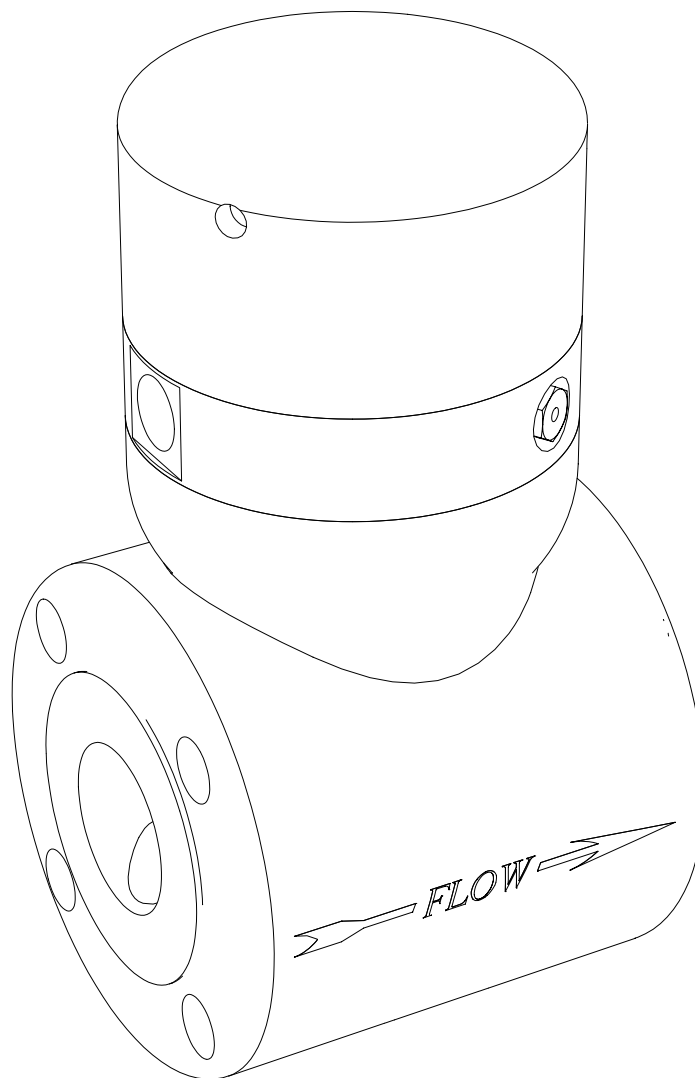


WARNING: DEVIATION FROM THESE INSTALLATION INSTRUCTIONS MAY LEAD TO IMPROPER ENGINE OPERATION WHICH COULD CAUSE PERSONAL INJURY TO OPERATORS OR OTHER NEARBY PERSONNEL.



Version 2.2
November, 2002

ALTRONIC, INC.
712 Trumbull Ave.
Girard, Ohio 44420 USA

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Section 1
INTRODUCTION

INTRODUCTION

This manual provides instruction and maintenance information for the Advanced Gas Valve, models AGV5-1 and AGV5-2.

It is recommended that the user read this manual in its entirety before commencing operations.

It is not our intention to instruct others on how to design control systems, nor can we assume responsibility for their safe operation. This advice is intended to help the end user install the AGV5 Gas Valve in such a manner to reduce the risk of accident to personnel or to equipment.

Do **NOT** attempt to operate, maintain, or repair the fuel control valve until the contents of this document have been read and are thoroughly understood.

By operating the fuel control valve in accordance with the instructions contained within, the user can be assured of a safe, long and reliable operation.

Every attempt has been made to provide sufficient information in this manual for the proper operation and maintenance of the AGV5 Gas Valve.

If additional information is required, please contact:

Altronic, Inc.
712 Trumbull Ave.

Girard, OH 44420
(330) 545-9768

WARNING

The Altronic AGV5 Gas Valves are normally used with natural gas. Natural gas and air, when combined together, become very combustible and when contained within an enclosure, such as a gas engine or its exhaust system, can explode in a violent manner when ignited. It is necessary to always use extreme caution when working with any fuel system. The control systems used with gas engines or other similar machines should always be designed to be "fail-safe". Towards this goal, the AGV5 Gas Valve plays an important part in the safety of the whole system.

