. SPLIT

2. FULL

3. NOT APPLICABLE

Due to the advanced algorithms employed by the AFDAU-T1, the drop type can be detected in real-time during the drop and will be reported as part of the Drop Stop event message.

Height AGL

Currently transmits a 0. Provisional attribute for future interface to Radalt Systems. Please contact technical support if further details are required.

<u>Drop Pair ID</u>

The ID of the drop pair. This value is unique to each Drop Start and Drop Stop that are a pair to help agencies match each drop start and stop event. This value resets when the AFDAU-T1 is reset.

<u>Container Type</u>

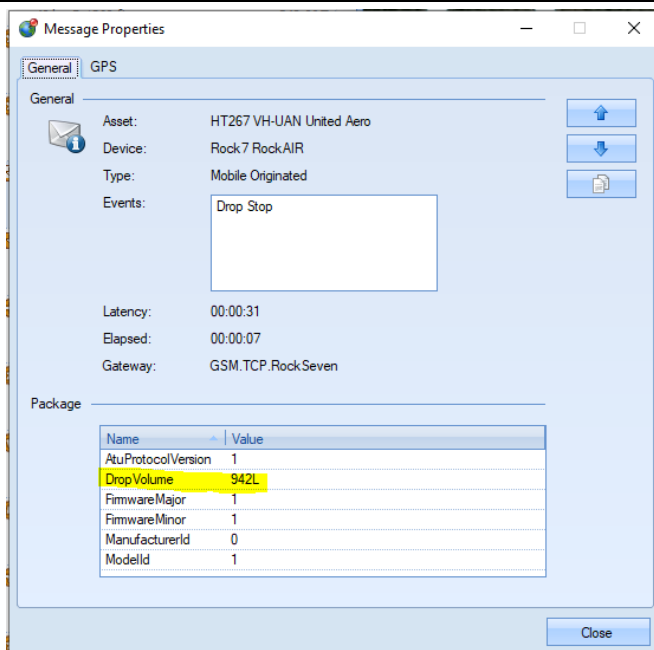The container type can be one of two attributes:

1. TANK
2. BUCKET

On single container aircraft, the container type is automatically detected and will reflect the container on which the fill event was generated.

On dual container rotary-wing aircraft the container type is selected via a Container Select (refer Section 2.2.7) discrete input.

When this event is detected, a message is transmitted via the connected modem to the TracPlus Pro 3 or v2viewer live mapping applications. The appearance of the event in the applications is shown below.

<u>Application: TracPlus Pro 3</u>

DROP STOP
17 Sep 2020 14:45:43 local   17 days ago 33° 25' 07.6" S   150° 59' 04.8" E 40 kn @ 833 ft   115.0° T

DROP VOLUME

TYPICAL DISPLAY OF DROP MESSAGES	
FIXED WING	**ROTARY WING**

Application: v2viewer

DROP STOP	
27 Apr 2022 11:13:49	**AFDAU Event**
27 Apr 2022 11:13:42	Drop Stop-Full Volume: 1659L Container type: Bucket (GPS)

DROP STOP VOLUME	
27 Apr 2022 11:13:49	**AFDAU Event**
27 Apr 2022 11:13:42	Drop Stop-Full Volume: 1659L Container type: Bucket (GPS)

1.4 Specifications

Electrical Specifications	
Input Voltage	+14/28V DC
Current Draw	0.2A max.
Discrete Input Voltage	+14/28V DC
Mechanical Specifications	
Dimensions	120x100x27.5mm (W x H x D)
Weight	0.3kg (0.66lb)
Mounting	Bulkhead mount using 10-32 fasteners in four (4) places
Material/Finish	Red anodised machined aluminium chassis with black anodised backplate and Autotex F200 Polyester electric lighted fascia.
Connectors	37 pin male D-Subminiature (J1)
Environmental Specifications	
Environmental Qualifications	TBD

1.5 Limitations

Volume Gauging System

The minimum gaugeable volume of a tank or hopper gauging system, i.e. the minimum reading on the gauge when the container is empty, must be no greater than 500 litres.

2 Installation Overview

2.1 Minimum Requirements

Before commencing installation of the AFDAU-T1 please ensure the following minimum requirements have been met.

System Voltage

The AFDAU-T1 is a multi-voltage 14-28VDC unit. However, the 6x internal relays can only be configured for a single nominal voltage, either 14VDC or 28VDC. By default, the AFDAU-T1 is supplied with 28VDC relays. If 14VDC relays are required, please specify at the time of ordering.

Volume Gauging System

An appropriate volume gauging system must be installed on the aircraft. This installation manual, or any other supplementary data for the AFDAU-T1, does not provide details on how to install or calibrate these systems. Typically, these systems would be installed under a separate STC or local approval.

Refer to Section 2.2.10 or contact technical support to ensure compatibility of an existing volume gauging system.

It is the responsibility of the installer and operator of the aircraft to ensure the existing volume gauging system is calibrated and accurate. The AFDAU-T1 does not provide any additional calibration tools and relies on existing accurate gauging systems.

It is recommended that an accuracy check of the volume gauging system is carried out and, if necessary, the system be calibrated after installation of the AFDAU-T1 and in accordance with the approved procedures for the system.

2.2 Interfaced Equipment and Sensors Considerations

2.2.1 Engine Start/Stop

If interfaced to an engine start/stop sensor, the AFDAU-T1 will process the signal and send an engine on or engine off event message to the connected modem.

The AFDAU-T1 can be configured for a discrete switched signal that represents the engine on/off state of the aircraft on one of either the 6 Relays or the 6 GPI inputs.

Typically, this would be connected to an existing main gearbox oil pressure switch. Refer to section 2.3 for guidance on how to connect this input.

2.2.2 Take-off/Landing

If interfaced to a take-off/landing sensor, the AFDAU-T1 will process the signal and send a take-off or landing event message to the connected modem.

The AFDAU-T1 can be configured for a discrete switched signal that represents the airborne or on ground state of the aircraft on one of either the 6 Relays or the 6 GPI inputs.

Typically, this would be connected to a new or existing collective lever micro switch. Refer to section 2.3 for guidance on how to connect this input.

⚠	**CAUTION** **IT IS NOT RECOMMENDED TO USE A TORQUE SWITCH COMMON ON SOME FIXED WING AIRCRAFT AS RESULTS ARE NOT RELIABLE. INSTALLATION OF AN AIRSPEED SWITCH IS RECOMMENDED.**

2.2.3 Container Door Open

For the AFDAU-T1 to send drop start and drop stop event messages to the connected modem, the AFDAU-T1 must be connected to a discrete signal that is active when the pilot commands the door or valve to open on the hopper, tank or bucket.

The AFDAU-T1 can be configured for a discrete switched signal that represents the container open door state of the container on one of either the 6 Relays or the 6 GPI inputs.

This input can be either momentary, such as pressing a release trigger, or on for the duration of the drop such as a microswitch fitted to a hopper door.

Helicopter Tank Typical Connections

- Helitak Tank PLC: No analog connection required. This signal is supplied to the AFDAU-T1 via the Helitak Tank RS-232 protocol.

Helicopter Bucket Typical Connections

- Waterhog Buckets: Typically, this would be connected to the door open side of the pilot's trigger switch.

- Bambi Max, Bambi Buckets: Typically, this would be connected to the switched side of the release switch.

- Dual Bucket Circuits: When an aircraft features more than one bucket control circuit (i.e both Bambi and Waterhog Bucket control circuits) both systems need to be detected by the Bucket Door Open input. Appropriate isolation needs to be insured when implementing this, such as installing an additional relay.

	CAUTION
⚠	**NEVER CONNECT DUAL BUCKET SYSTEM DROP SIGNAL WIRING DIRECTLY TOGETHER. PROPER ISOLATION BETWEEN THE TWO SYSTEMS MUST BE IMPLEMENTED.**

Fixed-Wing Hopper Typical Connections:

A door open discrete signal via a micro switch is the preferred method for detecting door open command with the AFDAU-T1. Consideration to suitability should be given if intending to connect the door open input to an electronic drop circuit as drops initiated by the door manual release will not be detected.

	NOTE
ℹ	**This connection is not required when only interfacing to a Helitak Tank PLC. This data is supplied via the Helitak Tank RS-232 protocol. For all other installations including a dual Helitak tank and bucket installation, connection is required.**

2.2.4   Premix Select

When sending Fill and Drop Start messages to the connected modem, the AFDAU-T1 will also send details on the type of additive mixed with the water.

The AFDAU-T1 can be configured for a discrete switched signal that represents either WATER or premixed RETARDANT product filled on one of either the 6 Relays or the 6 GPI inputs.

A typical configuration of this input is a pilot selectable, two position switch labelled WATER | RETARDANT.
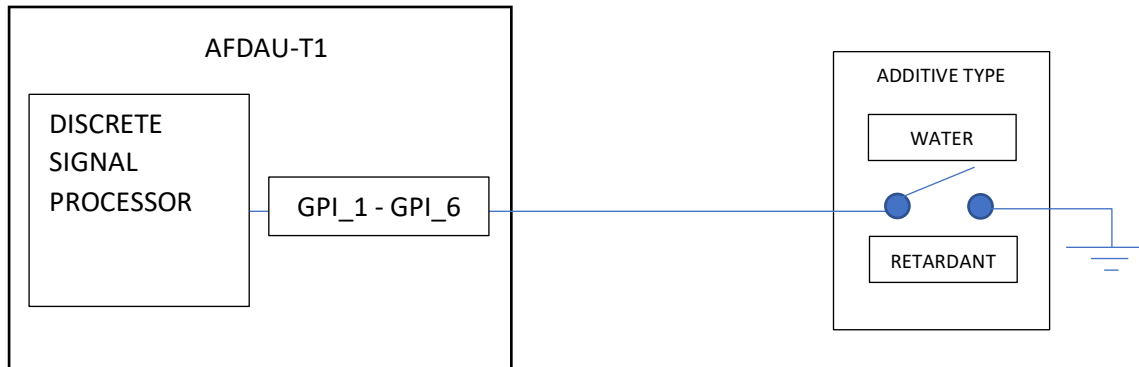
The premix selection will always be overwritten with FOAM or GEL if an Additive Pump On signal is detected, see sections 2.2.5 and 2.2.6.

2.2.5   Additive Select

When sending Fill and Drop Start messages to the connected modem, the AFDAU-T1 will also send details on the type of additive mixed with the water.

The AFDAU-T1 can be configured for a discrete switched signal that represents either a GEL or FOAM additive on one of either the 6 Relays or the 6 GPI inputs.

A typical configuration of this input is a pilot selectable, two position switch labelled GEL | FOAM.
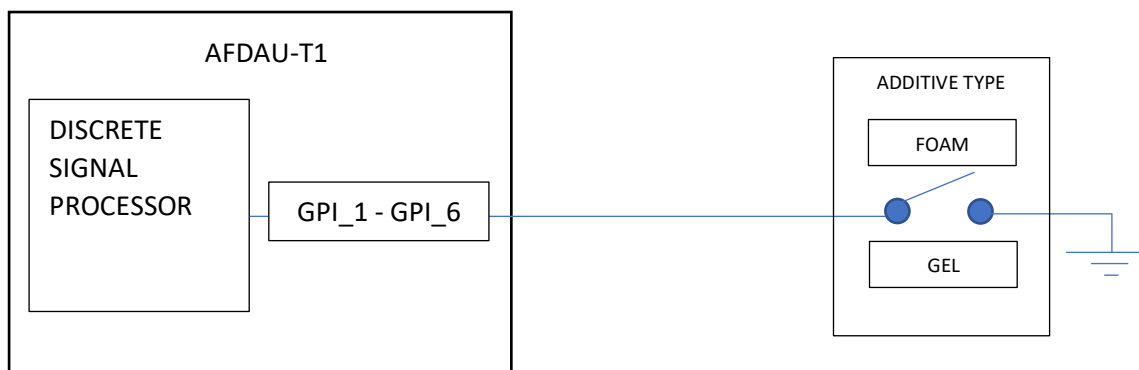
The AFDAU-T1 will always default to WATER or RETARDANT (as selected by the Premix Select discrete, see section 0) regardless of Additive Selection unless an Additive Pump On signal is detected, see section 2.2.6.

2.2.6   Additive Pump On

When sending Fill and Drop Start messages to the connected modem, the AFDAU-T1 will also send details on what type of additive mixed with the water.

The AFDAU-T1 can be configured for a discrete switched signal that tells the AFDAU-T1 to change from WATER type to the additive type selected by the Additive Select input (see section 2.2.5) on one of either the 6 Relays or the 6 GPI inputs.

A typical configuration of this input is connecting in parallel to the switched side of the additive inject switch.
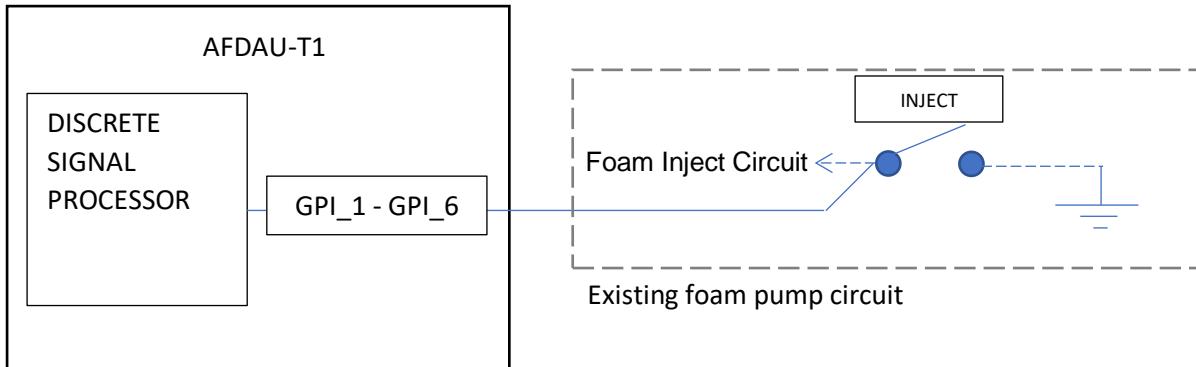

2.2.7 Container Select

When an airframe is configured for both a tank and bucket systems, the container select switch allows the pilot to change the AFDAU-T1's volume sensor inputs to report on events from the container type in use.

The AFDAU-T1 can be configured for a discrete switched signal that tells the AFDAU-T1 to change from TANK type to a BUCKET type container on one of either the 6 Relays or the 6 GPI inputs.

A typical configuration of this input is a pilot selectable, two position switch labelled BUCKET | TANK.
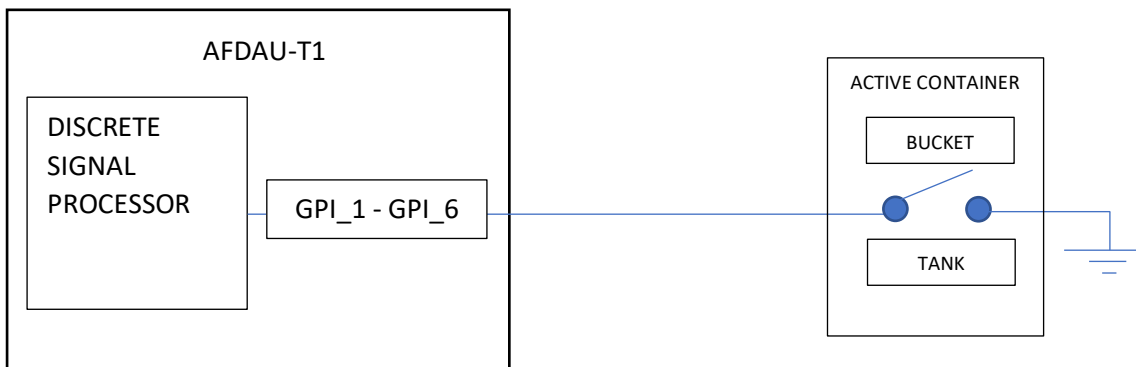
The default configuration when the input is not active is BUCKET type container.

CAUTION

FIXED WING AIRCRAFT <u>MUST LEAVE</u> THIS INPUT UNCONFIGURED, UNLESS OTHERWISE SPECIFIED IN AIRCRAFT SPECIFIC AFDAU-T1 INSTALLATION MATERIALS.

