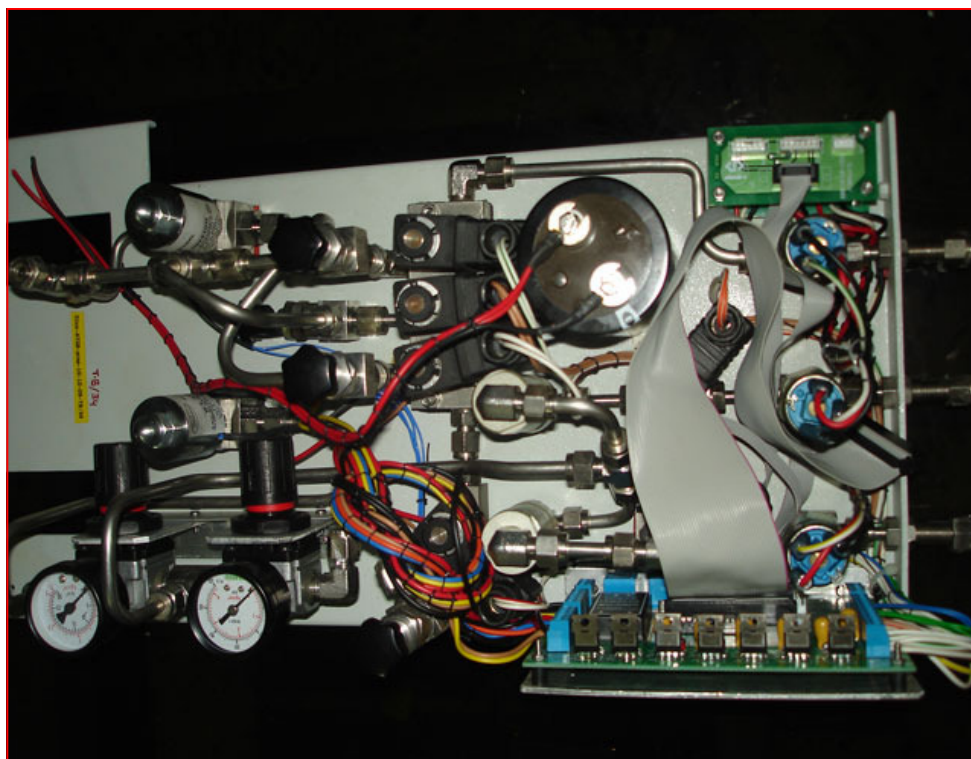


OEM Equipment

# Auto gas box for AAS

Customer specific



## Features

- In line pressure sensing
- Drain empty interlock
- Burner type & presence
- Auto flame mode setting
- Flame luminosity sensor
- Flame sensor
- Safety back-up capacitor
- Ratio metric control
- Proportionate valves
- Three microcontrollers
- All SS316 plumbing
- Internal pressure regulators & needle valves
- Protective shutdown in Nitrous flame
- SMPS power supplies

## System operation

At power-up the system monitors the burner limit switches, it then sets up the system operation mode depending upon the limit switches condition. If the system detects "Nitrous oxide burner", the system initiates CAP charge monitor routine. The system waits until the BACK-UP CAP is fully charged. Next it checks the line pressure sensors for proper gas pressure. If all is OK it proceeds to ignition ready status, otherwise it indicates the respective error and waits there until the error is cleared.

The system features automatic ignition procedure or the user may select manual ignition mode. The manual ignition mode may be initiated by first pressing "STOP" switch when system is displaying ALL OK READY for IGNITION". Next within three seconds the user is required to press "IGN" switch. The system then instructs the user to light a match, after 5 seconds it switches on the main "Acetylene solenoid"

In both manual and AUTO mode, post ignition, the system enters into monitoring mode, any interlock failure causes auto shut down procedure. The auto shutdown procedure also depends on the burner type. If the installed burner is "Nitrous oxide" it enters into a protective shutdown mode. Also in the event of power failure, the system enters into protective shutdown if installed burner is "Nitrous Oxide". However if the main flame itself fails, all solenoids are automatically shut down. The system accepts command from the keyboard or can be interfaced through a PC

