Department of consumer and corporate affairs / Ministère de la consommation et des corporations

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL
AVIS D'APPROBATION

G-110

OTTAWA June 10, 1975

ANDERSON, GREENWOOD & COMPANY,
TYPE R2/P1 PRESSURE REGULATOR

Apparatus

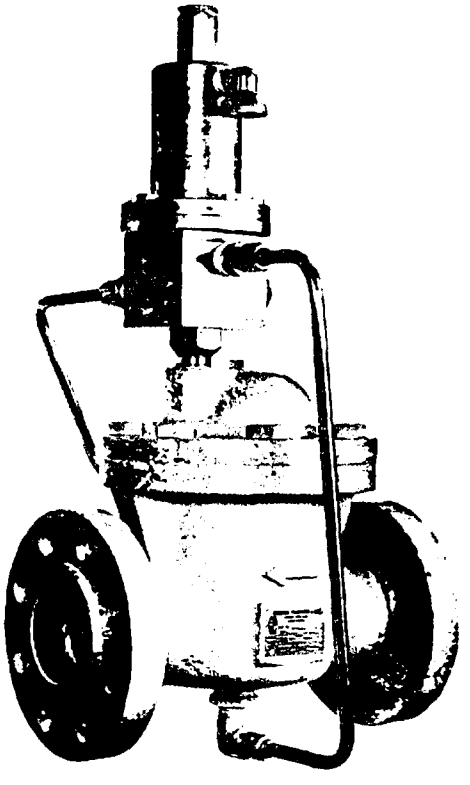
Model Designation	R2/P1
Maximum Inlet Pressure, psig	125
Outlet Pressure Range, psig	1 to 60
Approved Maximum Flow	
0.6 Sp. Gr. Gas, SCFH*	10,000
Valve Body Connections and Sizes	
(a) screwed NPT	1 inch
(b) welded	1 inch
(c) flanged ANSI	1 inch
Main Nozzle (i.e. Orifice) Sizes	
% of Standard Nozzle Capacity	Actual Inside Diameter, inches
100%	0.768
70%	0.590
50%	0.495
30%	0.381

* For some operating conditions the flow is less.

Approval is hereby granted for the use of the above-named apparatus in Pressure Factor Measurement Installations.

This Approval is conditional upon the installation conforming strictly to "Rules for Pressure Factor Measurement Installations" which may be issued by the Branch.

Theory of operation, setting instructions, sizing and connection details, flow limitations, etc., may be obtained from the appropriate manufacturer's bulletin. In cases where the information in these bulletins differs from that entered here, or is not available, the data entered in this Notice shall govern.



TYPE R2/ P1

PRESSURE REDUCING REGULATOR

ANDERSON, GREENWOOD & CO.

INDUSTRIAL PRODUCTS DIVISION

FIGURE I

Description

The R2/P1 consists basically of two major assemblies:

1) the R2 Main Valve Body which contains the nozzle (referred to as an "orifice" in the other makes of pressure regulators) and the main actuating diaphragm with its retainer and the main spring, and

2) the P1 Pressure Reducing Pilot which is a separate assembly from the Main Valve Body and which contains an adjustable "set pressure" spring and diaphragm.

This pilot is mounted directly on the main valve body. Remotely mounted pilots are not approved.

Figure 1 shows external view of the regulator and Figures 2A, 2B and 2C show cross-sectional views of the R2 main valve, the P1 pressure reducing pilot and the R2/P1 assembly respectively, giving details of the internal components.

In operation the upstream pressure enters the main valve body and acts against the main valve diaphragm. Due to an unbalanced dome area design the R2 valve will shut off whenever the dome pressure is equal to the inlet pressure. The sleeve/diaphragm retainer assembly is lightly spring-loaded to provide initial closing under zero pressure.

A reduction of pressure in the dome will cause the entire assembly to move upward, lifting the sleeve off the main seat, allowing flow downstream. The amount of lift will depend upon the degree of pressure reduction in the dome. The greater the differential, the wider the valve opens. The valve is stabilized by the sloping dome design. As the valve opens, the cap supports more of the diaphragm, causing a reduction in the working area and the total upward force. At a given inlet pressure and a certain pressure differential across the diaphragm, the valve will open to a point where the total forces are in balance. To open the valve more it is necessary for the pilot to further decrease the dome pressure.

The P1 Pilot is used with the R2 Main Valve to form a pressure reducing regulator designed to control the downstream pressure regardless of the demand or change of upstream pressure. The regulated pressure is transmitted to the sense chamber through the sense line. This pressure acts upward on the diaphragm and opposes the pilot spring. When the pilot is closed, inlet pressure is transmitted through the adjustable