2.2.8 Landing Gear Stowed/Deployed

The AFDAU-T1 can be configured for a discrete switched signal that tells the AFDAU-T1 if the aircraft landing gear is STOWED or DEPLOYED on one of either the 6 Relays or the 6 GPI inputs.

The landing gear discrete is used to distinguish between float take-off and landings and normal take-off and landings for seaplanes.

Typically, this would be connected to an existing landing gear stowed indicator light or other electrical indication of landing gear position. Refer to section 2.3 for guidance on how to connect this input.
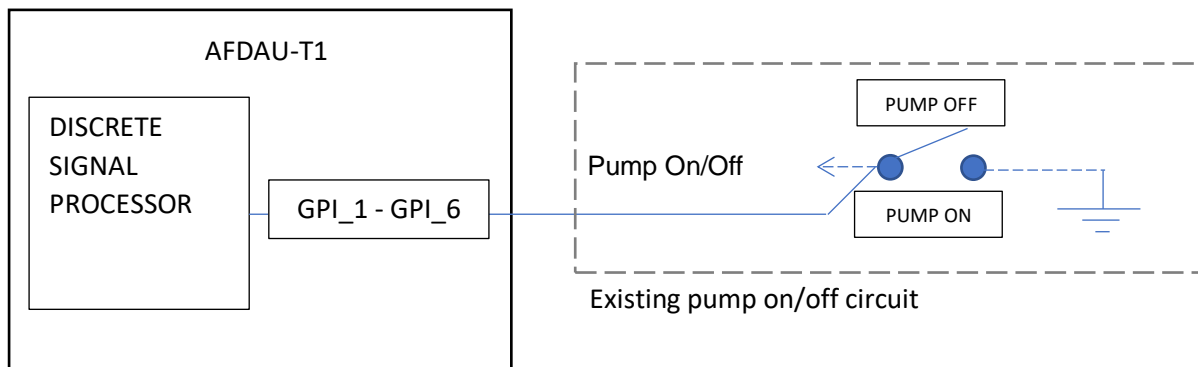
2.2.9 Pump On/Off

If interfaced to a tank pump on/off sensor, the AFDAU-T1 will process the signal and send a pump on or pump off event message to the connected modem.

The AFDAU-T1 can be configured for a discrete switched signal that tells the AFDAU-T1 if the tank fill pump is ON or OFF on one of either the 6 Relays or the 6 GPI inputs.

A typical configuration of this input is connecting in parallel to the switched side of the pump on/off.

	NOTE
(i)	**The AFDAU-T1 will produce Pump On/Off events for tanked aircraft only. While some buckets may be equipped with a pump for fast filling, the AFDAU-T1 does not currently generate Pump On/Off events for those systems.**

2.2.10 Container Volume

The AFDAU-T1 must be interfaced to a compatible volume sensor in order to detect and generate any fill and drop type event messages. When sending Fill Stop and Drop Stop event messages to the connected modem, the AFDAU-T1 will also send the volume of water either picked up or dropped during that event.

The AFDAU-T1 can be configured for and connected to the digital outputs of several different gauging systems, the current compatible systems are listed below:

Onboard Systems Load Cell w/ C39 Indicator

Pinouts		
AFDAU-T1 J1	**C39 Indicator J1**	Description
26	K	Serial Clock
8	J	Serial Data
21	L	Signal Return

Onboard Systems Load Cell w/ C40 Indicator

Pinouts		
AFDAU-T1 J1	**C40 Indicator J1**	Description
30*	J	RS232 TX
21*	P/GND	Aircraft Ground Bonding/EMI Ground

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 4 is shown above.

MSI Load Cell w/ MSI-150XM Indicator

Pinouts		
AFDAU-T1 J1	**150XM J2**	Description
8	C	Serial Data
21	D	Signal Return

MSI Load Cell w/ MSI-1 Indicator

Pinouts		
AFDAU-T1 J1	**MSI-1 P1**	Description
30*	10	TXD1
12*	9	RXD1
21*	7	SIGGND(PORT1)

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 4 is shown above.

Reabe Probe w/ Reabe Indicator

Pinouts		
AFDAU-T1 J1	**Reabe Ind. Remote/ Remote Output**	Description
30*	1	COM OUT
12*	2	COM IN
21*	4	GND

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 4 is shown above.

NOTE

The AFDAU-T1 is connected to the "Remote Output" connector on the Reabe remote indicator. If no remote indicator is installed, the AFDAU-T1 can be connected directly to the "Remote" connector on the Reabe main indicator.

Helitak Tank PLC

Pinouts		
AFDAU-T1 J1	**Helitak PLC Connector**	Description
30*	5	TXD
12*	4	RXD
21*	3	GND

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 4 is shown above.

NOTE

A Serial Comm module must be installed on the Helitak PLC. Refer to the Helitak manufacturer for more information.

2.2.11 Modems

For the AFDAU-T1 to be able to transmit event messages a modem must be connected. Various modems are supported as listed below and are connected to the AFDAU-T1 via any available RS232 port.

TracPlus RockAIR

Pinouts		
AFDAU-T1 J1	**RockAIR 4-Pin Conn.**	Description
28*	3	RS232 Tx
10*	4	RS232 Rx

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 2 is shown above.

TracPlus v2track

Pinouts		
AFDAU-T1 J1	**v2track 15-Pin D-Sub**	Description
28*	15	RS232 Tx
10*	8	RS232 Rx

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 2 is shown above.

Flightcell DZMx

	Pinouts		
AFDAU-T1 J1	**DZMx Civilian J1 (Primary)**	**DZMx Military J1**	Description
28*	12	44	Aux Data Tx
10*	13	45	Aux Data Rx
21*	25	37	Chassis Gnd

* RS232 Ports 1-4 may be used of the AFDAU-T1. Port 2 is shown above.

CAUTION
THE AFDAU-T1 IS SUPPORTED ON PLATFORM 3 AND 4 OF THE DZMX ONLY. CONTACT FLIGHTCELL FOR MORE INFORMATION.

2.3 Discrete Sensors

2.3.1 Overview

The AFDAU-T1 provides 12 inputs for discrete sensor connections, 6 of these being internal relays and 6 being ground seeking general purpose inputs. These inputs can be configured as various airframe and firefighting equipment inputs using the AFDAU Configuration Tool.

The following discrete sensors can be connected to the discrete inputs of the AFDAU-T1

- Engine Start/Stop Switch

- Take-off/Landing

- Container Door Open

- Additive Inject Pump On/Off

- Additive Select

- Premix Select

- Container Select

- Landing Gear Stowed/Deployed

- Tank Pump On/Off

2.3.2 Relays

Six relays, K1 through to K6 are provided for connection of discrete sensors and it is up to the installer to determine the suitability of using the relays as opposed to the General Purpose Inputs (GPI's, see below) for each discrete sensor's case. Each relay coil is presented on the AFDAU-T1's Main D37 Pin connector and features a diode in parallel across the coil and another in series with the ground pin. It is important during installation that the polarity of the relay pins is observed wired up correctly.

There are two ways in which to use the relays, by switching the ground pin or by switching the power pin as demonstrated below:

EXAMPLE: GROUND SWITCHED RELAY
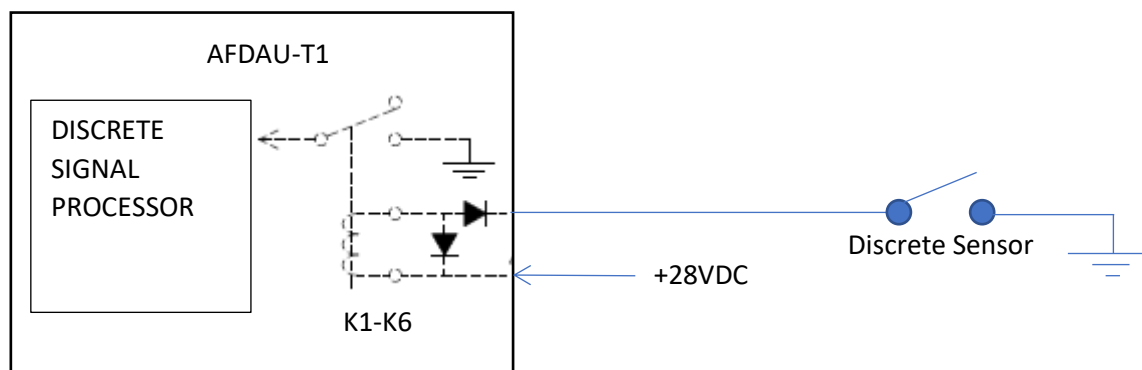
EXAMPLE: POWER SWITCHED RELAY
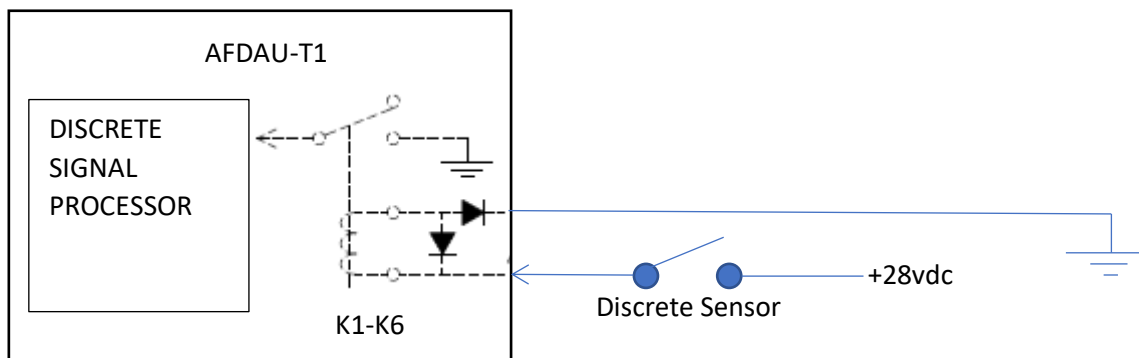
Relay Connection Pinouts

Main Connector (J1) Relay Pins						Description
K1	**K2**	**K3**	**K4**	**K5**	**K6**	
32	33	34	35	36	37	+28VDC Input
14	15	16	17	18	19	Ground

	CAUTION
⚠️	**CARE MUST BE TAKEN TO ENSURE THAT WHEN A RELAY IS CONNECTED IN PARALLEL TO AN EXISTING CIRCUIT THAT IT IN NO WAY INTERFERES WITH THAT CIRCUIT.**

	NOTE
ℹ️	**A common problem amongst some tracking hardware manufacturers when wiring up a discrete input to a warning light circuit is that a high voltage (14/28VDC) represents an OFF condition, i.e. MGB Oil Pressure light is ON meaning the engine is OFF. During power on the light voltage raises from LOW (0 VDC) to HIGH (14/28VDC) and is falsely detected as an Engine OFF event. The AFDAU-T1 does not suffer this issue and handles this problem through its firmware. No additional circuitry or relays are required, and using an internal relay provided in the AFDAU-T1 is sufficient.**

2.3.3 General Purpose Inputs

Six general purpose inputs, GPI_1 through GPI_6, are provided for connection of discrete sensors that provide a ground when actuated.

EXAMPLE: GROUND SWITCHED GPI
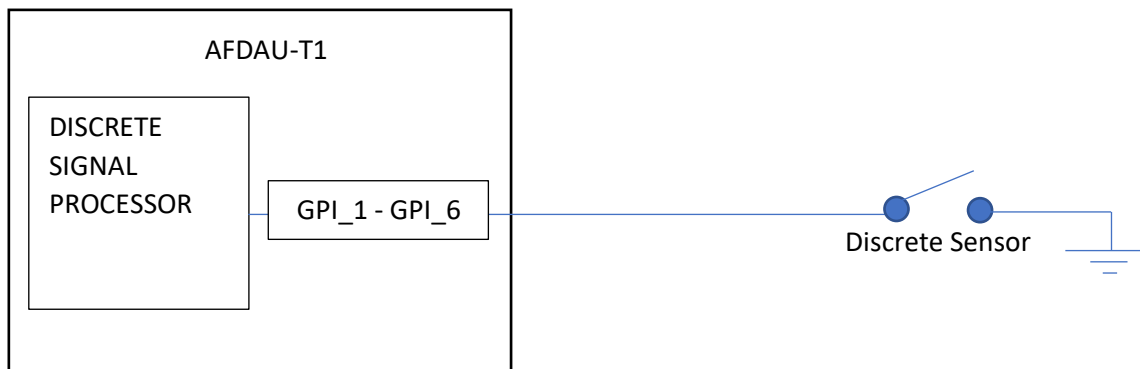
EXAMPLE: RELAY CIRCUIT IN PARALLEL W/ GPI

Existing relay circuit
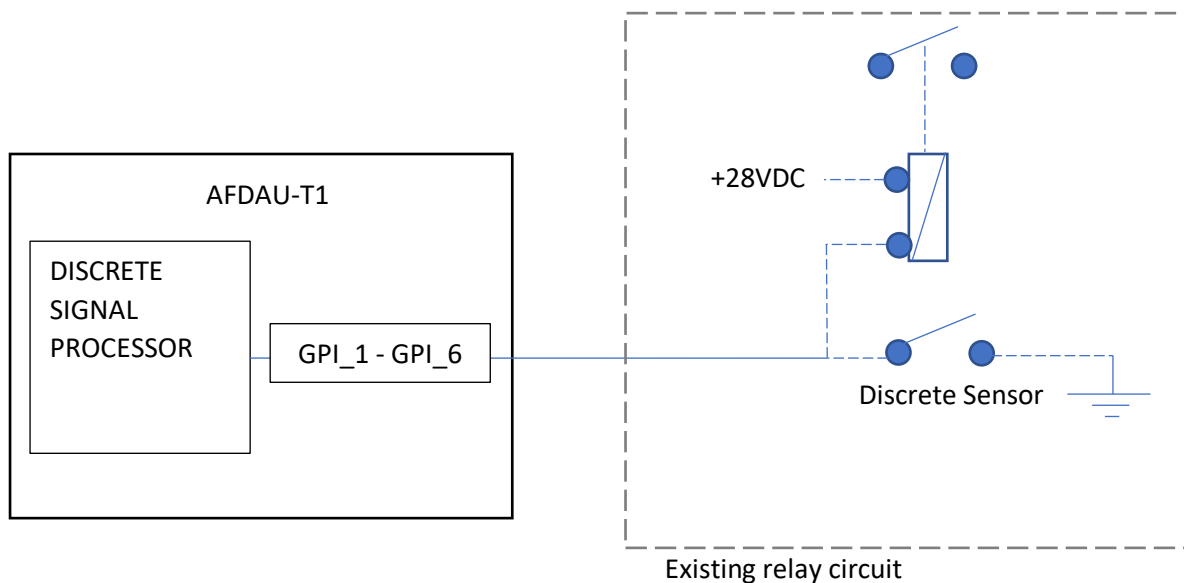
GPI Connection Pinouts
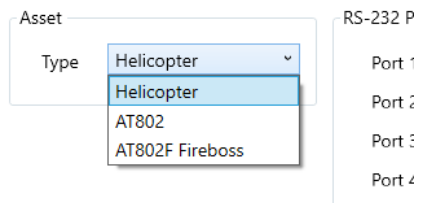
Main Connector (J1) GPI Pins						Description
GPI_1	**GPI_2**	**GPI_3**	**GPI_4**	**GPI_5**	**GPI_6**	
2	3	4	5	6	7	Switch to Ground

3 Configuration Overview
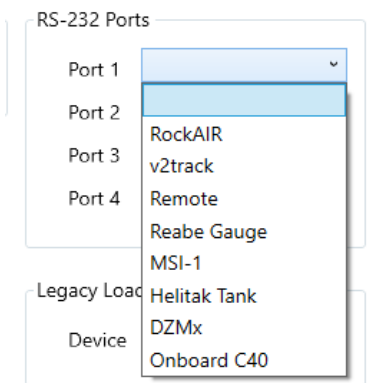
3.1 Asset Type

The Asset Type configuration item (applicable to firmware version 1.2 and above, and AFDAU Config Tool version 0.6 and above) selects a profile for tuning the AFDAU-T1 to the specific airframe type. This configuration enables or disables the Hover Entry/Exit event type and tunes the Fill and Drop event detection algorithm. For an in depth description of various sensors and interfaces see Section 2.2.