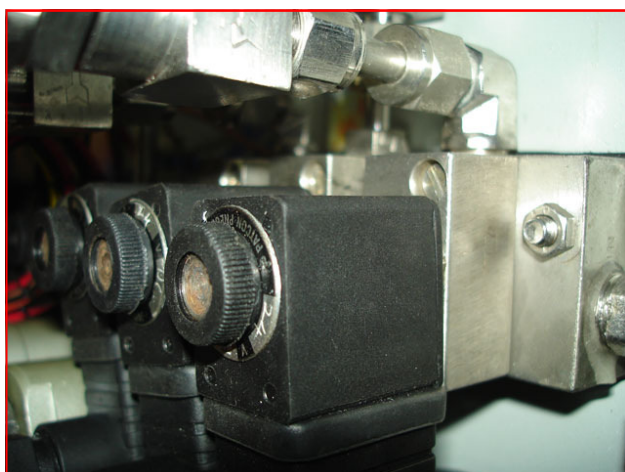
The system also has features for service engineer's diagnostic routines. These may be initiated to tune the system for finer operation or faultfinding.

## Multi ATMEL AVR RISC processor board



The CPU card is a multi microcontroller card. The master CPU is ATMEL AVR ATMEGA 128. This controller is responsible for overall functioning of the Auto gas box such as switching the appropriate solenoid sequence, checking safety interlocks, responding to user commands either through the keypad or through RS232 from host.

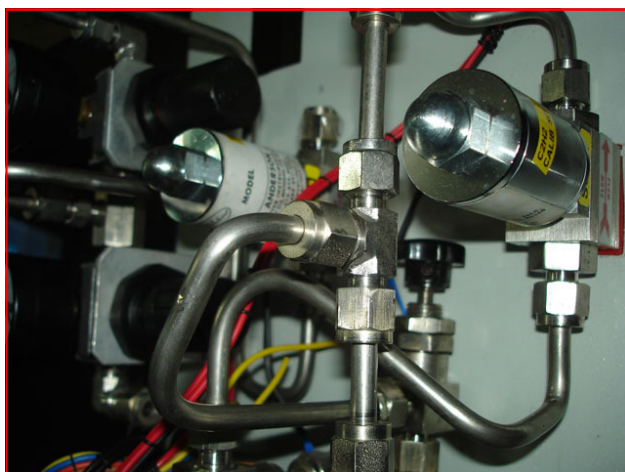
ATMEGA 128 is also responsible for controlling the two auxiliary slave controllers AVR ATMEGA88. The two microcontrollers each control a proportionate solenoid based on the user settings passed by the ATMEGA128. The board has various test points for easy setup. Also a service menu is provided for configuring & fault diagnosing.



## All SS316 Solenoid Valves

A total of six SS316 valves operating on 24V @ 300mA are employed. Five valves are normally closed type & the sixth is a normally open type. The sixth valve is employed for switching Oxidant (AIR).

Of the five N.C valves, three are fuel valves and are on a single block. These are for ignition, Main Acet & boost Acet. Of the other two N.C valves one is for the second oxidant (Nitrus) while the other is for Aux boost.

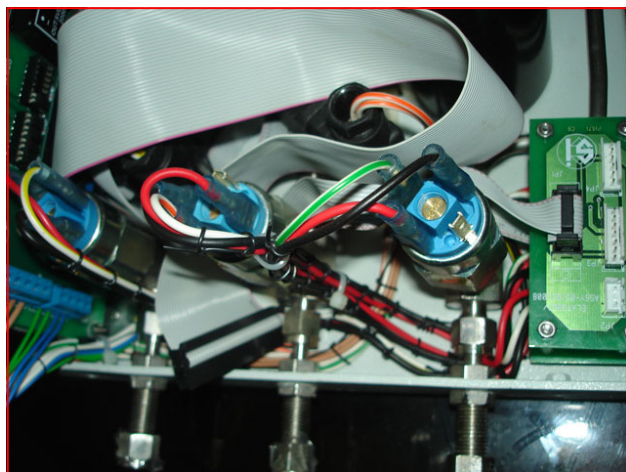


## Proportionate valves Dwyer U.S.A

Two proportionate valves, one for Fuel & the other for Oxidant are used. Each of these valves are controlled by a dedicated microcontroller ATMEL AVR ATMEGA88. PWM is employed for varying the orifice & thus control the respective flow.

The proportionate valves are controlled in a ratio metric mode which can be very finely adjusted. Four flame conditions, Lean, stotio metric, fuel rich & user are available to the user and these can be adjusted within pre defined control boundaries.

