

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

1.0 OVERVIEW

- 1.1 This manual provides instruction and maintenance information for the Advanced Gas Valve, models AGV5-xx with the Altronic circuit board assembly 872005-1. 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.

- 1.2 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, combusts 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.

WARNING: 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.

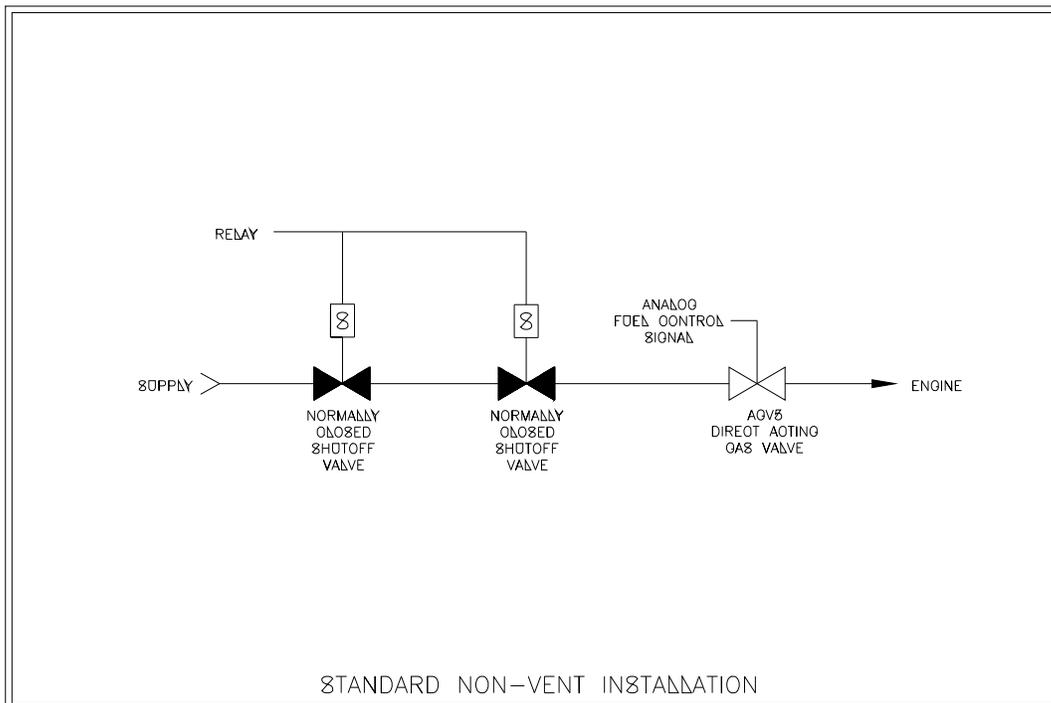
2.0 INSTALLATION

2.1 The Gas 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.

2.2 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.

2.3 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. For dimensions, refer to drawing 809 023.



3.0 ELECTRICAL CONNECTIONS

- 3.1 Refer to drawing 809 024 for electrical hookup details. The installation must conform to the applicable electrical code concerning hazardous environment installations.

WARNING: DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE 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 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.

4.0 POWER SUPPLY

- 4.1 The the AGV5 requires +20 to 36 Vdc supply (+24 Vdc typical) with peak currents of approximately 5 amps. The minimum wire size to the valve 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.

5.0 CONTROL SIGNALS

- 5.1 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.

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.

- 5.2 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 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.

6.0 CALIBRATION

- 6.1 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 curve drawing 809 029.

7.0 PLC CONFIGURATION

- 7.1 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 also available. See the overall control diagram 809 025 and the three logic diagrams (809 026, 809 027 and 809 028) for each control mode in these instructions.

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

1. Control is by *pressure* if input connection is only to pressure.
2. Control is by *position* if input connection is only to position.
3. 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 power wiring to provide a means of emergency shutdown. The relay would be wired to interrupt the power to the AGV5 in the event the system (PLC) detects a faulty condition. An output of the PLC should 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.