Asset Type	Description
Helicopter	This setting is applicable to installations in: • All Helicopters
AT802	This setting is applicable to installations in: • Air Tractor AT-802 • PZL-Mielec M-18 Dromader • All other non-listed fixed-wing aircraft
AT802F	This setting is applicable to installations in: • Air Tractor AT-802F Fireboss aircraft.

3.2 RS-232 Ports
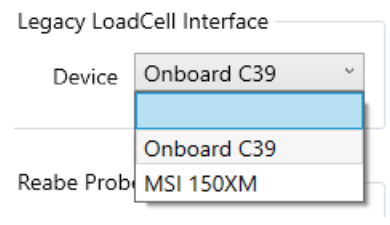
The four RS-232 ports can be configured with the following protocols to allow communication to external devices. For an in-depth description of various sensors and interfaces see Section 2.2.

Protocol	Description
RockAIR	Modem communication protocol for interfacing to TracPlus/Rock7 RockAIR devices. Provides the following data: • Delivery of AFDAU-T1 event messages • GPS position
v2track	Modem communication protocol for interfacing to the v2track modem. Provides the following data: • Delivery of AFDAU-T1 event messages • GPS position
DZMx	Modem communication protocol for interfacing to the Flightcell DZMx. Provides the following data: • Delivery of AFDAU-T1 event messages • GPS position
Remote	Do not configure
Reabe Gauge	Volume communication protocol for interfacing to Reabe Main and Remote indicators. Provides the following data: • Container volume

MSI-1	Volume communication protocol for interfacing to Ricelakes MSI-1 loadcell indicators. Provides the following functionality: • Container volume
Helitak Tank	Volume communication protocol for interfacing to the Helitak Tank PLC. Provides the following data: • Container volume • Pump on/off • Door open/closed • Additive inject • Additive select • Premix select
Onboard C40	Volume communication protocol for interfacing to the Onboard Systems C40 loadcell indicator. Provides the following data: • Container volume

3.3 Legacy Loadcell Interface

This setting configures the legacy loadcell interface to allow communication with several Loadcell indicators.

Interface	Description	
Onboard C39	Provides the following data: • Container volume	
MSI 150XM	Provides the following data: • Container volume	

3.4 Reabe Probe Offset

Field	Description	
Reabe Probe Offset	When the AFDAU-T1 is connected to and configured for a Reabe probe system, this field allows for a fine tuning of the reported value based on any un-gaugeable quantity of the probe.	

<table>
<tr><td rowspan="2">⚠</td><td align="center"><u>CAUTION</u></td></tr>
<tr><td align="center">THIS OFFSET VALUE IS FOR FINE TUNING ONLY AND IS NOT A COMPENSATION FOR AN INCORRECTLY OR UNCALIBRATED REABE PROBE SYSTEM. INPUTING LARGE VALUES (TYPICALLY ABOVE 500 LITRES) WILL ADVERSELY AFFECT THE ACCUARCY OF VOLUMES IN EVENT REPORTS.</td></tr>
</table>

3.5 Airframe Inputs

Airframe inputs can be configured to either of the 6 relays (K1-K6) general purpose inputs (GPI1-GPI6). For an in-depth description of various sensors and interfaces see Section 2.2.

Invert

Inverts the sense of the discrete input. For example: A normally low signal provides an active 'Engine On' signal, by selecting Invert, this would now be an 'Engine Off' signal.

Debounce

This value determines how long a discrete input must be stable for, before passing the change of state on to the AFDAU for processing. This prevents multiple event messages being created due to 'bouncing' or noisy sensor contacts. These values are expressed as microseconds.

Increasing the Debounce value reduces change sensitivity and increase time to detection of an event. Reducing the Debounce value increases change sensitivity and reduces time to detection of an event.

Debounce values are pre-configured and typically changes to these values are not required.

Airframe Input	Description
Engine On	Refer Section 2.2.1 Detects Engine On/Off events.
Airborne	Refer Section 2.2.2 Detects Takeoff/Landing events. Typically connected to: • Squat switch, or • Airspeed switch
Bucket Door Open	Refer Section 2.2.3 Detects Bucket Door Open command from pilot. Connects to: • Bucket drop switch, or • Bucket "Open" side of Open/Close switch
Tank Door Open	Refer Section 2.2.3 Detects Tank Door Open command from pilot. Connects to: • Hopper (Fixed-Wing) drop switch or door proximity switch or, • Tank (Helicopter) drop switch *Note: Input is not required when AFDAU-T1 is interfaced to a Helitak Tank.*
Bucket Additive Inject	Refer Section 2.2.6 Detects Additive Inject command from pilot. Connects to: • Foam or Gel Inject switch for bucket additive inject system
Tank Additive Inject	Refer Section 2.2.6 Detects Additive Inject command from Pilot. Connects to: • Hopper (Fixed-Wing) Foam or Gel inject switch or,

Airframe Inputs

Name	Input	Invert	Debounce
Engine On	NONE ⌄	☐	2000
Airborne	NONE ⌄	☐	2000
Bucket Door Open	NONE ⌄	☐	0
Tank Door Open	NONE ⌄	☐	0
Bucket Additive Inject	NONE ⌄	☐	0
Tank Additive Inject	NONE ⌄	☐	0
Additive Select	NONE ⌄	☐	2000
Premix Select	NONE ⌄	☐	2000
Container Type	NONE ⌄	☐	2000
Landing Gear Up	NONE ⌄	☐	2000
Pump On	NONE ⌄	☐	2000

	• Tank (Helicopter) Foam or Gel Inject Switch *Note: Input is not required when AFDAU-T1 is interface to a Helitak Tank.*
Additive Select	Refer Section 2.2.5 Detects Foam or Gel as product type for injection. Connects to: • Foam/Gel select switch, or: • Always Foam – Leave unconfigured. • Always Gel – Permanently ground GPI pin and configure for Additive Select. *Note: For dual Bucket and Tank systems found on Helicopters – this selection determines the product type for both containers.*
Premix Select	Refer Section 2.2.4 Detects Water or Premixed Retardant as the product type being loaded into container. Connects to: • Water/Retardant select switch, or: • Always Water – Leave unconfigured. • Always Retardant – Permanently ground GPI pin and configure for Premix Select. *Note: For dual Bucket and Tank systems found on Helicopters – this selection determines the product type loaded for both containers.*
Container Type	Refer Section 2.2.7 For dual Bucket and Tank systems found on Helicopters – this selection determines which container the AFDAU-T1 will report Fill and Drop Events on. Connect to: • Bucket/Tank select switch, or: • Always Bucket – Leave configured. • Always Tank – Permanently ground GPI pin and configure for Container Type *Note: For fixed-wing aircraft always leave this airframe input UNCONFIGURED.*
Landing Gear Up	Refer Section 2.2.8 Float-plane type aircraft only
Pump On	Refer Section 2.2.9 Detects tank pump on command from pilot. Connects to: • Tank system Pump On/Off switch

4 Installation Procedures

4.1 Incoming Inspection

Carefully unpack and inspect the received equipment. The items listed in Table 1 should be present. Report any damaged items to the carrier involved. Report any shortage to your supplier.

Table 1 - AFDAU T-1 Standard Kit

Items	Part Number
AFDAU-T1 Data Acquisition Unit	231-001
Installation Kit	231-001-A
Installation and Operation Manual	AMS-IM-1-01

Inspect the contents of the installation kit. The items listed in should be present. Report any damaged items to the carrier involved. Report any shortage to your supplier.

Table 2 - AFDAU T-1 Installation Kit

Items	Part Number
D-Subminiature Connector, Female, 37 Pin	M24308/2-4F
Backshell, D-Sub, 37 Pin	970-037-010R011
USB 2.0 A to USB Mini B Cable	182-8490

4.2 Standard Procedures

Installation is to be carried out in accordance with the instructions included in this manual, or later revision. AMS accepts no liability arising from installations deviating from the installation described herein.

Unless otherwise stated, adhere to the standard practices described in FAA AC 43.13-1B, Acceptable Methods Techniques, and Practices – Aircraft Inspection and Repair, Change 1, dated 8 September 1998.

Installation approval is the responsibility of the end user.

4.3 Structural Installation

The AFDAU-T1 can be installed in any location in the aircraft suitable for its mass and mounting requirements. Consideration should be given to locating the unit such that the power and status lights are visible, and the USB port is accessible, during maintenance.

	NOTE
	Locations subject to direct or accumulated contact with water are to be avoided. To minimise the possibility of water ingress where moisture may pool, avoid placing the AFDAU with the USB or Main Connector port facing upward.

4.4 Wiring Installation

All wiring is to be completed in accordance with the notes and diagrams contained in Section 10 of this manual.

4.5 Post Installation Procedures

4.5.1 Wiring Inspection

1. Inspect all wiring and terminals to ensure security and attachment.

2. Check wiring for correct polarity and terminated to correct pins of the main connector.

4.5.2 Power-on Checks

1. Apply power to the unit and ensure the green POWER LED on top of the unit is on solid.

2. Ensure the amber STATUS LED on top of the unit is flashing steadily.

4.5.3 Configuration

1. If the modem is a RockAIR, carry out configuration of the RockAIR as per Section 5.5.

2. If the modem is a v2track, contact TracPlus to ensure the device is configured to communicate with the AFDAU-T1.

3. If the modem is a DZMx, carry out configuration of the DZMx as per Section 5.6.

4. Check for the latest version of AFDAU-T1 firmware and, if required, carry out a firmware update per Section 5.3 (See Section 5 for PC Configuration Tool instructions).

5. Carry out configuration of AFDAU-T1 per Section 5.4.

4.5.4 Functional Checks

Discrete Sensors

1. While monitoring the AFDAU-T1 Diagnostics Tool, actuate each configured discrete sensor and ensure their respective states are displayed.

2. If any states are actuating in reverse, invert the input in the Configuration Tool and try step 1 again.

Volume Sensors

3. Ensure that the volume readout of the AFDAU-T1 Diagnostics Tool matches the value on the volume gauging system display.

    a. For a Reabe Probe system move the ball up and down the length of the probe rod and ensure that the Volume value on the Diagnostics Tool moves and matches the value on the Reabe cockpit and/or remote gauge.

    b. For a load cell type system either put a weight on the hook or temporarily disconnect the load cell at the bulkhead connector and typically the weight value will start to move erratically or increase to a large number. Ensure that any changes in weight are displaying on the Diagnostics Tool (negative values on an MSI gauge will read as a zero in the Diagnostics Tool).

    c. Bucket and tank equipped rotary-wing aircraft only: Select TANK on the Container Select Switch and ensure the volume reading changes to follow the tank volume sensor. Actuate the tank controls such as container door open and additive selects and pumps to ensure that the fields track the selected container and operate correctly and in the correct sense.

Modem

4. Under the Modem heading in the Diagnostics Tool ensure a Latitude and Longitude are displayed and check to ensure they make sense for your current location. (Expect large inaccuracies if carrying out checks inside a hangar, a clear view of the sky may be required if unable to acquire position).

NOTE

Once you have reached this point you have fully verified the proper installation and configuration of the AFDAU-T1. The following functional checks are optional and are used verify the end-to-end functionality of the event reporting system and may detect issues unrelated to the installation.

<u>Event Reporting (Optional)</u>

5. Monitoring the aircraft in the TracPlus Pro 3 (TPP3) mapping software and with the aircraft powered and stationary:

    a. Actuate the engine sensor for more than 2 seconds to generate an "Engine On" event in TPP3.

    b. Release the engine sensor to generate an "Engine Off" event in TPP3.

    c. Actuate the airborne sensor for more than 2 seconds to generate a "Take-Off" event in TPP3 and for more than 10 seconds to generate a "Hover Start" event (helicopters only). It is not possible to generate a "Hover Stop" event on the ground however a successful hover start indication is sufficient to verify functionality.

    d. Release the airborne sensor to generate a "Landing" event in TPP3.

NOTE

It is possible, but can be difficult, to simulate fill, drop start and drop stop events on the ground. The following procedure is general and applicable to all types of volume sensors however it is impractical for load cell type sensors without additional hardware. AMS does NOT recommend suspending loads from the aircraft cargo hook for the purposes of testing the AFDAU-T1 installation.

---

    e. Increase the volume reported by the volume sensor by a significant amount (to guarantee an event an increase of >400 L (kg) is recommended) and hold to generate a "Fill" event in TPP3.

        i. For a Reabe probe system this can be achieved by accessing the aircraft hopper and lifting the Reabe probe float to the top of the tank and holding it there.

    f. Actuate the container door sensor and, within 10 seconds, reduce the volume reported by the volume sensor by a significant amount to generate "Drop Start" and "Drop Stop" events in TPP3.

NOTE

Simply actuating the container door sensor does not generate a drop event. Drop events are generated by the combination of a container door open signal and a significant decrease in volume.

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5 Configuration and Firmware Update

5.1 Requirements

The following equipment is required to configure or update the firmware of the AFDAU-T1:

- AFDAU-T1 unit connected to power.

- USB A to USB Mini B Cable (supplied with installation kit).

- Computer running Windows 10 or later operating system (see note below) with AFDAU Config Tool installed.