## Safety Interlocks

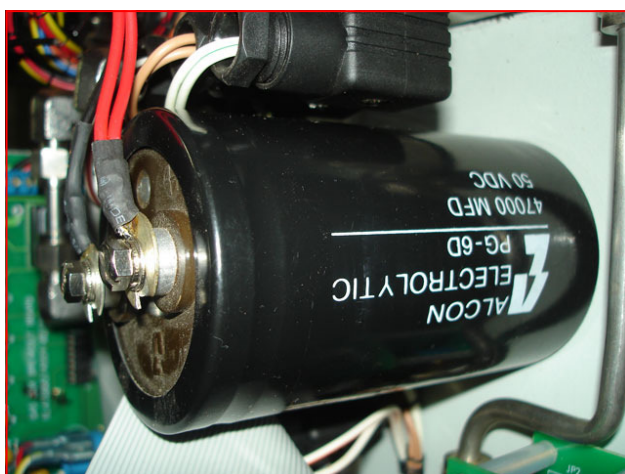
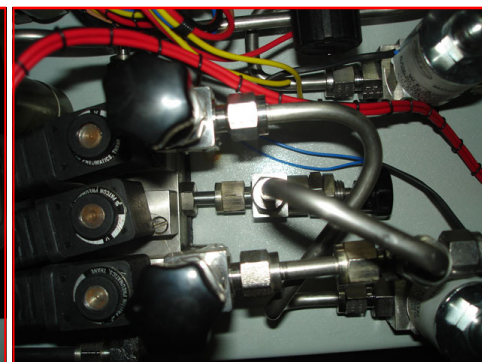
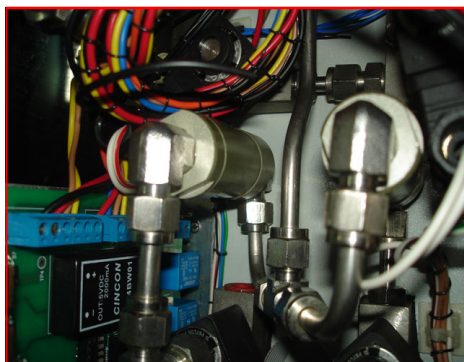


The first set of interlocks or the primary sensors are the in line pressure sensors fitted to each of the gas connections. The sensors are adjustable and are factory calibrated after fitting in to the gas box.

The "AIR", "ACET" & "NITRUS" supply is constantly monitored, in case of any fault, the gas box is automatically shut down. However in case of Nitrous mode an emergency shut down procedure is exercised.

The other safety interlocks are the burner sensor, drain sensor & the flame sensor. All the sensors are constantly monitored in real time.

## Non return valves, Internal pressure regulators & needle valves



## Emergency safety shutdown

Our auto gas box has highest safety protection features. Even when in Nitrous flame & power fails, the system is shutdown keeping the Acet solenoid "ON".

The back-up capacitor provides the required power for about 15 secs to keep the ACET solenoid "ON". This very effectively provides a safe shutdown. Similarly in case of any interlock reporting error except for Flame & "ACET" pressure low, the system enters a safety shutdown.

The auto burner detection feature automatically locks the system to the installed burner type & appropriately charges the back up capacitor.



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## Specifications:

### Sensors

In Line gas pressure	Pre settable NC/NO type pressure switch A) Air B) Acetylene C) Nitrous Oxide
Drain	Float sensor, drain empty when no minimum water level
Burner	Twin limit switches for burner recognition & burner absence recognition. Automatically sets the gas box to Air-Acetylene or Nitrous Oxide-Acetylene flame mode
Flame	Pre-settable, background light, pilot flame & main flame recognition
Flame Chemistry	Luminosity measurement & feedback to gas box for the four flame types

### Electronics

Microcontroller	Master ATMEGA128, AUX ATMEGA88 Three microcontrollers are employed for extended safety.
Communication	Full duplex RS232 with status messaging
User Interface	20 X 4 Alpha numeric back lit LCD Four button keyboard
Memory	IIC EEPROM AT24C64, stores system settings & flame analytical conditions
Back-up Safety Capacitor	Back up capacitor charge monitor circuit prevents ignition in case capacitor is not charged when in Nitrous Oxide-Acetylene flame mode

### Electrical

Power supply	5V dc @ 2 A from DC-DC converter 24V @4.5 A LAMBDA SMPS 12V @ 4.0 A LAMBDA SMPS
Solenoid Valves	5 Normally closed 24V @ 300 mA 1 Normally open 24V @ 300 mA
Dwyer U.S.A	2 Proportionate Valves 12V @400mA
Solenoid Switching	Acetylene through relay & back up Cap All other through power MOSFETS switched through optical isolators

### Mechanical

As per customer's AAS chassis  
Complete plumbing by SS316 6.35mm OD seamless tube, 2 NRV's, 2 gauged pressure regulators & 4 precision needle valves.