The AGV5 Gas Valve is **NOT** a shutoff valve. Shutoff valves should be used in addition to the fuel control valve. The fuel system should be designed in such a way that:

- 1. No single failure of a component will cause the fuel system to admit fuel to the engine when the engine has been shutdown.**
- 2. No single failure can result in grossly over-fueling the engine when attempting to start.**

Failure to follow the above rules may lead to serious damage to equipment or to personnel.

Section 2

INSTALLATION

SECTION 2 INSTALLATION

The gas metering valve should be inspected immediately after unpacking. Check for any damage that may have occurred during shipping. If there are any questions regarding the physical integrity of the valve, contact the distributor or Altronic, Inc.

NOTE: If possible, keep the original shipping container. If future transportation or storage of the valve is necessary, this container will provide the optimum protection.

1. Always provide an adequate supply pressure for the application.
2. Supply the valve with 24Vdc, 1 amp at the valve. Actuator voltage should be separate and provide 24Vdc, 5 amp. Using small gauge wire may cause a large voltage drop resulting in an inadequate power supply. The use of 14 or 16 AWG, stranded tinned wire is recommended.
3. Avoid ground loops when connecting the AGV5.
4. Never install valve wires in the same conduit with any other wiring.
5. Never paint the valve.
6. Do not install the valve in such a manner where condensate may build up inside the electronics housing.

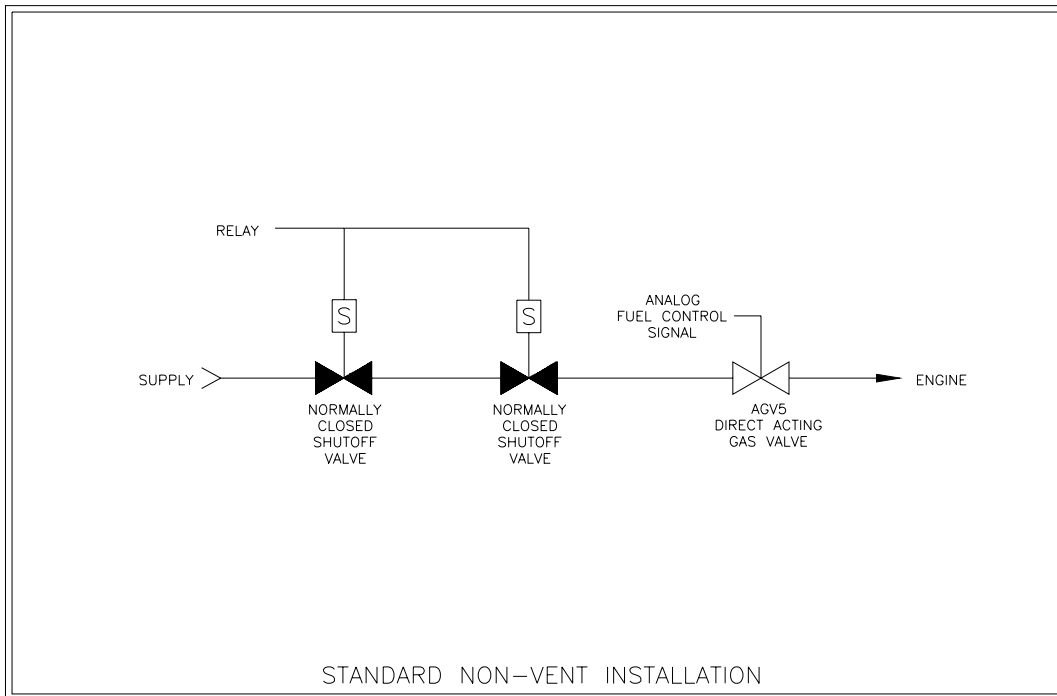
INSTALLATION DO'S AND DON'TS

NOTE: The use of resistor spark plugs and/or resistor spark plug leads is strongly recommended. This plus adherence to points 2 through 4 above will avoid most RFI noise problems.

MOUNTING THE AGV5

The AGV5 Gas Valve is designed to be installed on natural gas fired, reciprocating engines. It is a flow-controlling device that responds to a 4 to 20 mA signal from a controlling device (for example, PLC) and throttles the fuel available to the engine. When considering where to place the AGV5 Gas Valve, choose a location away from any extreme sources of heat. Operating ambient temperature is -40°F . to $+185^{\circ}\text{F}$ / -40°C . to $+85^{\circ}\text{C}$. Do not expose the valve to temperatures higher than indicated here.