	CAUTION
⚠️	**A PC RUNNING WINDOWS 10 OR LATER OPERATING SYSTEM IS REQUIRED TO INTERFACE WITH THE AFDAU-T1.**

5.2 Installing the AFDAU Config Tool
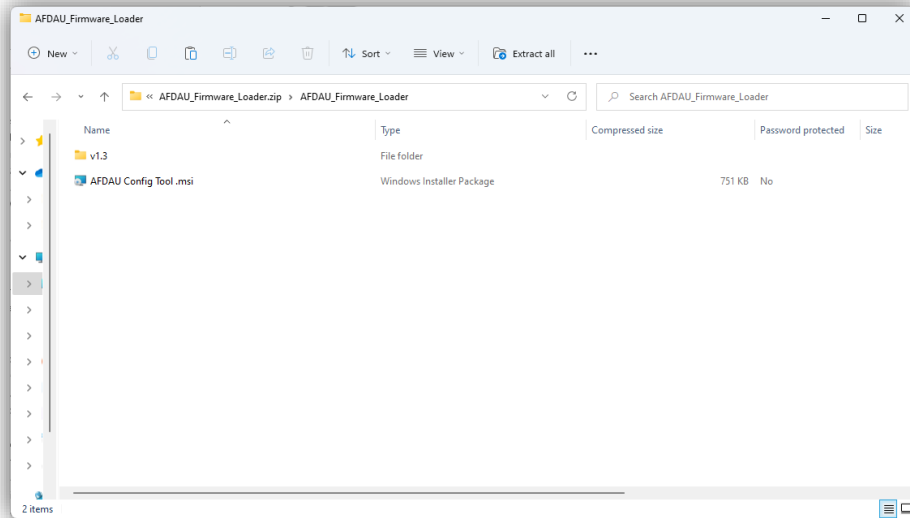
1. Locate and run the "AFDAU Config Tool" windows installer. 2. If a prompt appears asking if you want to allow access to an app from an unknown publisher select yes from the options. Wait for the installation to complete.	3. Run the tool to verify installation. Search AFDAU Config Tool in the start bar and select AFDAU Config Tool from the menu.
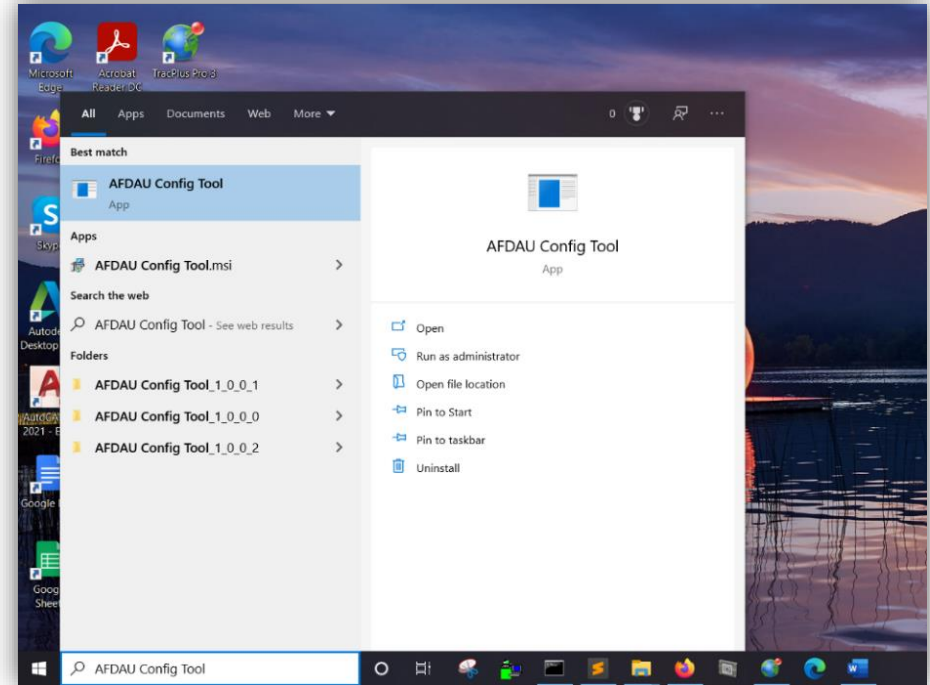
5.3 Updating the AFDAU-T1 Firmware
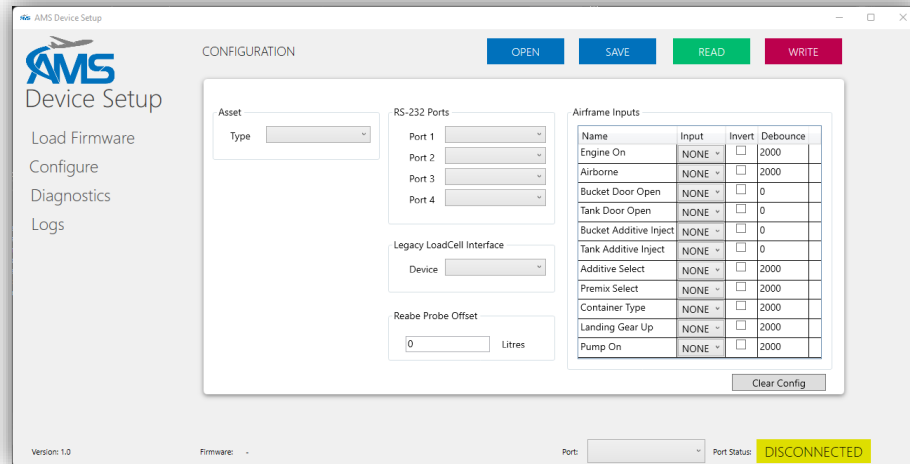
1. Firmware is loaded onto the AFDAU-T1 using the AFDAU Config Tool. Run the AFDAU Config Tool. 2. Click the "Load Firmware" menu item found on the left of the program underneath the AMS logo.	3. Plug the Mini USB end of the supplied USB lead into the powered AFDAU-T1 and the standard USB end into a port on your laptop. 4. When detected, the AFDAU-T1 port will be available in the dropdown box at the bottom of the page as shown above. 5. Select the AFDAU port from the list (COM port number may vary to that shown).
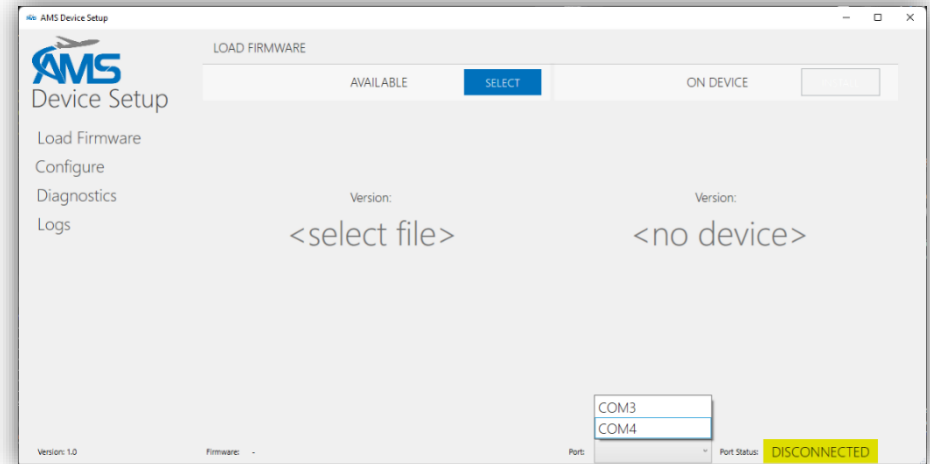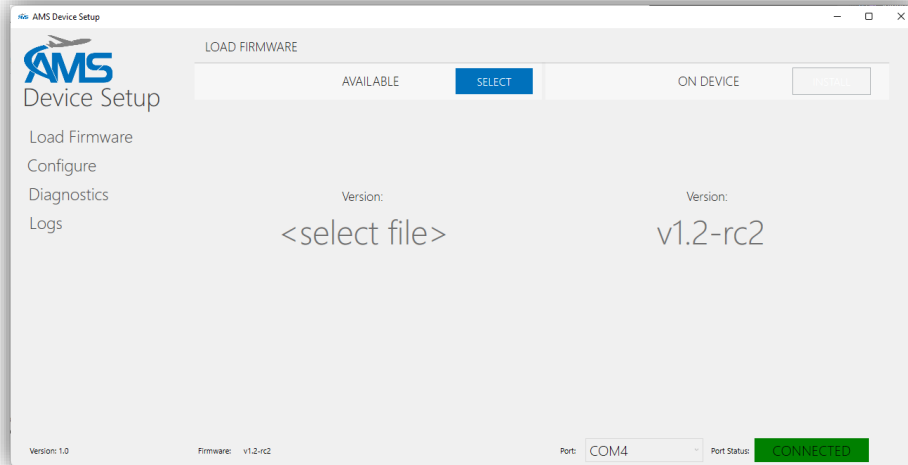
6. Once connected, the port status bar will change to a green CONNECTED message and the ON DEVICE Version will change from <no device> to the firmware level currently on the unit.	7. Click the blue "SELECT" button and locate and open the "firmware.afdau" file that you have been given or that you have downloaded.
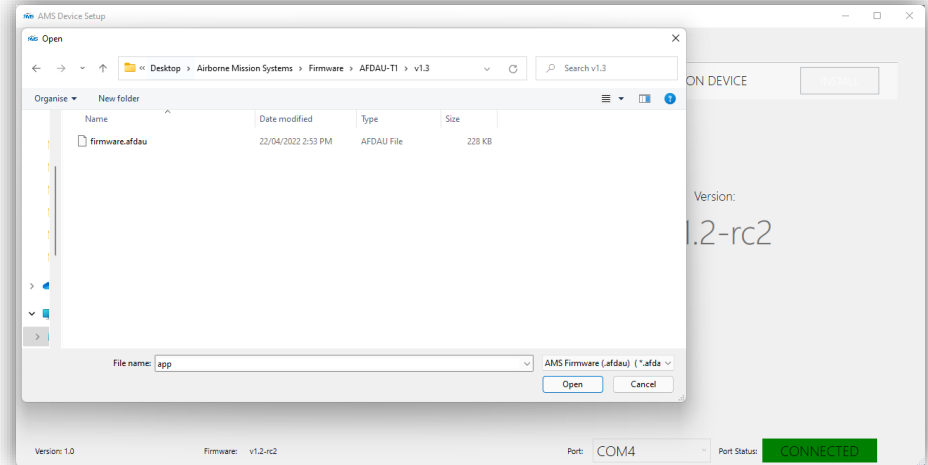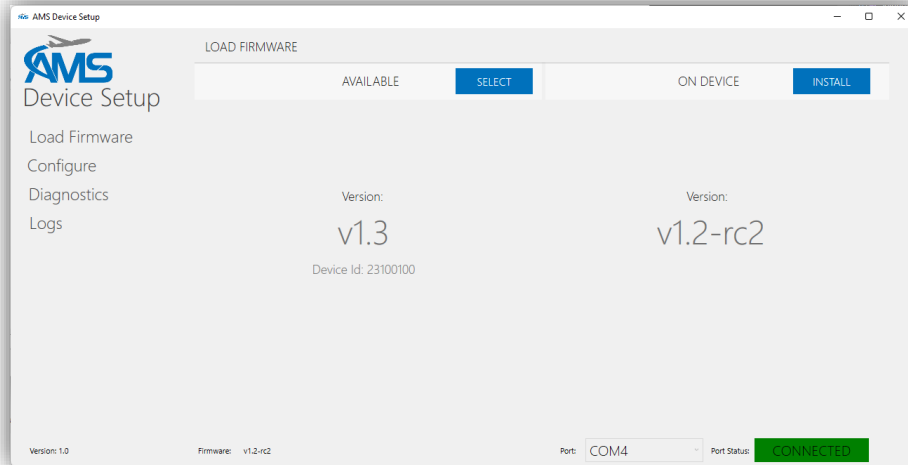
8. Once you have opened the "firmware.afdau" file, the AVAILABLE Version will change from <select file> to the firmware level contained in the selected file and a blue "INSTALL" button will appear on the right hand side of the config tool window.
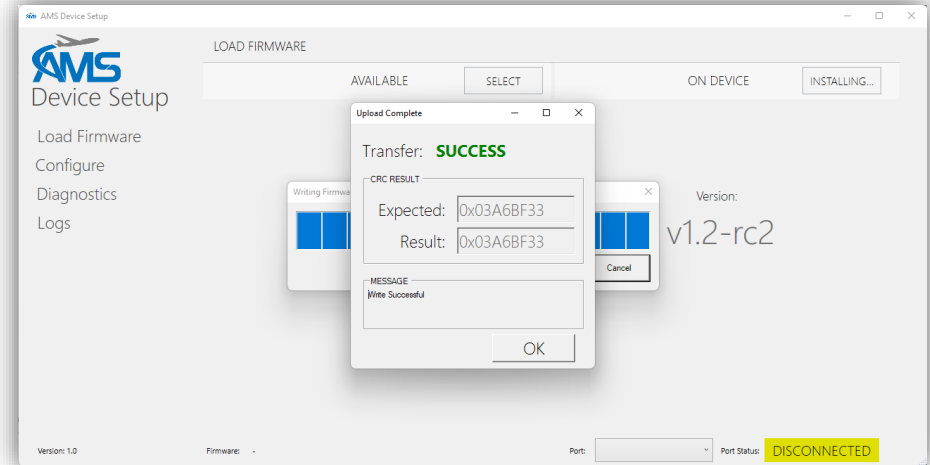
9. Click the "INSTALL" button to start the firmware load.

10. A progress bar will appear in the centre of the screen. Wait for the firmware load to complete. The red light on the AFDAU will flash faster to indicate a transfer of data.

11. Once the firmware has loaded, a box will appear telling you your upload was successful. Click OK to continue. The AFDAU will reboot. The red light on the AFDAU will be solid during the reboot.

5.4 Configuring the AFDAU-T1
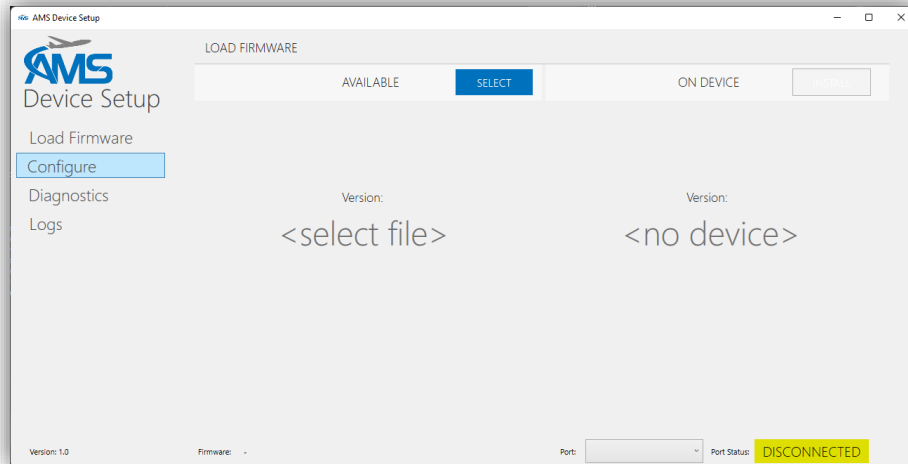
1. Configuration of the AFDAU-T1 is done using AFDAU Config Tool. Run the AFDAU Config Tool. 2. Click the "Configure" menu item found on the left of the program underneath the AMS logo.	3. Plug the Mini USB end of the supplied USB lead into the powered AFDAU-T1 and the standard USB end into a port on your laptop. 4. When detected, the AFDAU-T1 port will be available in the dropdown box at the bottom of the page as shown above. 5. Select the AFDAU port from the list (COM port number may vary to that shown).
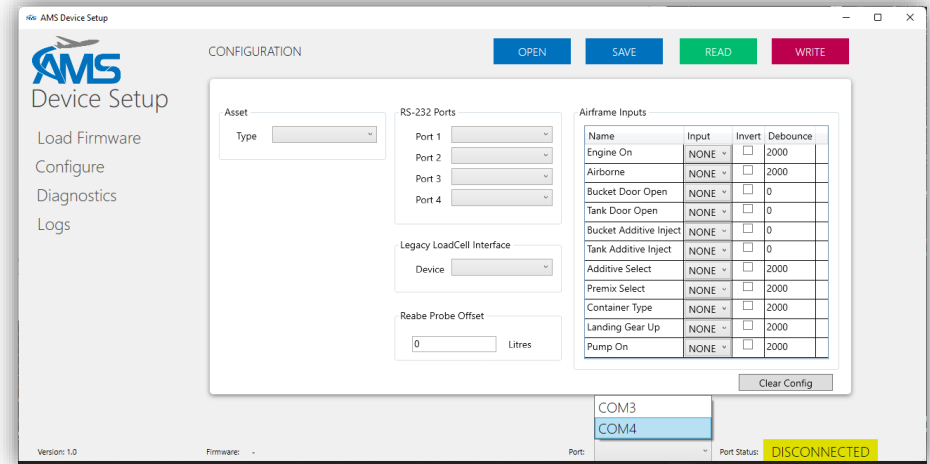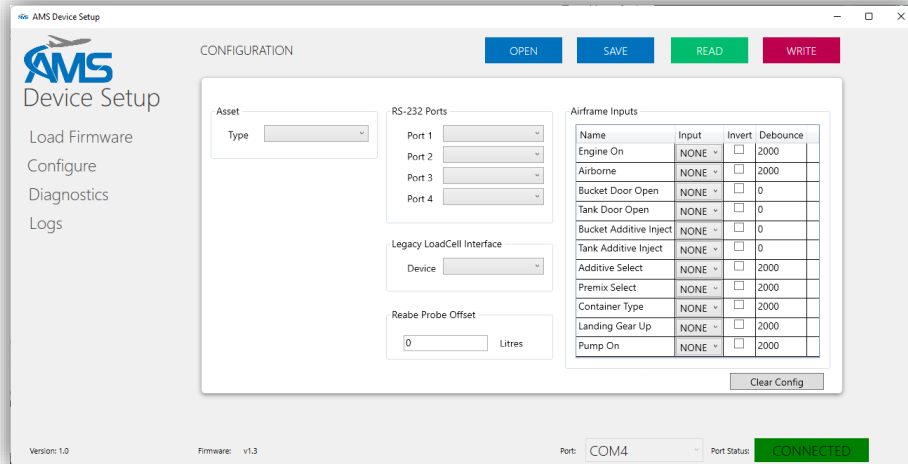
6. Once connected, the port status bar will change to a green CONNECTED message and the current firmware version of the connected unit appears at the bottom of the window.