DRAWINGS:

809 023 GAS METERING VALVE, AGV5

809 024 WIRING DIAGRAM, AGV5

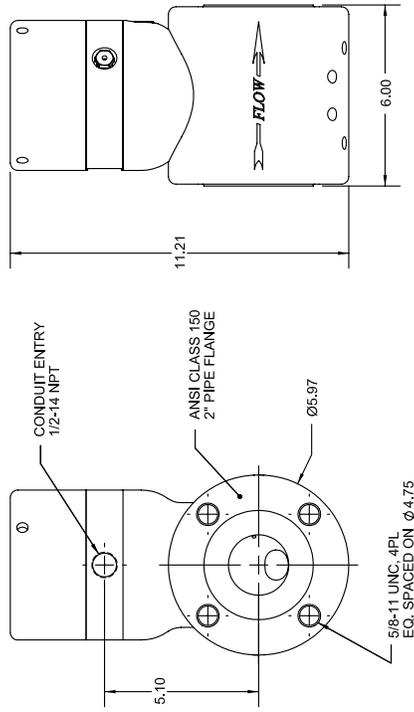
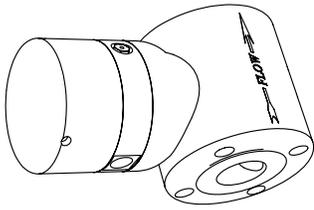
809 025 CONTROL DRAWING, AGV5 FROM A PLC

809 026 PRESSURE CONTROL DIAGRAM, AGV5

809 027 POSITION CONTROL DIAGRAM, AGV5

809 028 LOW SELECT DIAGRAM, AGV5

809 029 MAX FLOW CAPACITY OF AGV5



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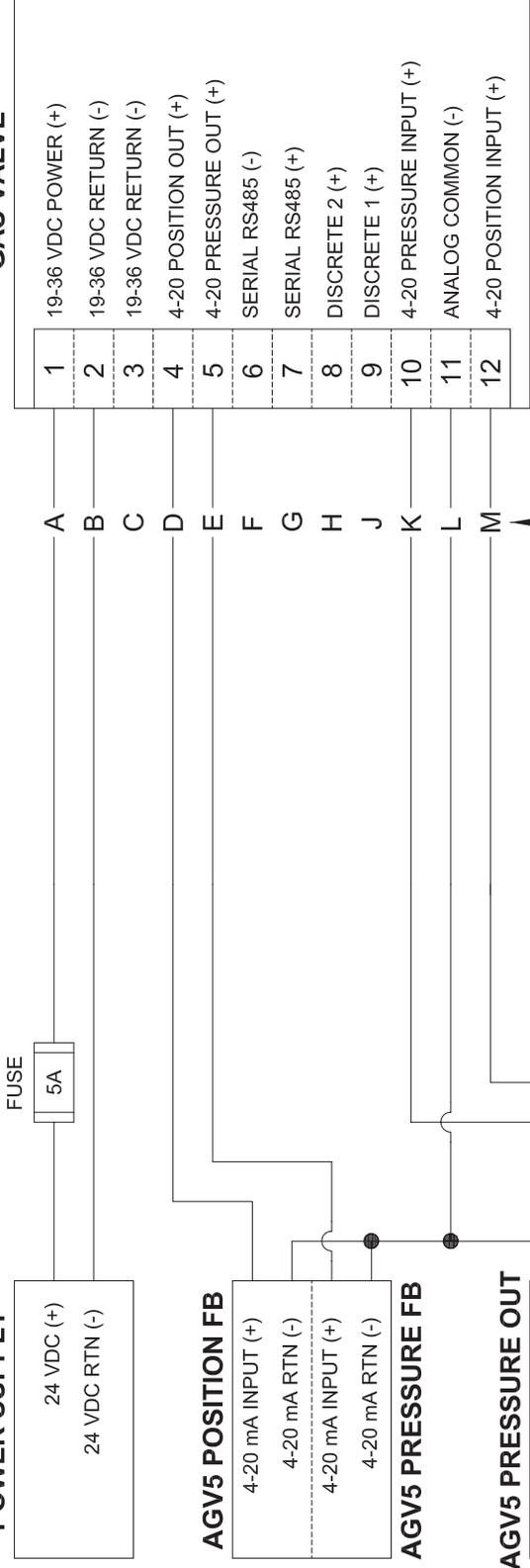
TOLERANCES (EXCEPT AS NOTED)				
DECIMAL	XXX - .006			
FRACTIONAL	XX - ±.010			
MATERIAL				

