

# MIDAS FUEL SELECTIVE VALVE

- ◆ PREVENTS DELIVERY OF THE INCORRECT FUEL INTO THE STORAGE TANK
- ◆ FULLY AUTOMATED, INTELLIGENT CONTROL AT THE FILLING POINT
- ◆ POSITIVE SHUT OFF
- ◆ STAND ALONE, SELF POWERED
- ◆ ROBUST CONSTRUCTION



AVGAS

OR

JET A-1

## The problem

For many years the major fuel suppliers have been acutely aware of the risks associated with loading the wrong grade of fuel onto aircraft because aircraft misfuelling has serious consequences. A turbo prop aircraft which requires Jet Fuel will continue to operate (albeit very inefficiently) if it is refuelled with Avgas. However, an Avgas piston engined aircraft will not run at all if it is refuelled with Jet Fuel, and so this situation carries the biggest risk because it could cause engine failure in flight.

Aircraft refuelling operators are normally very knowledgeable about the fuel grade required for various aircraft types, however, certain aircraft look very similar to each other but require different fuel. Many precautions have been taken in order to minimise the probability of aircraft misfuelling at the aircraft wing, including a joint initiative between the fuel suppliers and the aircraft manufacturers to set 'grade selective' fuelling nozzle and filling orifice sizes, decals stuck to the aircraft wing which state the fuel grade, refuelling nozzle colour coding, hose end wraps which state the fuel grade, colour coded wing protection mats, and tie on tags for the aircraft control column. Aljac Fuelling Components supplies all of the above products, but still there is the risk of misfuelling due to human error.

In addition, there is also a major area of risk when a bulk delivery is made to a refuelling depot which

contains both Avgas and Jet Fuel storage tanks. These deliveries are sometimes driver controlled so they are made when no depot staff are in attendance, and it is quite possible that the incorrect fuel could be delivered into the storage tank. Under such circumstances this incorrect fuel could then be loaded directly onto an aircraft, or into a refuelling vehicle which will in turn refuel an aircraft. In this situation, all of the above mentioned safeguards which have been applied on the refuelling vehicle or the aircraft would be redundant and completely ineffective.

## History

A number of attempts have been made to solve this problem over many years, most of them involving a pilot operated control valve which is fitted to the fuel storage tank inlet point. Density sensitive pilots using floats have been the most common method of identifying the fuel grade being supplied, but up until now none of these systems have been found to be sufficiently reliable to gain widespread acceptance, which of course is not surprising given the crude nature of the technology itself. However, alternative more advanced technologies have now evolved to the point where they can be utilised to dramatically improve this potentially hazardous situation.

## Introducing MIDAS

The problem of misfuelling does not only exist in aviation refuelling, it is also a problem when refuelling cars and trucks. MIDAS was developed

as a safeguard against delivering the incorrect fuel into forecourt fuel storage tanks, and it has been very successful in differentiating between petrol (gasoline) and diesel fuel. It is already fitted to a large number of installations all over the world and its usage is becoming increasingly widespread as it gains acceptance by the major fuel suppliers. So if MIDAS can differentiate between petrol and diesel fuel, logically it should also be able to differentiate between Avgas and Jet Fuel, **AND IT CAN.** Aljac is now able to offer you MIDAS to protect your aviation fuel system against delivery of the incorrect fuel.

MIDAS is the Misfuel Identification and Avoidance System, and it is fitted to the fuel storage tank filling point to protect against the incorrect fuel being delivered into that tank.

MIDAS consists of a housing containing a butterfly type Valve which is driven open/closed by a low current high torque DC electric motor, a Battery Pack and a Sensing Cell and Float. A Control Unit is also fitted which contains a microprocessor, status indicator LEDs, a sounder and a wireless interface. The Sensing Cell and Float is the heart of the unit because it checks the incoming fuel and feeds data (which includes specific gravity,



**Control Unit**

refractive index and temperature) to the microprocessor, which then uses algorithms to produce a rating number for the fuel. If the rating number does not correlate with that for the correct fuel (within a tolerance band) MIDAS will prevent the incorrect fuel from passing into the storage tank.

### Installation and operation

MIDAS uses a series of electronic Keys which communicate with the Control Unit using a wireless infra-red link. The Keys are motion activated in order to maximise battery life, so to communicate with MIDAS it is only necessary to shake the relevant Key and to hold it label down adjacent to the Control Unit.

When a fuel delivery is to be made, the driver connects the delivery hose and activates MIDAS with the Operator Key. All three LEDs will flash and there will be three tones from the sounder which indicates that the MIDAS is now active. After completion of the diagnostic phase the green LED will flash every 2 seconds to indicate that MIDAS is ready to accept fuel. The tanker valve(s) can then be opened, but if fuel is not supplied within 5 minutes MIDAS will enter the hibernation state again, and must then be re-activated by using the Operator Key. After fuel is introduced the Valve will partially open for 5 minutes in order to allow the air out of the system and introduce fuel to the Sensing



**Operator Key**

Cell. MIDAS will then check if the fuel is correct or incorrect.