7. You can read the existing configuration from the connected unit, load a previously saved ".cfg" file or use the dropdown fields to set the configuration as required to match your installation.
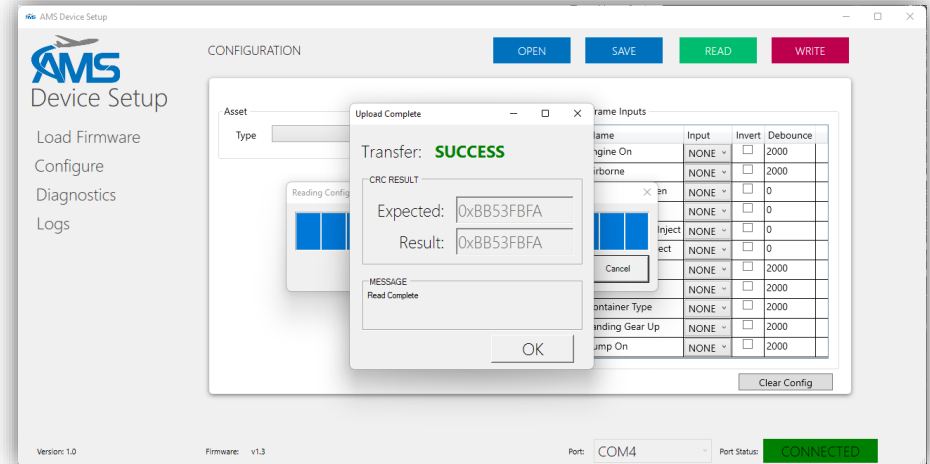
8. To read the configuration from the connected unit, click the green "READ" button. A progress bar will appear, followed by a dialog box telling you the read was successful (or not).

9. Click OK and the configuration fields will be populated with the current configuration on the connected AFDAU.
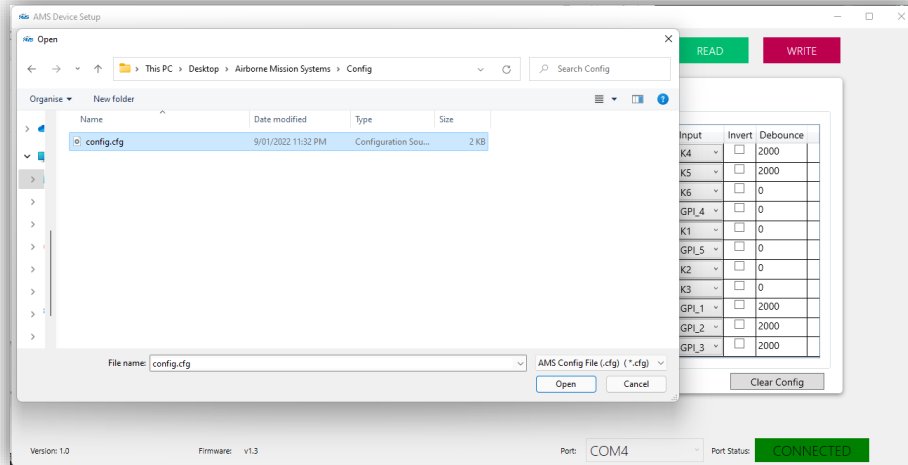
10. To load a previously saved configuration file, click the blue "OPEN" button and select the desired ".cfg" file.

11. Click OK and the configuration fields will be populated with the configuration contained in the opened file.
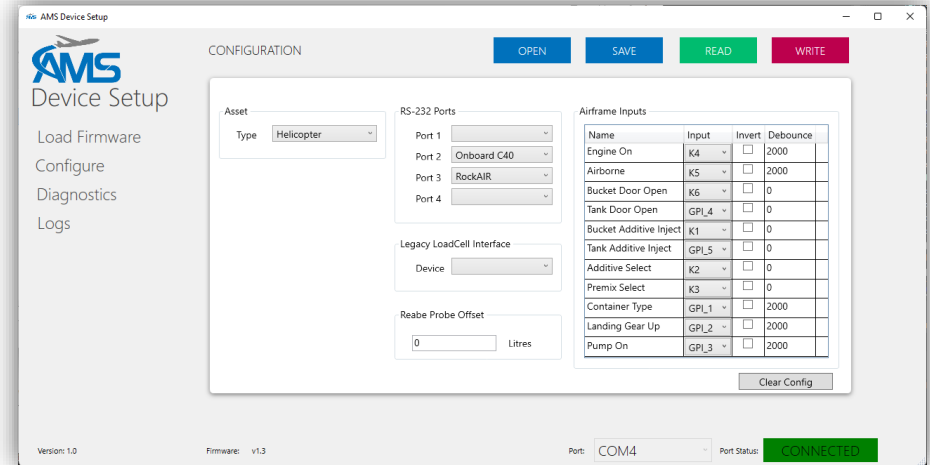
12. Otherwise, manually fill out the configuration fields. Refer to Section 3 for more information about each configuration field.

13. To reset the configuration fields and start again, click the "Clear Config" button. Note this button does not affect the connected unit, no changes will be made to the connected unit's configuration unless they are written to the unit using the red "WRITE" button.

14. To save the current state of the populated fields, use the blue "SAVE" button.

15. Click the "WRITE" button to write the configuration to the connected device.

16. A progress bar will appear in the centre of the screen. Wait for the config load to complete. The red light on the AFDAU will flash faster to indicate a transfer of data.

17. Once the configuration has loaded, a box will appear telling you your upload was successful. Click OK to continue. The AFDAU will reboot. The red light on the AFDAU will be solid during the reboot.

5.5 Configuring the RockAIR

Download the TP Connect app and connect to your RockAIR. Refer to RockAIR Owner's Manual for details.

Check the firmware level:

1. Select "About" and compare the firmware version listed under "Device Firmware" with the latest RockAIR firmware on the TracPlus website:

2. https://tracplus.freshdesk.com/support/solutions/articles/44001752993-updating-firmware-on-a-rockair

3. If the firmware listed is different from the latest firmware available on the website, carry out an update per the instructions on the website.

	CAUTION
⚠️	**IF THE FIRMWARE VERSION OF THE ROCKAIR BEFORE UPDATING WAS 03.04.16 OR EARLIER, THE ROCKAIR SD CARD MUST BE FORMATED AFTER UPDATING TO THE LATEST FIRMWARE VERSION.**

Configure the device:

1. Navigate to the Configure tab and select Custom from the options.

2. Enter your TracPlus assigned pin as prompted.

3. Expand the External Data entry and configure as shown

   - MOB Watcher – Off

   - Serial Mode – Serial API

   - Baud Rate – 9600

   - Sample Rate – 5 sec

4. Wait until the entries change (can take a few seconds) to confirm configuration has been correctly set.
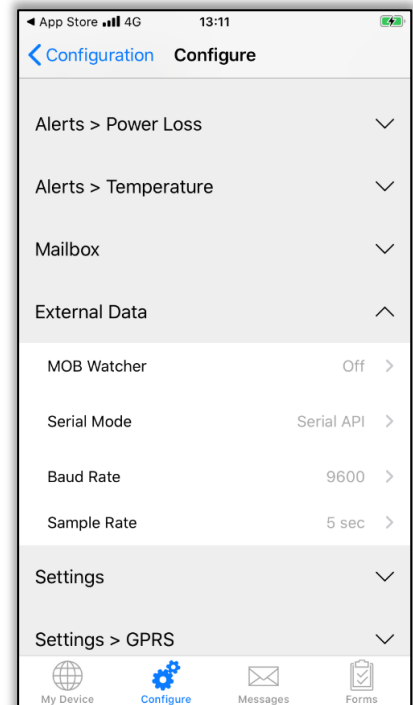
5.6 Configuring the DZMx

Check the hardware/firmware level:

1. The DZMx must conform to one of the configurations listed below to be compatible with the AFDAU-T1.

Hardware	Firmware
DZMx Platform 3	v3.8 or later
DZMx Platform 4	v4.8 or later

Configure the device:

1. The DZMx can be configured via the menus on the unit or via the DZMx Manager. Instructions for using the DZMx Manager can be found in the DZMx Installation Manual.

2. To configure via the unit menus:

    a. Press MENU > Hardware Config > Installer Menu Enable > (Enter Installer Pin)

    b. Press MENU > Hardware Config > Debug Port Config > (Select AFDAU)

3. To configure via the DZMx Manager:

    a. Login > Authenticate as Installer

    b. Settings > Hardware > External > Debug Port Config > (Select AFDAU)

5.7 Configuring the MSI-1 Indicator

The MSI-1 may not be configured by default to output serial data on Port 1. Consult the manufacturer and any applicable airworthiness authority for approval to change the configuration of this device.

6 Event Log Download

6.1 Requirements

The following equipment is required to download event logs from the AFDAU-T1:

- AFDAU-T1 unit connected to power.

- USB A to USB Mini B Cable (supplied with installation kit).

- Device running Windows 10 or later operating system (see note below) with AFDAU Config Tool installed.

<table>
<tr><td rowspan="2">⚠️</td><td><u>CAUTION</u></td></tr>
<tr><td>A DEVICE RUNNING WINDOWS 10 OR LATER OPERATING SYSTEM IS REQUIRED TO INTERFACE WITH THE AFDAU-T1.</td></tr>
</table>

6.2 Downloading Logs From the AFDAU
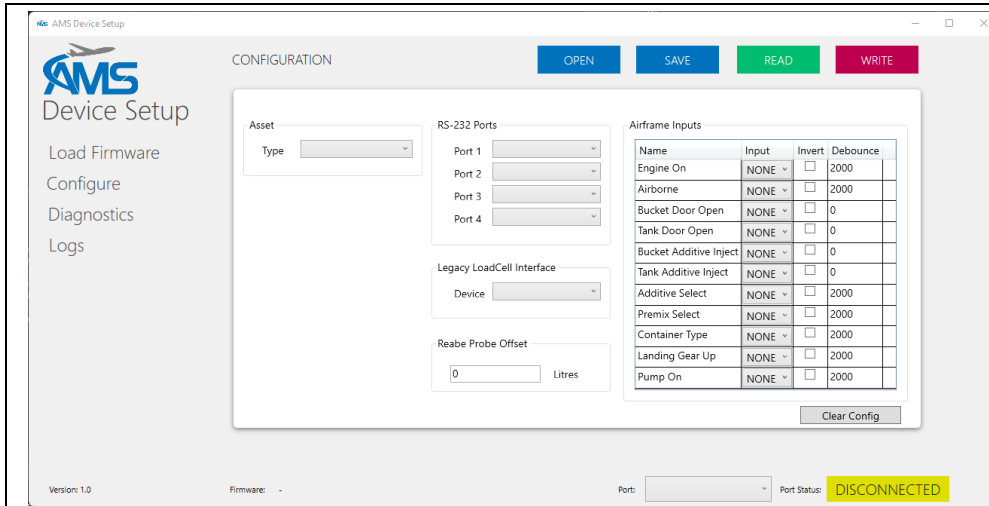
1. Logs can be downloaded from the AFDAU-T1 using the AFDAU Config Tool. Run the AFDAU Config Tool.	2. Plug the Mini USB end of the supplied USB lead into the powered AFDAU-T1 and the standard USB end into a port on your laptop. 3. When detected, the AFDAU-T1 port will be available in the dropdown box at the bottom of the page as shown above. 4. Select the AFDAU port from the list (COM port number may vary to that shown).
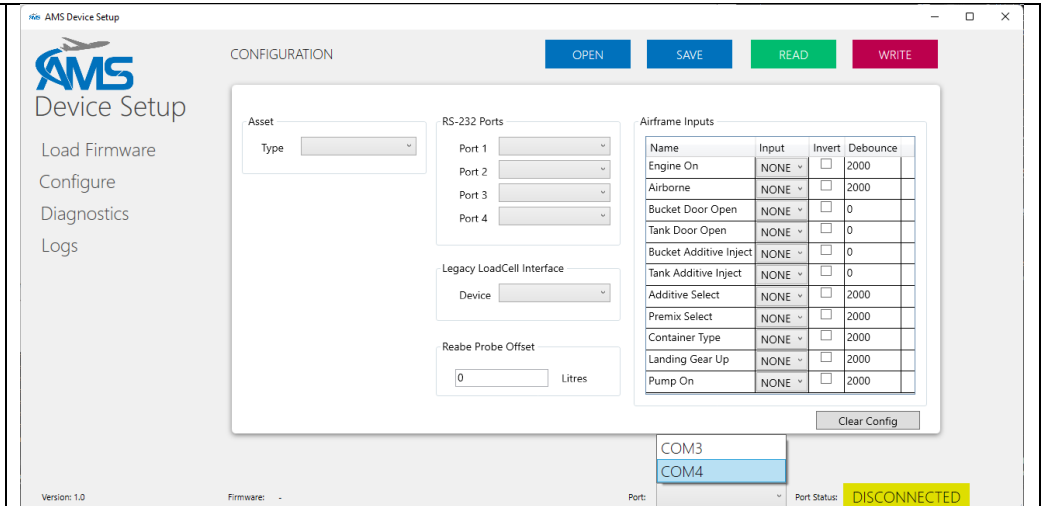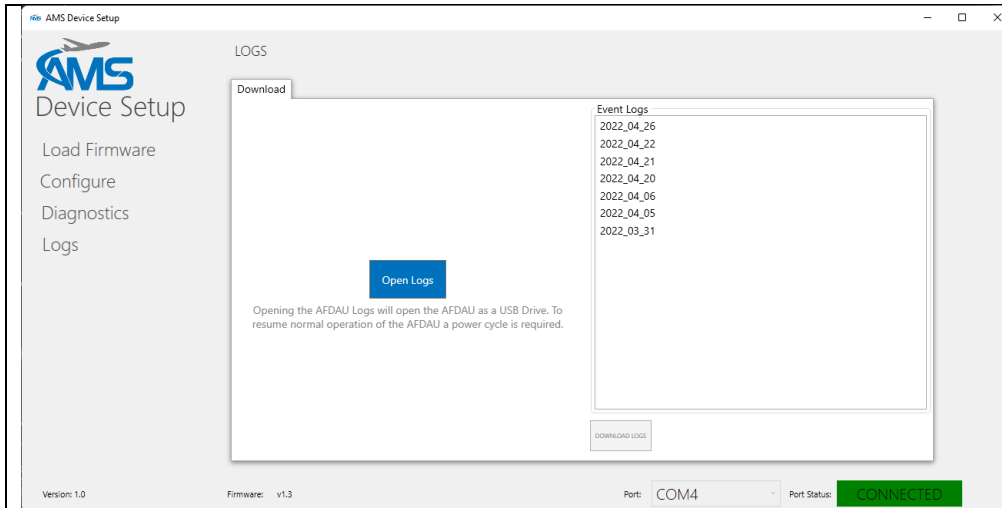
5. Click the "Logs" menu item found on the left of the program underneath the AMS logo.	6. Select the dates you wish to download logs for. You can select one date at a time, or multiple dates at once by selecting the first date you want, and then while holding the SHIFT key on your keyboard, select the last date you want.
	7. When you have made your selection, click the grey "DOWNLOAD LOGS" button near the bottom of the window.
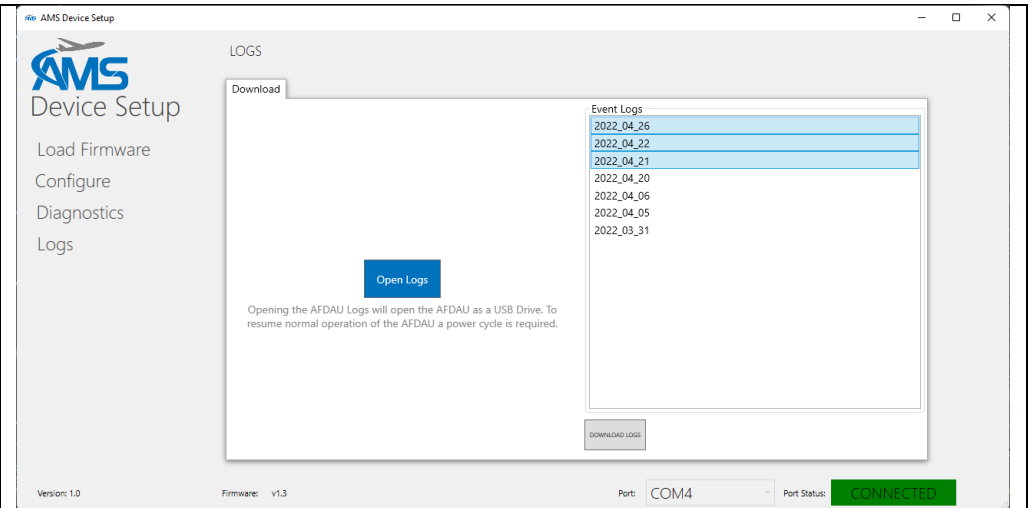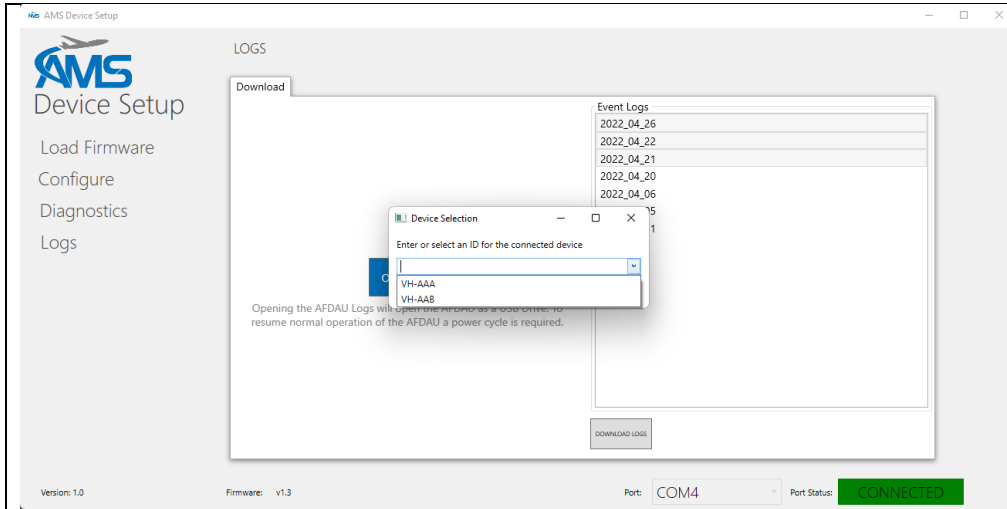
8. Select your device from the dropdown menu. If your device is not listed, enter your aircraft registration.	9. Click the "OK" button. A progress bar will appear. Once the event logs have finished downloading, a box will appear indication the download has completed successfully. 10. Click the "OK" button and a window will appear showing your downloaded logs. 11. Alternatively, the "OPEN LOGS" button can be used to open the AFDAU-T1 as a USB device on your computer. To resume normal operation of the AFDAU a power cycle is required.
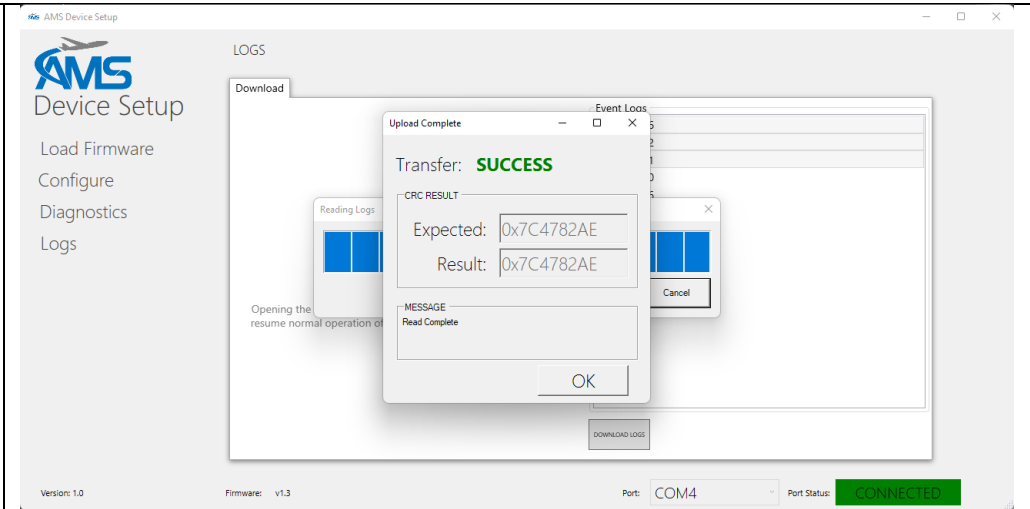
7 Troubleshooting