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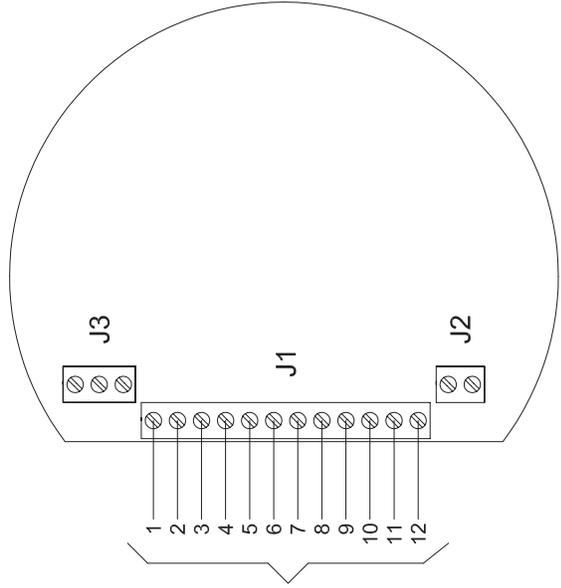
ALTRONIC INC.				
TITLE	AGV5 GAS METERING VALVE 2" CLASS 150 FLANGE			
DRAWN BY	WTP	SCALE	NONE	DRAWING NUMBER
CHECKED BY	DATE	9-3-03		809 023
APPROVED BY				

AGV5 DIRECT ACTING GAS VALVE

1	19-36 VDC POWER (+)
2	19-36 VDC RETURN (-)
3	19-36 VDC RETURN (-)
4	4-20 POSITION OUT (+)
5	4-20 PRESSURE OUT (+)
6	SERIAL RS485 (-)
7	SERIAL RS485 (+)
8	DISCRETE 2 (+)
9	DISCRETE 1 (+)
10	4-20 PRESSURE INPUT (+)
11	ANALOG COMMON (-)
12	4-20 POSITION INPUT (+)



WHEN USING CONNECTOR ADAPTOR (893004-1), CONNECT PINS AS SHOWN.