The AGV5 can be mounted either horizontally or vertically using its 2.0 inch, 4-bolt, 150 class ANSI flanges. It is recommended that the AGV5 be placed within a straight run of piping to provide adequate fuel flow control.



The following section applies to the electrical requirements of the AGV5 Gas Valve. The installation must conform to the applicable electrical code concerning hazardous environment installations.

ELECTRICAL CONNECTIONS

WARNING: DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NON-HAZARDOUS.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 1 OR 2.

CAUTION: KEEP COVERS TIGHT WHILE CIRCUITS ARE ALIVE.

The equipment may be installed in Class I, Division 1 or 2, Group D hazardous locations. Because of these requirements, the wiring methods to be used are through threaded rigid metal conduit or flexible conduit and termination fittings, in all cases approved for the location. For a Division 1 installation, the entire assembly is to be explosion-proof.

HAZARDOUS AREA REQUIREMENTS

POWER SUPPLY

To power the circuitry of the AGV5 Gas Valve, +20 to 36 Vdc supply is required (+24Vdc typical). The AGV5 electronics are electrically isolated, but if excessive voltage noise (AC ripple) is found, it may be filtered out using a capacitor (300 to 1000 microfarad at 50Vdc is suggested). The capacitor should be placed near the source of the noise, if practical. The power wires to the electronics board in the AGV5 valve are:

White: +24Vdc

Gray: 24V common

The actuator of the AGV5 has a separate power connection and requires +20 to 36 Vdc supply with approximately 5 amp (peak) current. The minimum wire size to the actuator must be 16AWG. If long distances between control device and the AGV5 are expected, the wire size may have to be increased to compensate for the associated voltage drop. Preferably, power wiring for the actuator should be separate from that of the electronics board power due to the large inductive field produced by the coil. The power wires to the actuator are:

Red: +24Vdc

Gray: 24V common

CAUTION: THE TWO SETS OF WIRES DESCRIBED ABOVE ARE THE ONLY CONNECTIONS TO ANY VOLTAGE SOURCE.

The AGV5 valve position input signal is a 4 to 20 mA signal.

NOTE: Current to the AGV5 valve position input must never exceed the maximum of the calibrated range.

CONTROL SIGNALS

The valve position input signal, position feedback signal and pressure feedback signal from the AGV5 Gas Valve are non-isolated signals. If both of these signals are being connected to a source with the same ground (i.e. the same PLC), no problem is usually encountered using direct connections.

If any other devices are connected in the demand or feedback circuits, or if demand and feedback are connected to different devices care must be exercised not to create potential ground loops. An example is using an external electronic governor on generator sets. Even if the external devices are powered from the same source, the internal circuitry of the external devices may cause a ground potential difference. Different ground voltage potentials in the demand or feedback circuits will cause ground loops to the AGV5.

To avoid ground loops when the demand and feedback signals are wired to different devices, or when external devices are to be added to either circuit, it is recommended that signal isolators be installed in the feedback wiring.

Most, if not all, signal isolators have significant time delays between their input and output. These delays can cause problems if the isolators are wired into the valve position signal.

The standard factory calibration for AGV5 valve is:

At 100 psig, $C_v = 0$ at 4 mA, $C_v = 10$ at 20 mA

See the flow capacity curves in the drawings section.