FAULT DESCRIPTION	CAUSE	RECTIFICATION
No event messages of any type are being shown on TracPlus Pro 3, or Apple and Android TracPlus App.	1. Configuration of the AFDAU-T1 or Modem Device is incorrect. 2. Serial RS232 wiring between the AFDAU-T1 and Modem Device is not connected correctly	1. Ensure the AFDAU-T1 is configured for the correct Modem Type and RS232 Port. 2. Confirm that the modem is sending data by checking the RS-232 Monitor tab in the Diagnostics Page. If the device is correctly configured, there should be output on the port it is configured on. 3. If there is no output on the port the modem is configured on: Check wiring between the AFDAU-T1 and modem 4. Ensure the modem's serial RS232 port is properly configured (refer Section 4.5.3).
Drop messages are not display on the Apple and Android TracPlus App.	At this time, the drop messages will only display on the TracPlus Pro 3 desktop app.	1. Use the TracPlus Pro 3 desktop app to view the drop messages.
The Power (Green) LED light does not light up when powered on.	Internal power supply circuit is not getting a regulated 5VDC.	1. Ensure that 14-28VDC is available on Pin 1 of P1 Main Connector 2. Ensure that airframe ground is available on Pin 20 of P1 Main Connector 3. If steps 1-2 above are OK, there is an internal fault in the AFDAU-T1. Contact AMS for repair.
The Status (Amber) light is always on steady (remains on for more than 1 minute)	The unit is not progressing through the bootloader stage.	1. Reset power to the unit. 2. An internal fault has occurred in the AFDAU-T1. Contact AMS for repair.
The Status (Amber) light is not on. The Power (Green) light is on.	The unit has an internal fault	1. An internal fault has occurred in the AFDAU-T1. Contact AMS for repair.
The Status (Amber) light is flashing in a heartbeat pattern (flash-flash-pause)	The unit has a configuration fault (modem not configured or corrupt configuration file).	1. Use the AFDAU Config Tool to write a new configuration file to the AFDAU-T1. Make sure a modem (RockAIR or

|		
		v2track) is assigned to a serial port.
Volume in the Diagnostics page is stuck at 0 litres.	The volume measurement device is not configured correctly.	1. Ensure the measurement device is configured to the correct port in the Configure page (Refer Section 5.4)
		2. If a container select switch is installed and configured, ensure the switch is selected to the correct container.
		3. Confirm that the device is sending data by checking the RS-232 Monitor tab in the Diagnostics Page.
		If the device is correctly configured, there should be output on the port it is configured on.
The AFDAU Config Tool has shown a message with the error code "INTERNAL STORAGE FAULT"	There has been an issue with the internal storage of the AFDAU.	1. Power Cycle the AFDAU
		2. An internal fault has occurred in the AFDAU-T1. Contact AMS for repair.

8 Mechanical Drawings
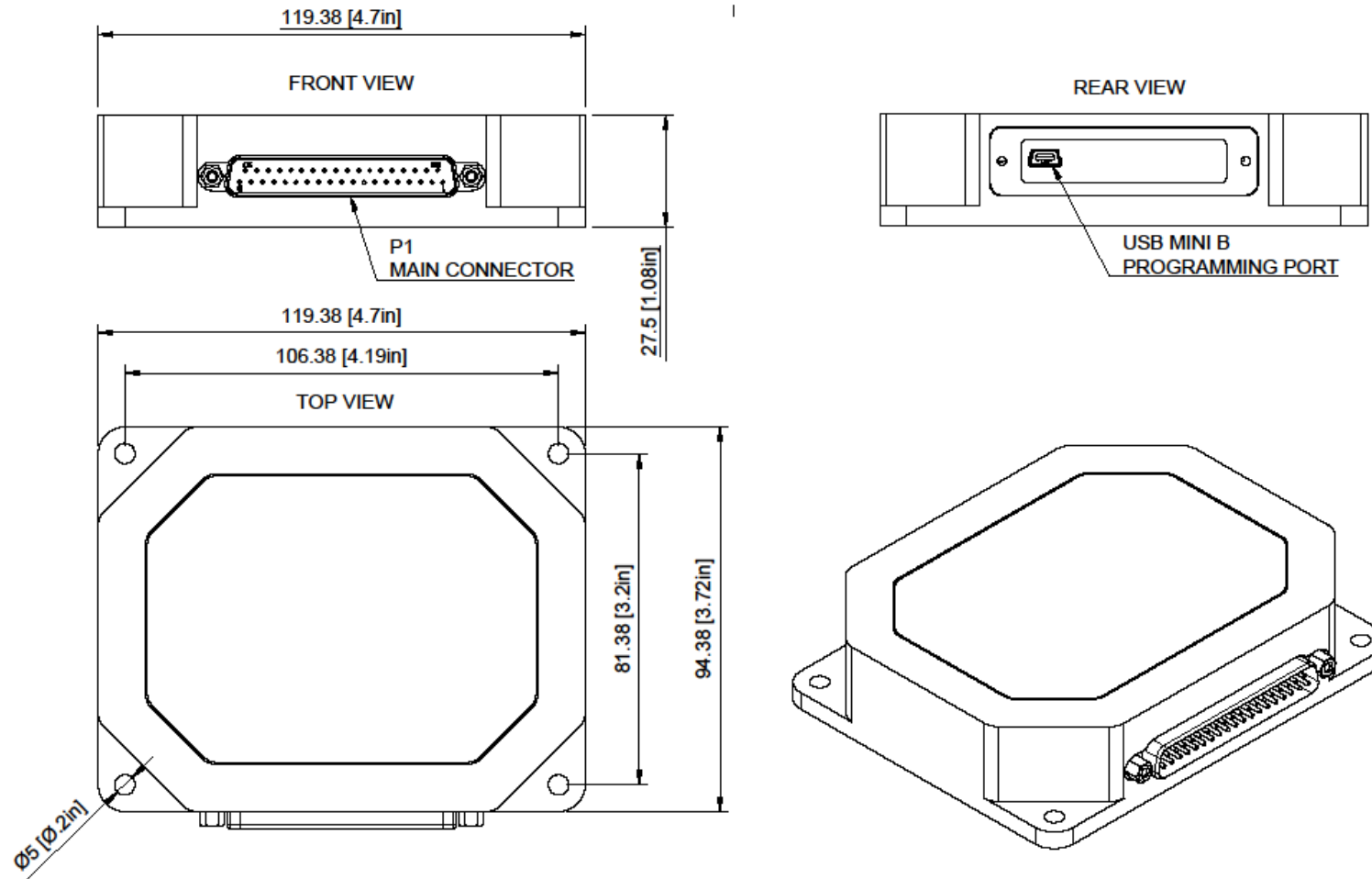
9 Connector Pinouts

9.1 P1 – Main Connector
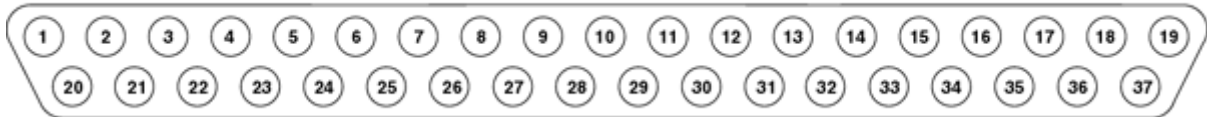
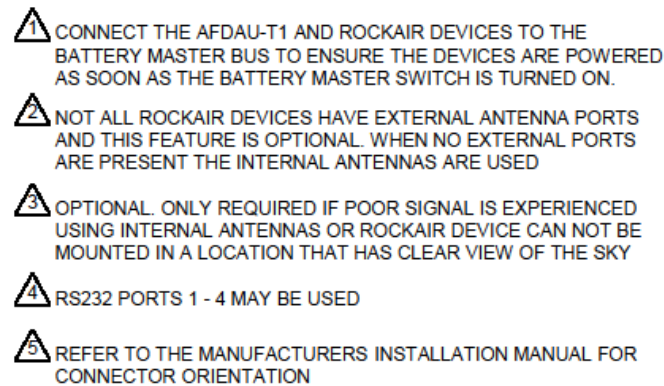| PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	POWER INPUT	14/28 VDC INPUT			
2	GPI_1	General Purpose Input, active when grounded	20	POWER GROUND	Airframe ground input
3	GPI_2	General Purpose Input, active when grounded	21	SHIELD GROUND	Common with pin 20, connect shields or relay grounds
4	GPI_3	General Purpose Input, active when grounded	22	SHIELD GROUND	Common with pin 20, connect shields or relay grounds
5	GPI_4	General Purpose Input, active when grounded	23	OUTPUT_COMMON	
6	GPI_5	General Purpose Input, active when grounded	24	OUTPUT_1	
7	GPI_6	General Purpose Input, active when grounded	25	OUTPUT_2	
8	INDICATOR DATA B	C39 CLK, MSI150XM DATA	26	INDICATOR DATA A	C39 DATA
9	RS232 TX 1	RS-232 Transmit Port 1	27	RS232 RX 1	RS-232 Receive Port 1
10	RS232 TX 2	RS-232 Transmit Port 2	28	RS232 RX 2	RS-232 Receive Port 2
11	RS232 TX 3	RS-232 Transmit Port 3	29	RS232 RX 3	RS-232 Receive Port 3
12	RS232 TX 4	RS-232 Transmit Port 4	30	RS232 RX 4	RS-232 Receive Port 4
13	RESERVED	NOT CONNECTED	31	RESERVED	NOT CONNECTED
14	K1 RELAY GROUND	14 or 28 VDC Relay, -ve side of coil	32	K1 RELAY POWER	14 or 28 VDC Relay, +ve side of coil
15	K2 RELAY GROUND	14 or 28 VDC Relay, -ve side of coil	33	K2 RELAY POWER	14 or 28 VDC Relay, +ve side of coil
16	K3 RELAY GROUND	14 or 28 VDC Relay, -ve side of coil	34	K3 RELAY POWER	14 or 28 VDC Relay, +ve side of coil
17	K4 RELAY GROUND	14 or 28 VDC Relay, -ve side of coil	35	K4 RELAY POWER	14 or 28 VDC Relay, +ve side of coil
18	K5 RELAY GROUND	14 or 28 VDC Relay, -ve side of coil	36	K5 RELAY POWER	14 or 28 VDC Relay, +ve side of coil
19	K6 RELAY GROUND	14 or 28 VDC Relay, -ve side of coil	37	K6 RELAY POWER	14 or 28 VDC Relay, +ve side of coil

10 Wiring Diagrams

10.1 Wiring Installation Considerations

1. UNLESS SPECIFICALLY NOTED ON THIS DRAWING, WIRE TYPE AND GAUGE IS TO BE SELECTED IN ACCORDANCE WITH THE AIRCRAFT PUBLICATIONS (I.E. WIRING OR MAINTENANCE MANUAL) OR FAA AC 43.13-1B CHANGE 1 PARAGRAPH 11-76 THROUGH 11-78.

2. UNLESS OTHERWISE NOTED ALL POWER AND GROUND LINES ARE TO BE 20AWG. ALL OTHER WIRING IS TO BE 22AWG. IF IN DOUBT, SELECT A GAUGE BASED ON THE INLINE CIRCUIT BREAKER RATING IN ACCORDANCE WITH FAA AC43.13-1B CHANGE 1 SECTION 11.

3. UNSHIELDED WIRE TYPES ARE TO BE QUALIFIED TO MIL-W-22759 PER FAA AC 43.13-1B CHANGE 1 PARAGRAPH 11-85, 11-86 AND TABLE 11-11. WHERE A SHIELDED WIRE TYPE IS INDICATED, USE MIL-DTL-27500 SHIELDED WIRE WITH SOLDER SLEEVES FOR SHIELD TERMINATIONS. ALLOW 75MM (3") FROM THE END OF THE SHIELDED WIRE TO THE SHIELD TERMINATION TO FACILITATE CLAMSHELL HOOD INSTALLATION AFTER WIRING IS COMPLETE.