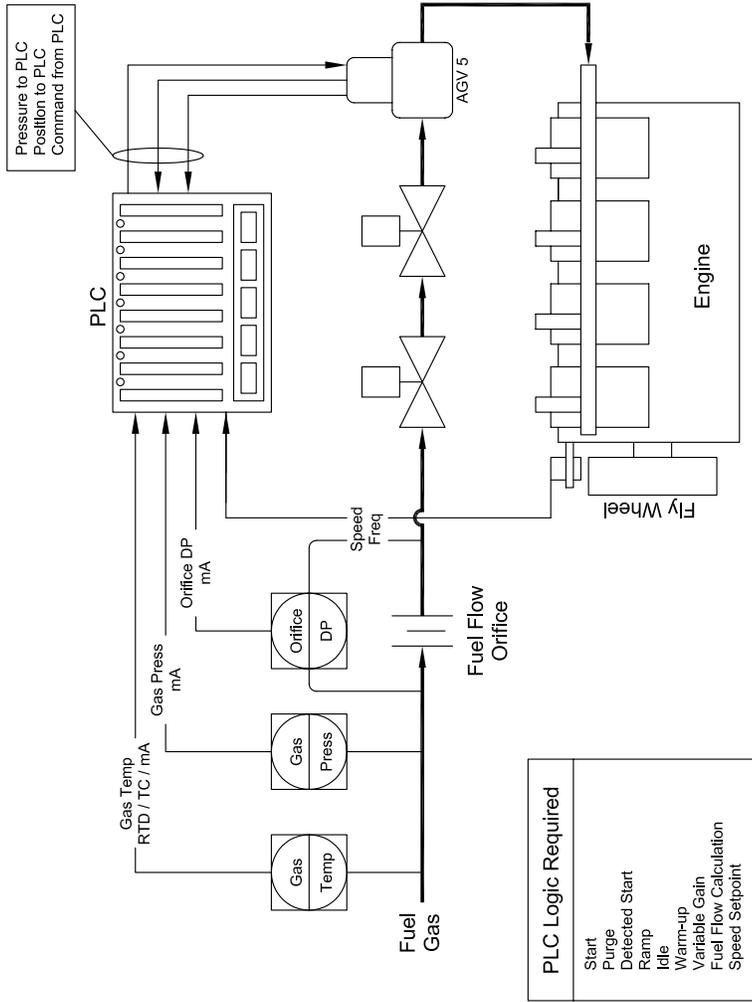


FIELD WIRING

NOTES:

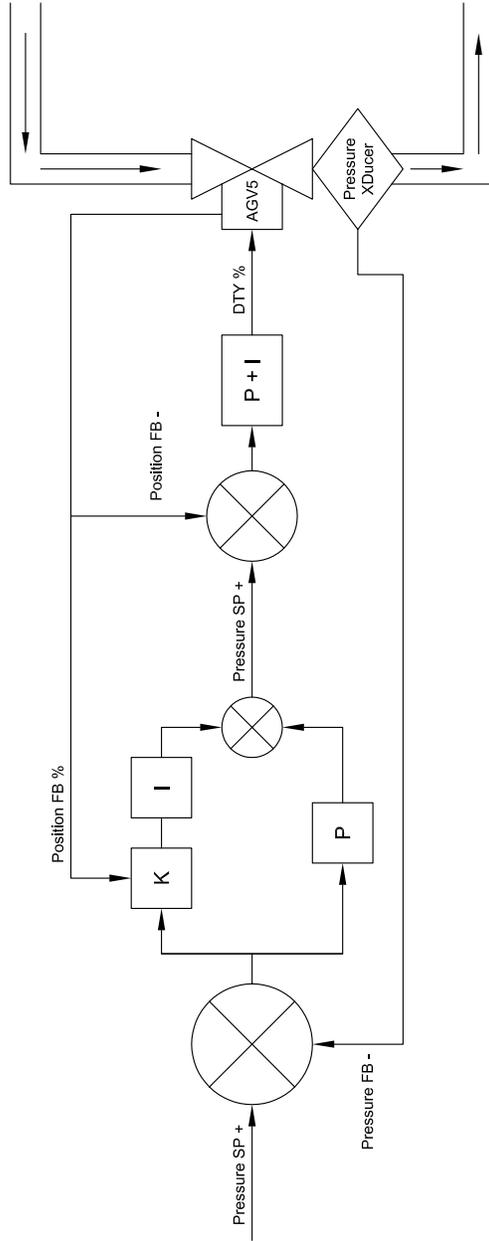
1. USE OF APPROPRIATE FUSES AND CIRCUIT BREAKERS SHOULD BE INCORPORATED.
2. EACH ANALOG INPUT REQUIRES 4V AT 20mA.
3. EACH ANALOG OUTPUT IS CAPABLE OF 5V AT 20mA.
4. ALL ANALOG POINTS ARE VOLTAGE COMMON.
5. INSTRUMENTATION WIRING REQUIRES 16AWG MINIMUM (DISTANCE DEPENDANT ON VOLTAGE DROP).
6. THE ONLY VOLTAGE SUPPLY CONNECTIONS ARE TO TERMINALS 1 AND 2. ANALOG INPUTS AND OUTPUTS ARE NOT LOOP POWERED.