### Correct fuel

If the fuel is correct MIDAS will enter the 'approved fuel' condition. The sounder will emit a double tone and the Valve will open fully which allows the fuel delivery to proceed. MIDAS continues to monitor the fuel every 0.6 sec for the full duration of the fuel delivery and the green LED will continue to flash every 2 seconds. At the end of the fuel delivery the Float senses that fuel is no longer present and MIDAS will enter the 'drain down' phase. The Valve will partially close, the sounder will emit a double tone, the red LED will flash every 2 seconds, and MIDAS will remain in this condition for 5 minutes in order to allow the driver to drain the hose. After draining the hose down it can be disconnected and MIDAS will re-enter the hibernation state.



**Valve part open**



**Valve fully open**

### Incorrect fuel

If the fuel is incorrect MIDAS will enter the 'misfuel' condition'. The Valve will close fully, the sounder will emit intermittent tones for 30 seconds and the red LED will flash rapidly for 2.1/2 minutes. It will then be necessary to use the Override Key which is kept in the office by the supervisor. When this Key is presented to the Control Unit the Valve will open for 30 seconds (default) to allow the driver to drain the hose. The tanker must then be taken away. The use of the Override Key and the Valve open time can be adjusted in the software to suit the client's preference.



**Green LED**

### Critical failure

If a problem is detected during the diagnostic phase the Valve will remain fully closed, the sounder will emit intermittent tones and the amber LED will flash for 2.1/2 minutes. MIDAS cannot then be used until the fault is corrected.

### Low battery power

If less than 80% of battery life is detected during the diagnostic phase the amber LED will flash alongside the green LED for 30 secs at the start of the delivery. At less than 90% of battery life a 'critical failure' condition will be generated (as described above).



**Red LED**



**Override Key**

## Features

MIDAS is fail safe. It stays closed in the event of the incorrect fuel being delivered, or low battery power, or a fault developing, and due to the low power requirement and simple design the unit requires minimal maintenance. The Battery Pack will typically last approximately 5 to 7 years (based on two deliveries per day), and can be replaced very easily.

In the event of maintenance being required a hand held Datatec unit is available for calibration, parameter changes, data capture, event logging and fault diagnosis by the service engineer.

MIDAS is approved to ATEX Zone 1 (Europe), TR-CU GOST-R (Russia) and IEC Ex (International). It has also been tested to FM (United States) and CSA (Canada).

Because MIDAS is programmed to only accept the desired fuel grade, it has the added advantage that it will also sense the presence of water, so it is impossible to put bulk water into the fuel storage tank.

Although MIDAS has been designed to be the first line of defence against the incorrect fuel grade being delivered into your fuel storage tanks, it also has many other potential applications within the fuel supply system. Please tell us if you require this technology to solve a problem for you!



## Shipping Specification

**Overall dimensions:** 231mm high x 214mm wide x 206mm deep.

**Nett weight:** 13 kg (all excluding flanged adapters).

## Specification

**Description:** Butterfly Valve driven by a low power high torque motor. Sensing Cell and Float system. Control Unit with microprocessor, infra-red wireless link, Red/Green/Amber indicator LEDs and a sounder.

**Materials of construction:** LM25 Aluminium alloy body. 304 Stainless Steel covers, Valve disc and stem. PTFE Valve seat. Stainless Steel Float and mechanism.

**External surface finish:** Chromate pre-treatment with a Polyester paint finish.

**Maximum working pressure:** 10.5 Bar.

**Test pressure:** 21 Bar.

**Operating temperature range:** -40°C to +60°C.

**End connections:** Flanged with 4xM12 threaded holes on a 145mm square pattern, 207mm face to face. Supplied complete with bolts and Viton gasket. Various flanged and threaded connecting adapters are available to order (including 3 inch and 4 inch ANSI150lb).

**Mounting orientation:** Horizontal, vertical or any intermediate orientation. Note:- The mounting orientation must be advised at time of order

placement.

**Power supply:** 10.8 Volts 14 Ah High Energy replaceable Lithium Thionyl Chloride battery pack.

**Battery life:** Approximately 5 to 7 years based on two deliveries per day.

**Cable gland entries:** M20 fitted with blanking plug. Ex d rated cable glands must be used (not included).

## Applicable Standards

Hazard classification: Ex d[jia Ga] IIB T4 Gb.

Approvals: ATEX, Sira 12ATEX1292X. IECEx, SIR 12.0131X.

## How to order

Quote the following part numbers:

**MIDAS valve:** MIDVEX01.

**Operator Key:** MIDVEXMC003.

**Override Key:** MIDVEXMC004.

**Datatec Unit:** MIDVDATMC001.

Please specify:

End connections and mounting orientation.

The fuel to be accepted, Jet A-1 or Avgas. MIDAS will then be programmed to accept **ONLY** the specified fuel grade.

**SO NO INCORRECT FUEL DELIVERIES.**