4. WIRING LOOMS ARE TO BE SUPPORTED AT INTERVALS NO GREATER THAN 600MM (24"). ADHERE TO CLAMPING AND SEPARATION REQUIREMENTS OF AIRCRAFT PUBLICATIONS OR FAA AC 43.13-1B CHANGE 1 PARAGRAPH 11-146.ROUTE WIRES IN ACCORDANCE WITH AIRCRAFT PUBLICATIONS.
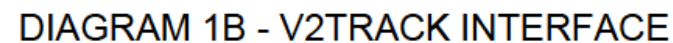
10.2 Modem Interface – RockAIR

DIAGRAM 1A - ROCKAIR INTERFACE

△1 CONNECT THE AFDAU-T1 AND ROCKAIR DEVICES TO THE BATTERY MASTER BUS TO ENSURE THE DEVICES ARE POWERED AS SOON AS THE BATTERY MASTER SWITCH IS TURNED ON.

△2 NOT ALL ROCKAIR DEVICES HAVE EXTERNAL ANTENNA PORTS AND THIS FEATURE IS OPTIONAL. WHEN NO EXTERNAL PORTS ARE PRESENT THE INTERNAL ANTENNAS ARE USED

△3 OPTIONAL. ONLY REQUIRED IF POOR SIGNAL IS EXPERIENCED USING INTERNAL ANTENNAS OR ROCKAIR DEVICE CAN NOT BE MOUNTED IN A LOCATION THAT HAS CLEAR VIEW OF THE SKY

△4 RS232 PORTS 1 - 4 MAY BE USED

△5 REFER TO THE MANUFACTURERS INSTALLATION MANUAL FOR CONNECTOR ORIENTATION

10.3 Modem Interface – v2track

DIAGRAM 1B - V2TRACK INTERFACE

10.4 Modem Interface – DZMx
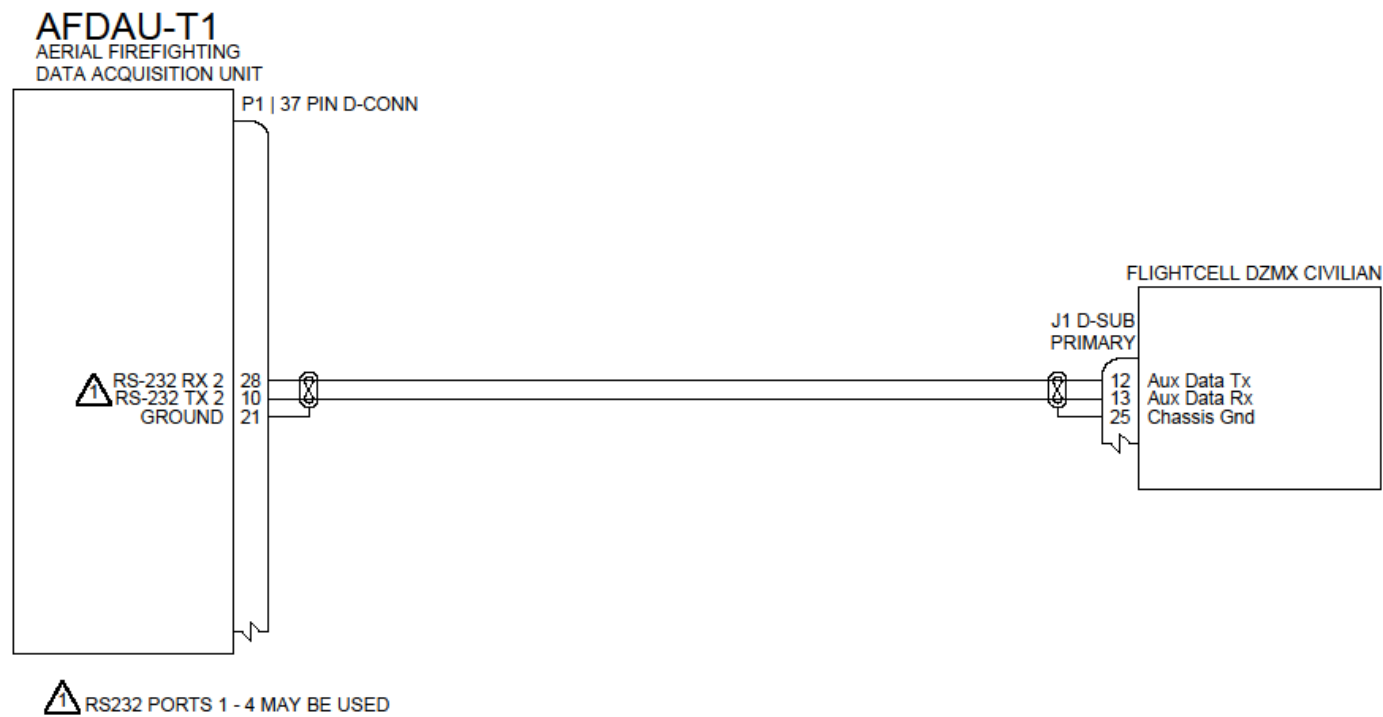
DIAGRAM 1C - FLIGHTCELL DZMX INTERFACE

10.5 Additive Interface – Helicopter Typical Installation
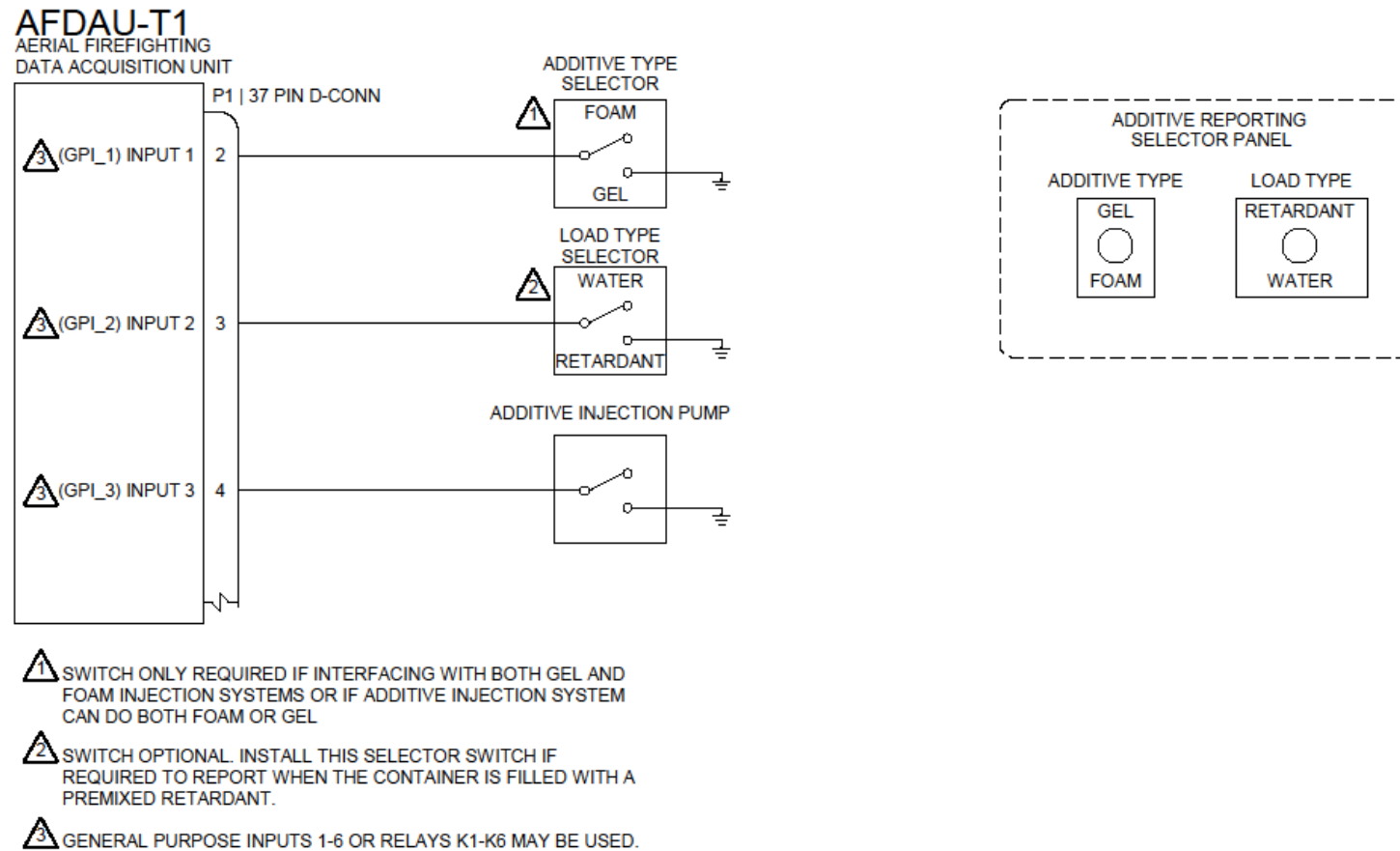
DIAGRAM 3A - ADDITIVE INTERFACE

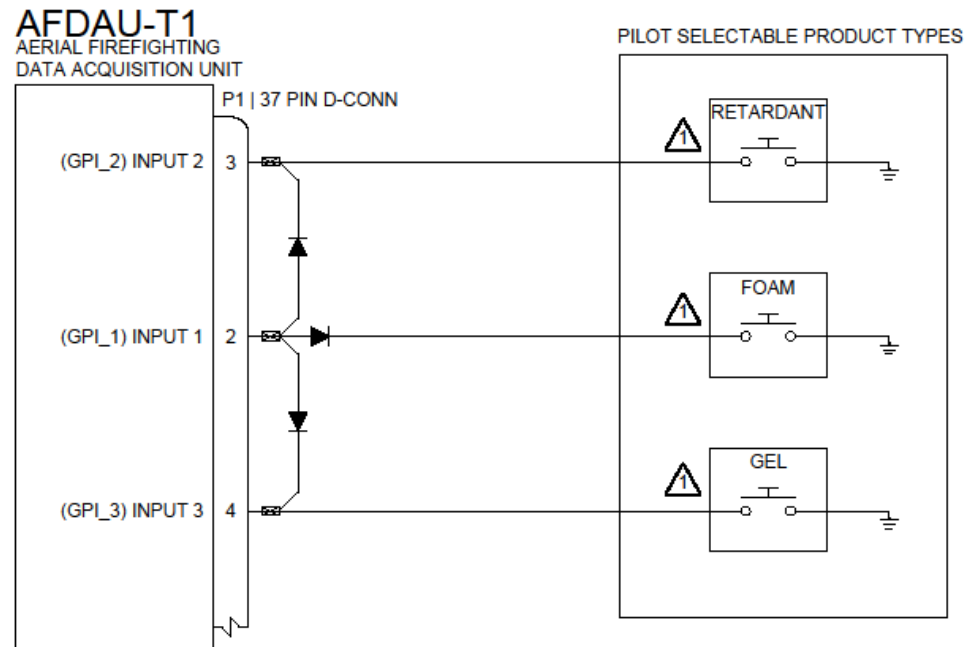## 10.6 Additive Interface – Helicopter SEI Sacksafoam Controller
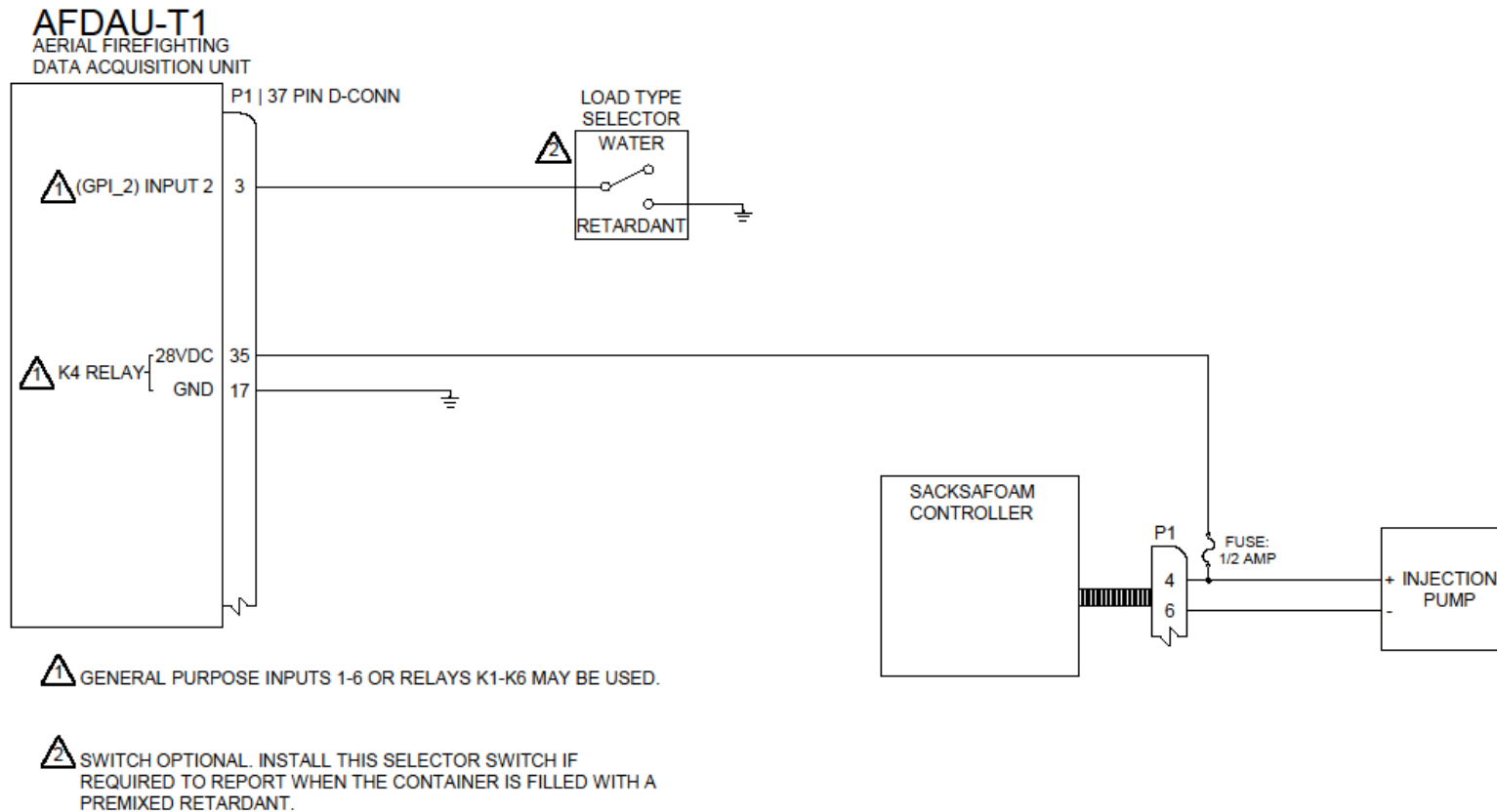
DIAGRAM 3B - SACKSAFOAM CONTROL INTERFACE

10.7 Additive Interface – Fixed Wing Typical Installation

AFDAU-T1
AERIAL FIREFIGHTING
DATA ACQUISITION UNIT

P1 | 37 PIN D-CONN

(GPI_2) INPUT 2   3

(GPI_1) INPUT 1   2

(GPI_3) INPUT 3   4

PILOT SELECTABLE PRODUCT TYPES

RETARDANT

FOAM

GEL

⚠ AN EXISTING INJECT SWITCH WHICH PUMPS ADDITIVE FROM AN
ONBOARD TANK CAN BE CONNECTED IN PARALLEL TO EITHER OF
THESE SWITCHES. CONNECT IN PARALLEL TO THE APPROPRIATE
PRODUCT TYPE SELECTOR SWITCH. EXISTNG SWITCH MUST
SWITCH TO GROUND WHEN ACTIVE OR AN ADDITIONAL RELAY
MAY BE REQUIRED