REVISIONS		TOLERANCES (unless noted)		ALTRONIC INC.	
NO.	DATE	BY	DESCRIPTION	TITLE	WIRING DIAGRAM, AGV5
1				DRAWN BY	GET
2				CHECKED BY	DATE
3				APPROVED BY	SCALE
4					DATE
5					9-3-03



REVISIONS		TOLERANCES (EXCEPT AS NOTED)	
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ALTRONIC INC.			
TITLE CONTROL DIAGRAM AGV5 FROM A PLC			
DRAWN BY	WTP	SCALE	DRAWING NUMBER
CHECKED BY		DATE	809 025
APPROVED BY			

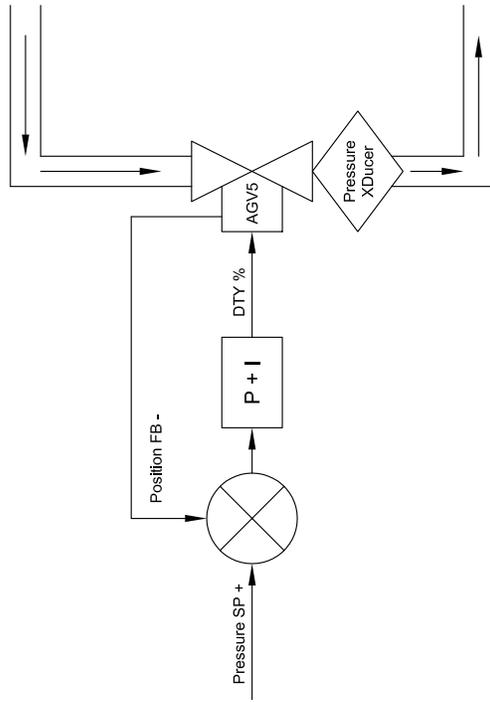


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TOLERANCES (EXCEPT AS NOTED)			
DECIMAL	XXX - ±0.05		
FRACTIONAL	XX - ±0.10		
MATERIAL			

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ALTRONIC INC.			
TITLE	PRESSURE CONTROL DIAGRAM AGV5		
DRAWN BY	WTP	SCALE	NONE
CHECKED BY		DATE	9-3-03
APPROVED BY			
			DRAWING NUMBER 809 026

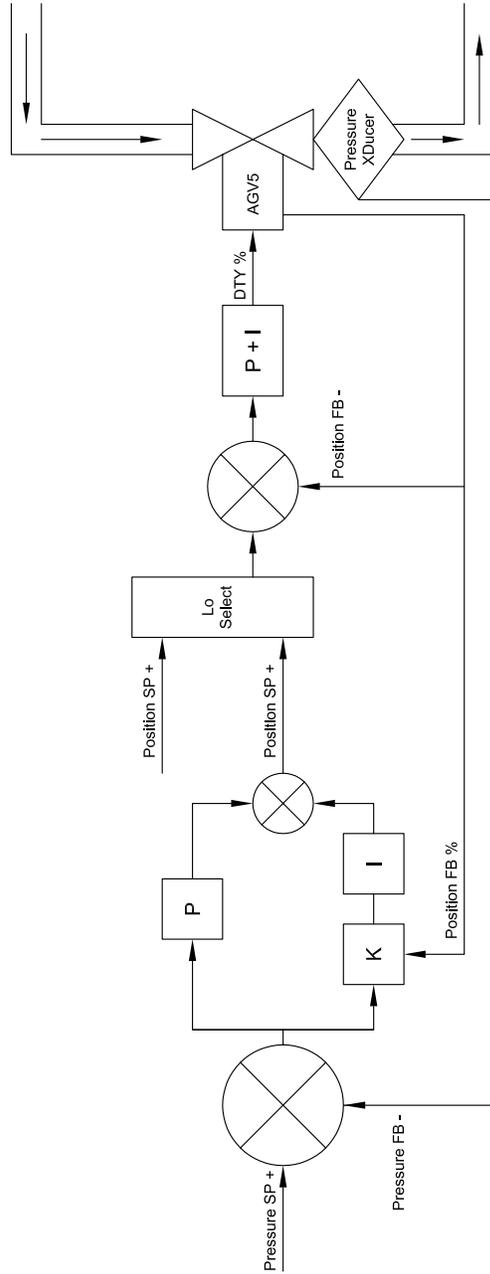


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TOLERANCES (EXCEPT AS NOTED)	
DECIMAL	XXX - ±0.05
FRACTIONAL	XX - ±0.010
MATERIAL	