CALIBRATION

PLC CONFIGURATION

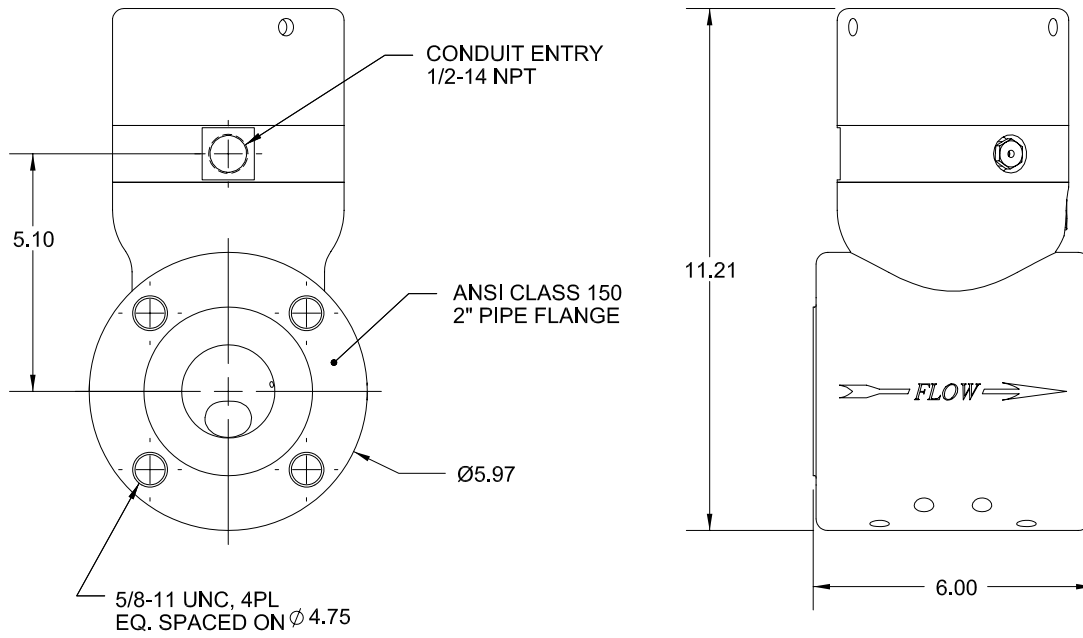
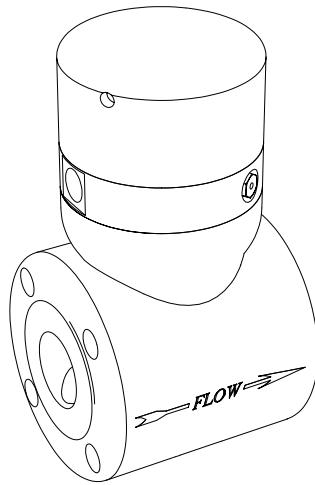
The AGV5 is designed to be controlled by a PLC (Programmable Logic Controller). The appropriate analog inputs, outputs and discrete relay output must be configured and wired before the AGV5 will operate. The AGV5 valve may be controlled by analog inputs that control position or pressure. A low-select feature selecting the lower of either of these is available also. See the overall control diagram and the three logic diagrams for each control mode in these instructions.

NOTE: AGV5 valves with serial number 400 and higher are configured as follows:

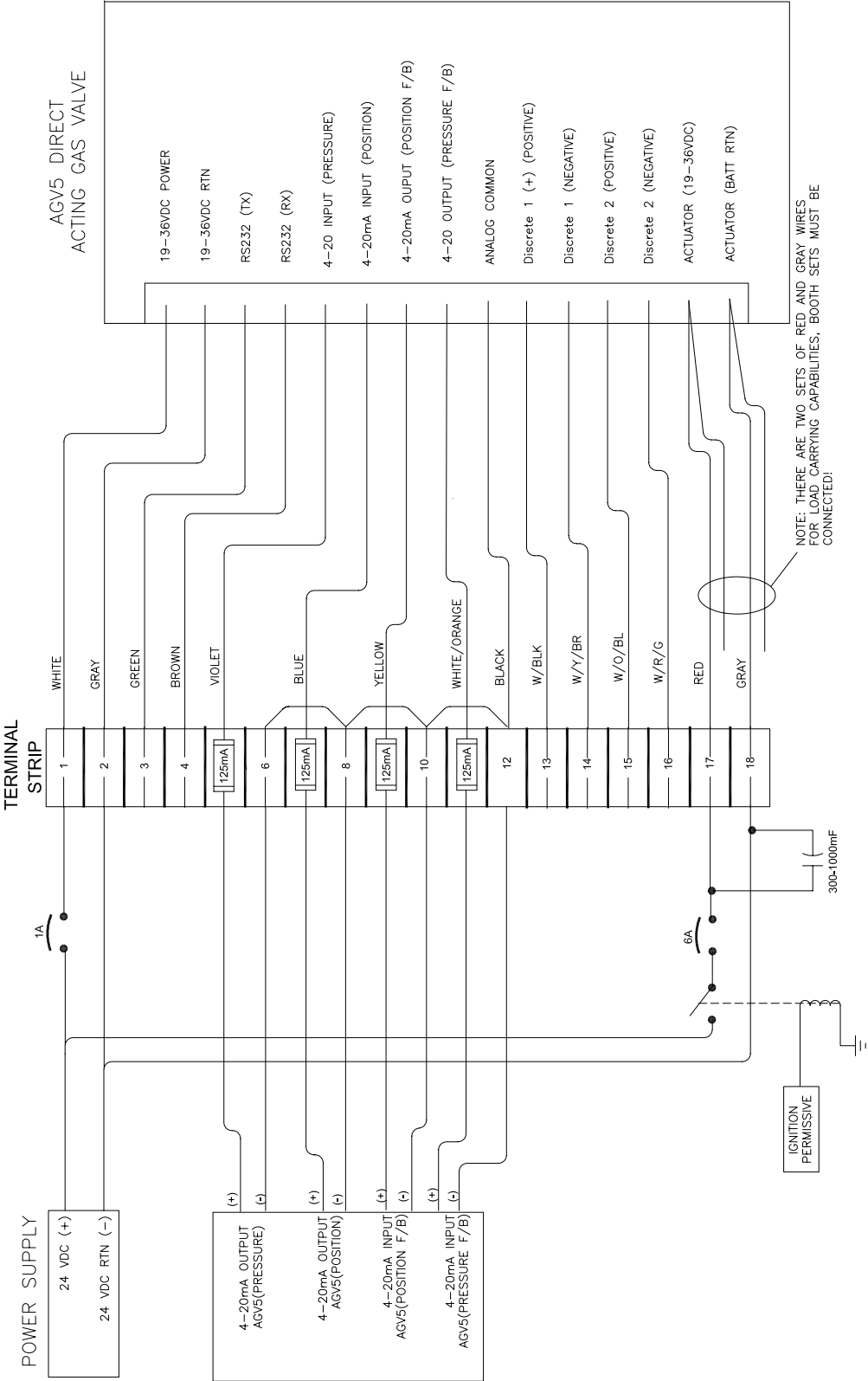
- Control is by pressure if input connection is only to pressure.
- Control is by position if input connection is only to position.
- Control is by low-select if input connection is to both pressure and position.

It is recommended that an interposing relay be installed with the AGV5 actuator wiring to provide a means of emergency shutdown. The relay would be wired to interrupt the power to the AGV5 actuator (see page 2-4) in the event the system (PLC) detects a faulty condition. An output of the PLC would control the actuating coil of the relay. When the engine is shut down, the block and bleed valve should close, and the input to the AGV5 should be 4 mA to minimize heating of the valve with no gas flow.