AIRFRAME INPUT CONFIGURATION	
ADDITIVE INJECT	GPI_1
PREMIX SELECT	GPI_2
ADDITIVE SELECT	GPI_3

DIAGRAM 3C - PRODUCT TYPE SELECTOR EXAMPLE

10.8 Container Interface
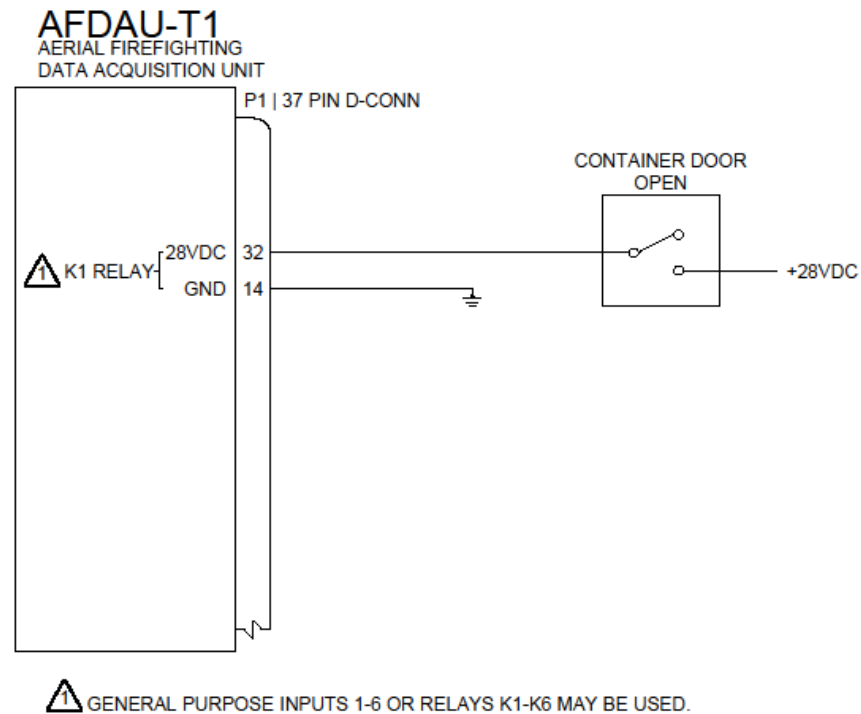
DIAGRAM 4A - CONTAINER INTERFACE
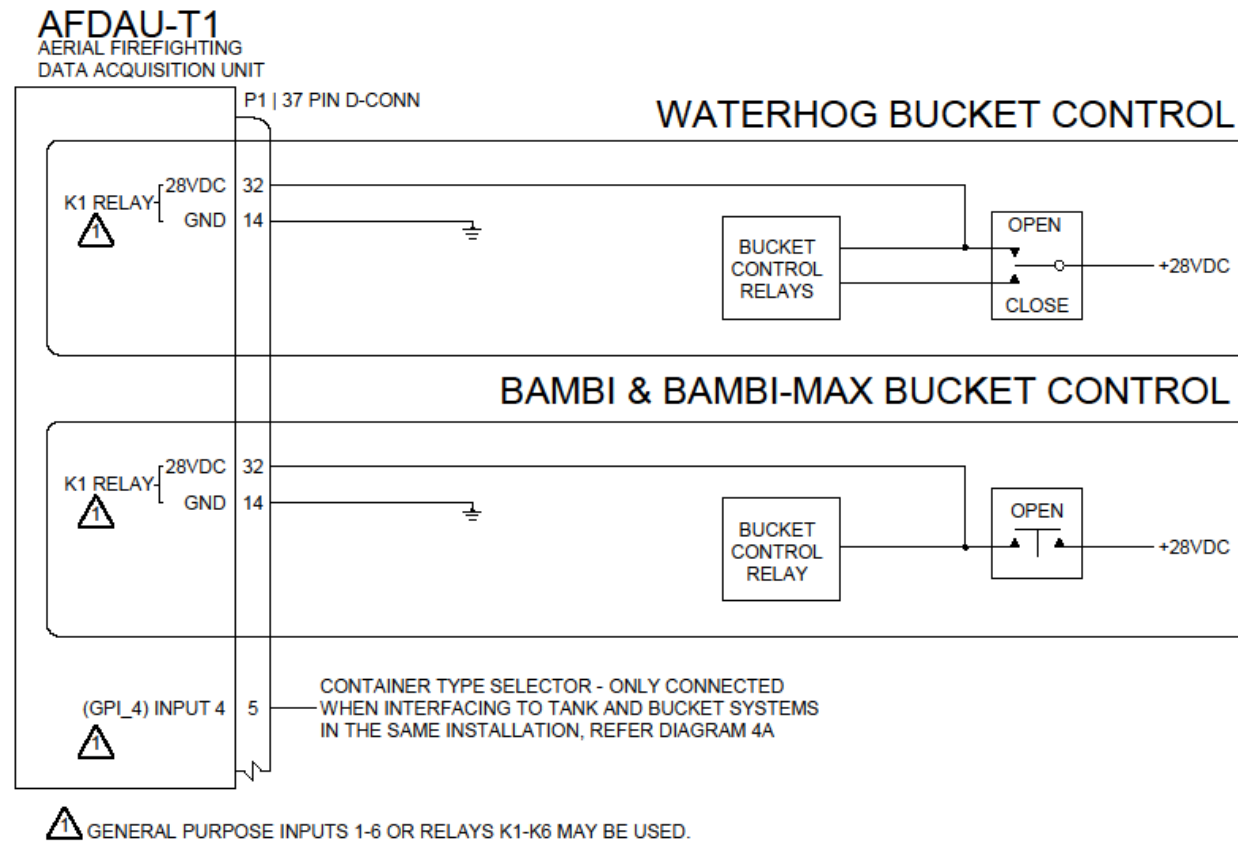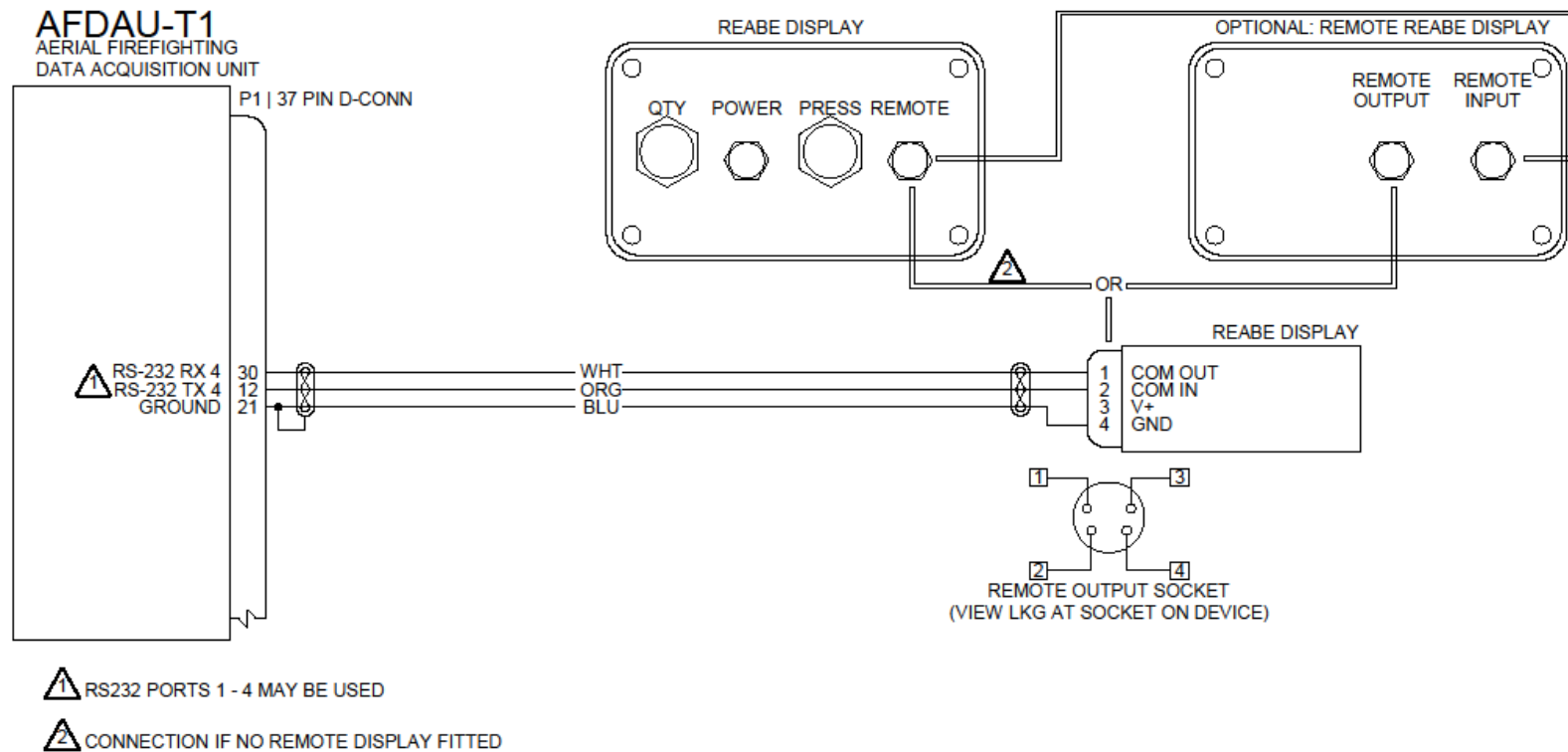
10.9 Container Interface – Buckets

DIAGRAM 4B - BUCKET INTERFACE

10.10 Volume Sensor Interface – Reabe Probe System

DIAGRAM 5A - REABE PROBE INTERFACE

10.11 Volume Sensor Interface – Loadcell Indicator Interfaces
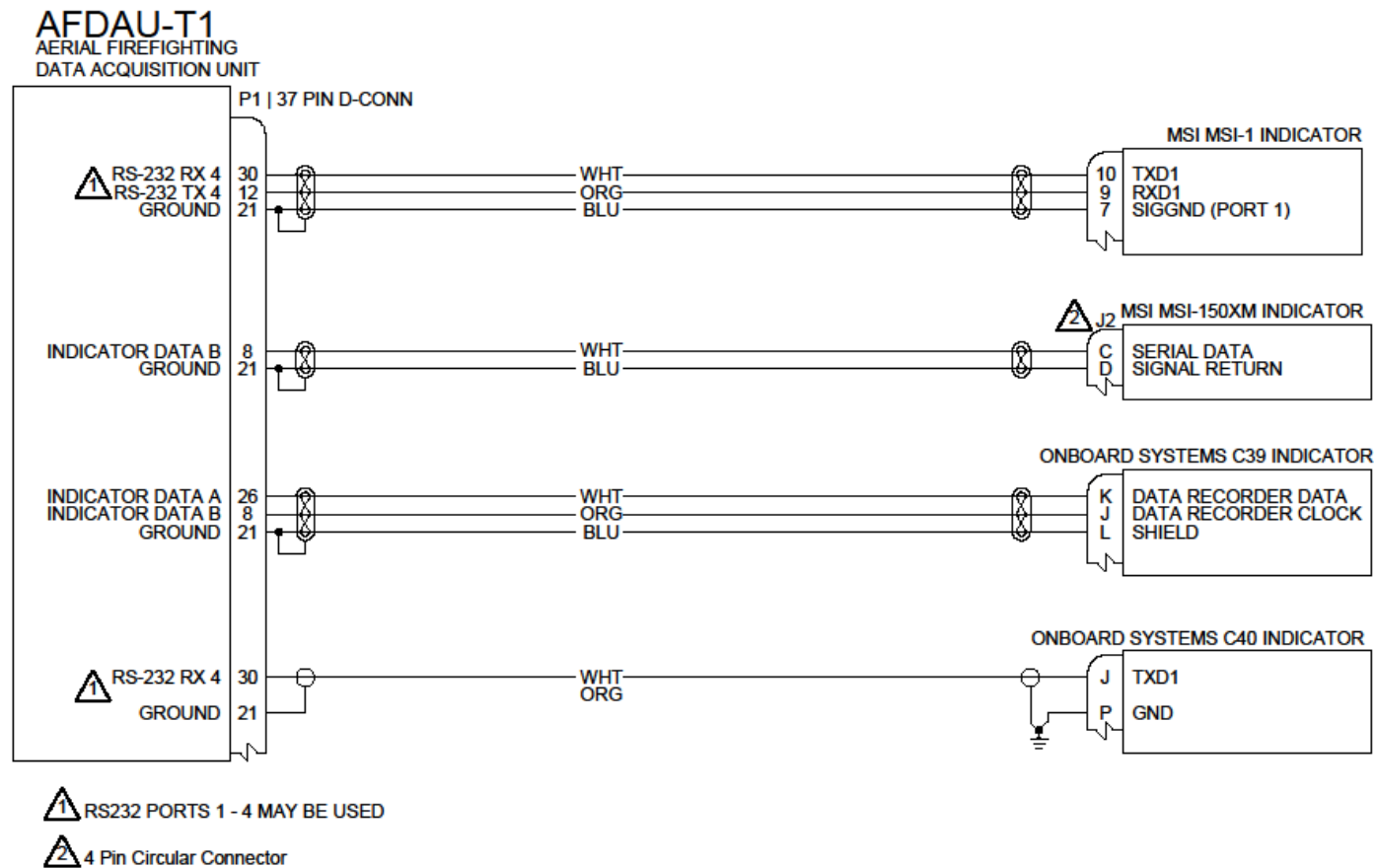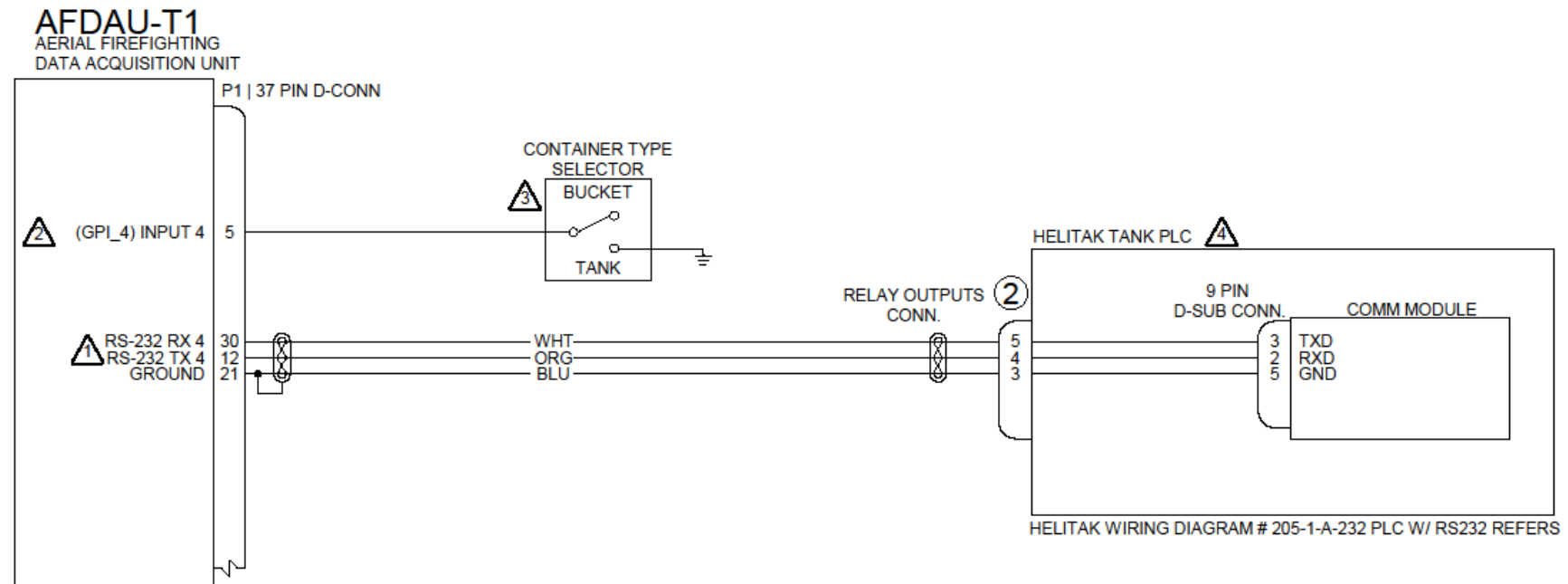

DIAGRAM 5B - LOADCELL INTERFACES

10.12 Volume Sensor Interface – Helitak Tank

DIAGRAM 5C - HELITAK TANK