ALTRONIC INC.			
TITLE		POSITION CONTROL DIAGRAM AGV5	
DRAWN BY	WTP	SCALE	NONE
CHECKED BY		DATE	9-3-03
APPROVED BY		DRAWING NUMBER 809 027	



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TOLERANCES (EXCEPT AS NOTED)				
DECIMAL	L:0.05			
FRACTIONAL	XX: ±0.10			
MATERIAL				

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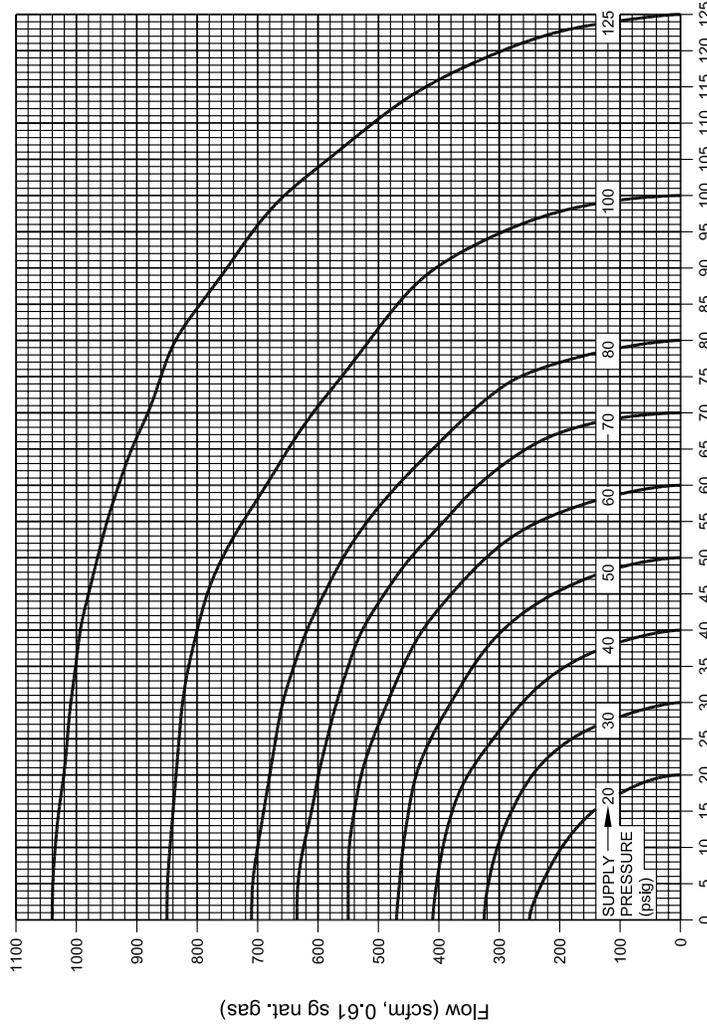
ALTRONIC INC.				
TITLE: LOW SELECT DIAGRAM AGV5				
DRAWN BY	WTP	SCALE	NONE	DRAWING NUMBER
CHECKED BY		DATE	9-3-03	809 028
APPROVED BY				

ACTUAL TEST DATA FOR 0.200" MAX STROKE

Notes:

To convert cubic M / hr to scfm, multiply by 0.56886;

To convert Bar, gage to psig, multiply by 14.504



Manifold Pressure (psig)

REVISIONS		TOLERANCES (EXCEPT AS NOTED)		ALTRONIC INC.		
NO.	DATE	BY	DESCRIPTION	DECIMAL	FRACTIONAL	MATERIAL
1				XXX ±.006		
2				XX ±.010		
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TITLE				MAXIMUM FLOW CAPACITY OF AGV5		
DRAWN BY	WTP	SCALE	NONE	DRAWING NUMBER	809 029	
CHECKED BY		DATE	9-3-03			
APPROVED BY						