Section 3
DRAWINGS



AGV5 GAS METERING VALVE
ENVELOPE DRAWING, 2" CLASS 150 FLANGE

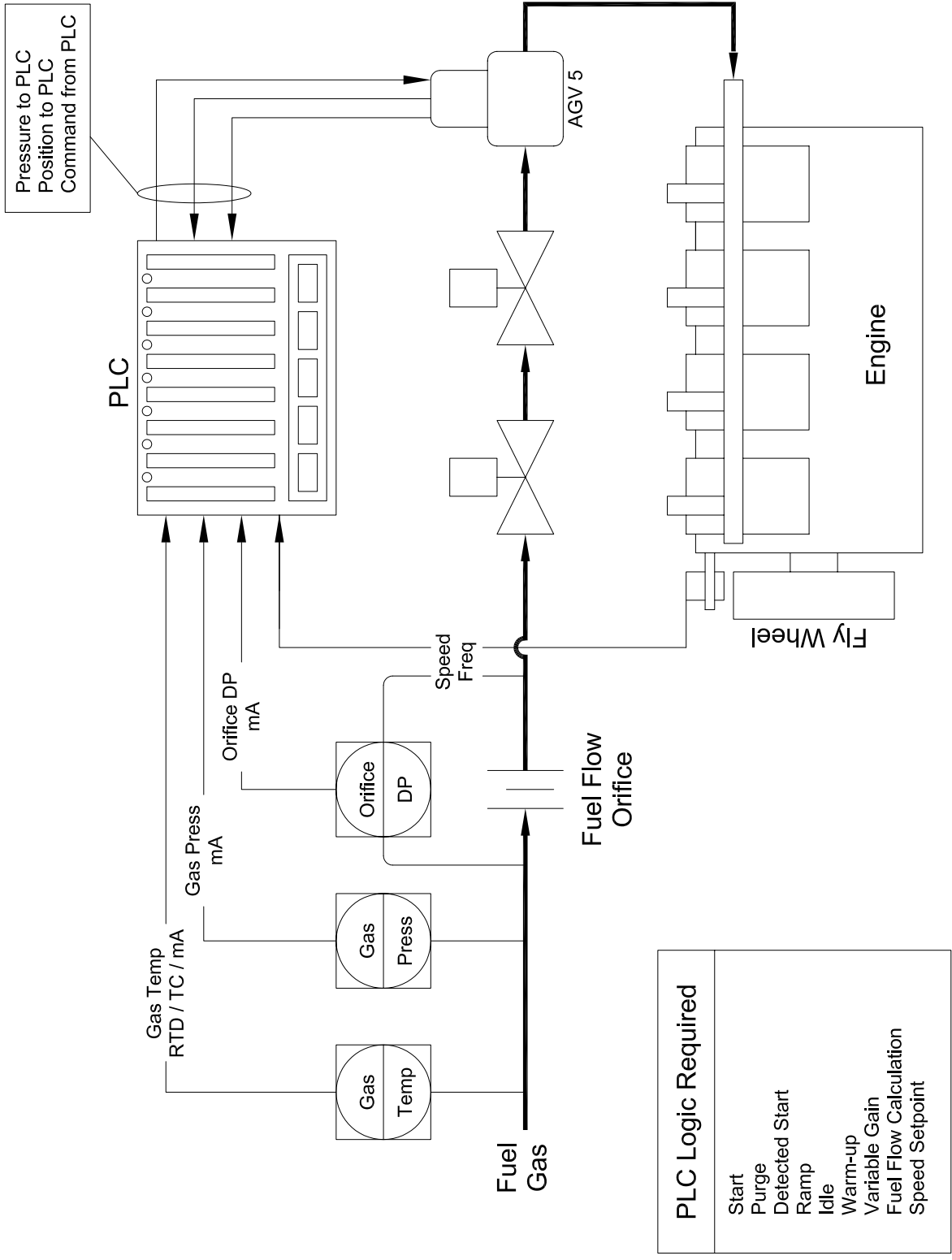


AGV5 WIRING DIAGRAM

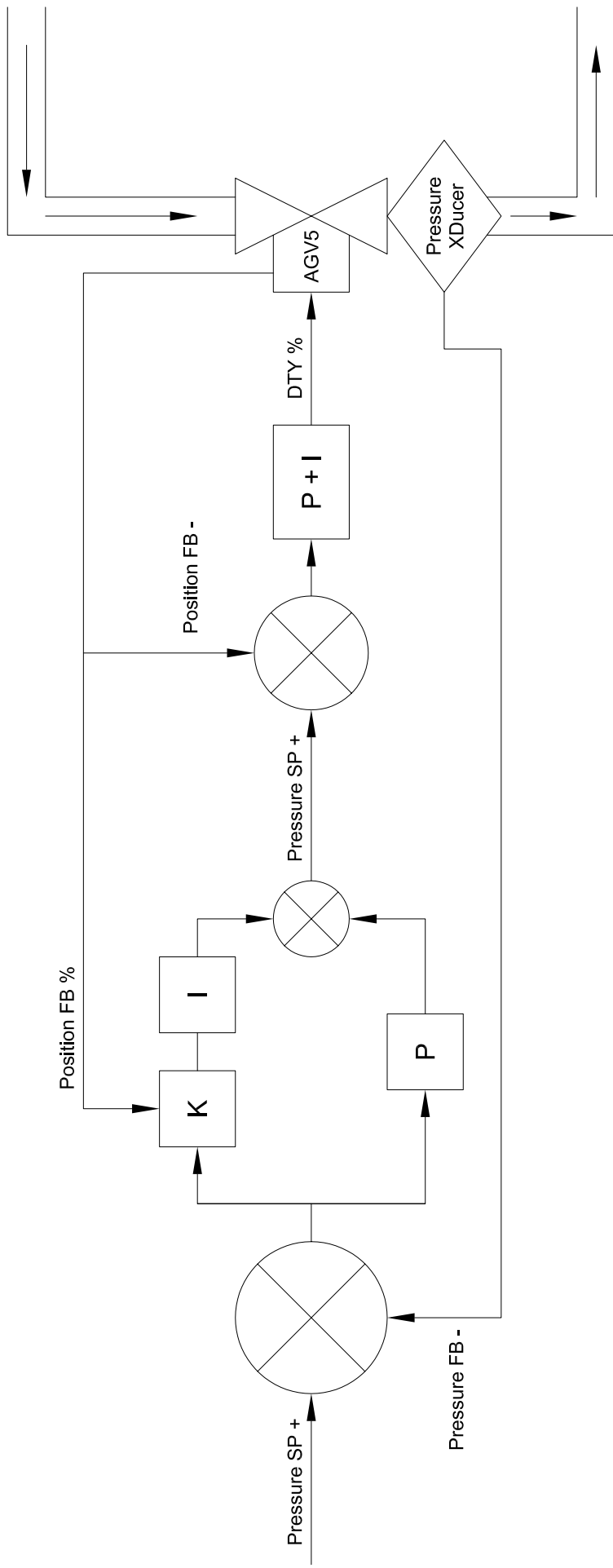
NOTES:

1. USE OF APPROPRIATE FUSES & CIRCUIT BREAKERS SHOULD BE INCORPORATED.
2. CURRENT TO ELECTRONICS BOARD SHOULD NOT EXCEED 250mA, NORMAL CONDITIONS.
3. ACTUATOR REQUIRES 5A AT 24VDC STEADY STATE, NORMAL CONDITIONS.
4. RS232 COMMUNICATIONS IS FOR CCC USE ONLY.
5. EACH ANALOG INPUT (AGV5) REQUIRES 5V AT 20mA.
6. EACH ANALOG OUTPUT (AGV5) CAPABLE OF 5V AT 20mA.
7. ALL ANALOG POINTS ARE VOLTAGE COMMON.
8. 16AWG MINIMUM SIZE INSTRUMENTATION WIRING (DIST. DEPENDANT FOR VOLTAGE DROP)
9. SEPARATE BATTERY POWER WIRING SHOULD BE APPLIED TO ACTUATOR.
10. THE ONLY VOLTAGE CONNECTIONS TO THE AGV 5 ARE THE WHITE/GREY AND RED/GREY WIRING COMBINATIONS. ALL ANALOG POINTS ARE NOT LOOP-POWERED.

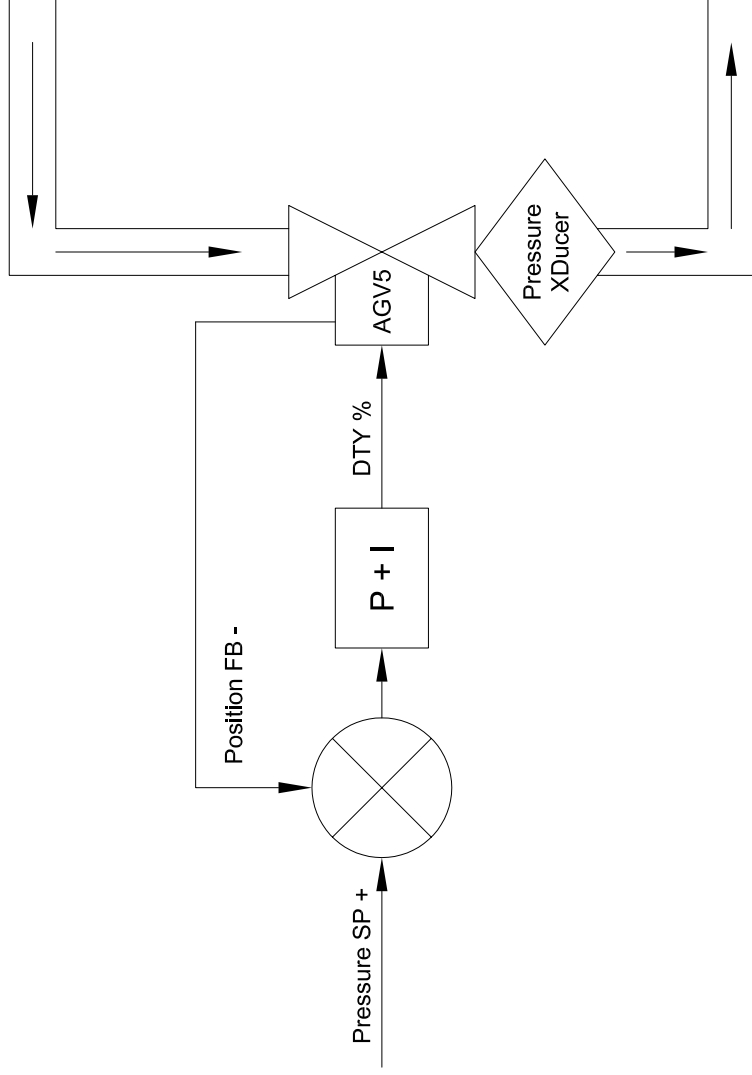
Control Diagram - AGV5 from a PLC



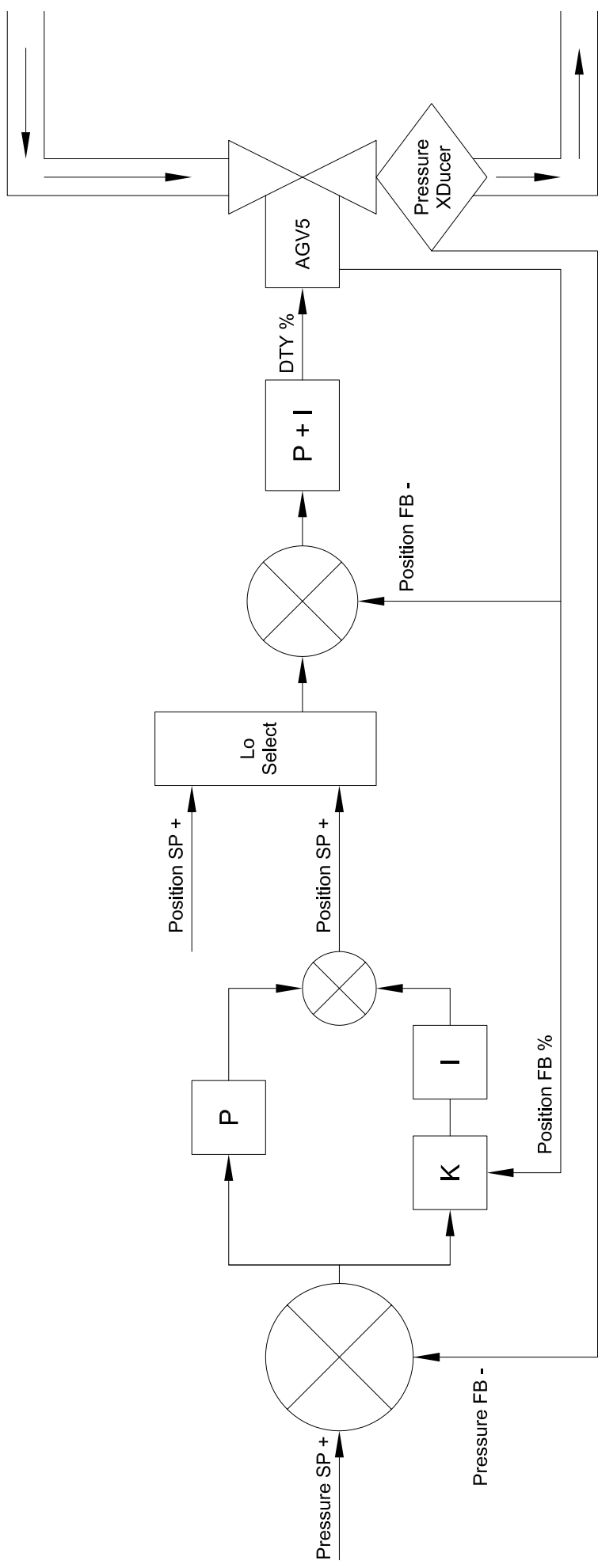
AGV5 Pressure Control Diagram



AGV5 Position Control Diagram



AGV5 Low Select Diagram



**MAXIMUM FLOW CAPACITY OF AGV-5
ACTUAL TEST DATA FOR 0.200" MAX STROKE**

Notes:

To convert cubic M / hr to scfm, multiply by 0.5886;

To convert Bar, gage to psig, multiply by 14.504