R2 MAIN VALVE OPERATION

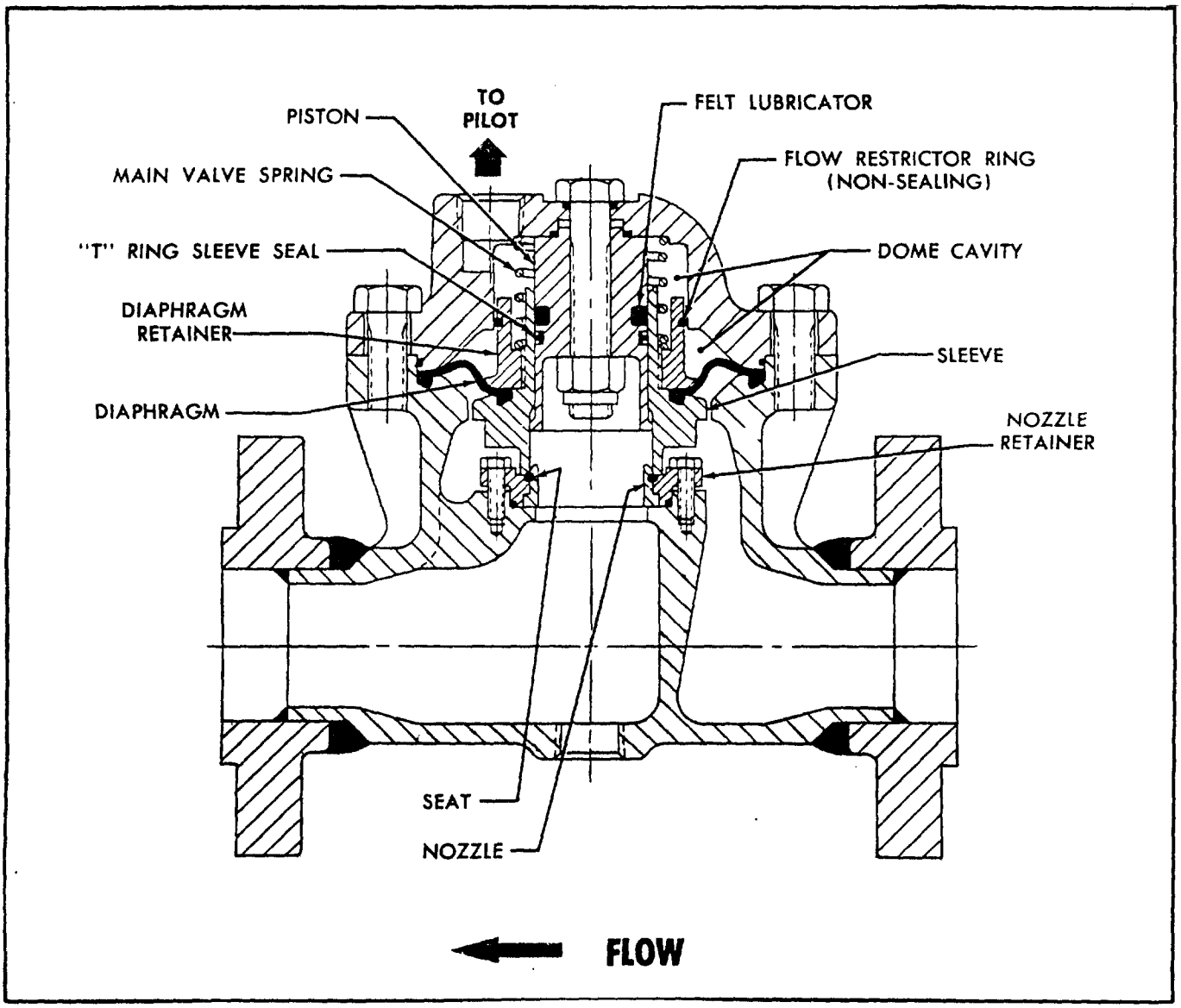


FIGURE 2A

orifice and down into the main valve dome cavity.

When the upward force on the pilot diaphragm is less than the spring force, the spring force moves the diaphragm down and the spindle pushes the sleeve off the O-ring seat. As soon as the pilot opens, inlet fluid begins to flow across the adjustable orifice (creating a pressure drop), through the nozzle, and out the pilot discharge line. The pressure drop across the adjustable orifice reduces the pressure in the pilot connection and thereby the main valve dome cavity. The amount of this drop depends upon the opening of the adjustable orifice and the amount the pilot is opened. Thus, a change in sense (regulated) pressure is reflected in the main valve dome pressure by the pilot action. As the sense (regulated) pressure changes, the main valve opening moves the amount necessary to maintain a balance in the pilot.

Table I shows the manufacturer's recommendations for settings and sizings of the regulator. This table outlines all of the specifications which the manufacturer has determined will ensure an outlet pressure within the prescribed limits of ±1% absolute pressure.

The R2/P1 regulator is available with a series of interchangeable, restricted capacity, nozzles to provide a percentage of the total capacity of the valve. Operational characteristics of the regulator remain the same, regardless of the size of nozzle used. However, it should be noted that maximum capacities, listed in Table I are to be multiplied by the appropriate nozzle percentage when other than the 100% nozzle is used. Although the manufacturer's tables list capacities in excess of 10,000 SCFH, the approved maximum flow-rate of 10,000 SCFH remains in force at this time.

In Table I the heading "ORIFICE SETTING" refers to the numeral to which the "Orifice Adjustment Screw" on the Pressure Reducing Pilot must be set to achieve proper operation. (Refer to Figure 2C). It is important to note that the "SET POINT INLET PRESSURE" remains constant up to outlet pressures of 20 psi but that the spring type and the set flow rate vary for each outlet pressure level.

P1 PRESSURE REDUCING PILOT OPERATION

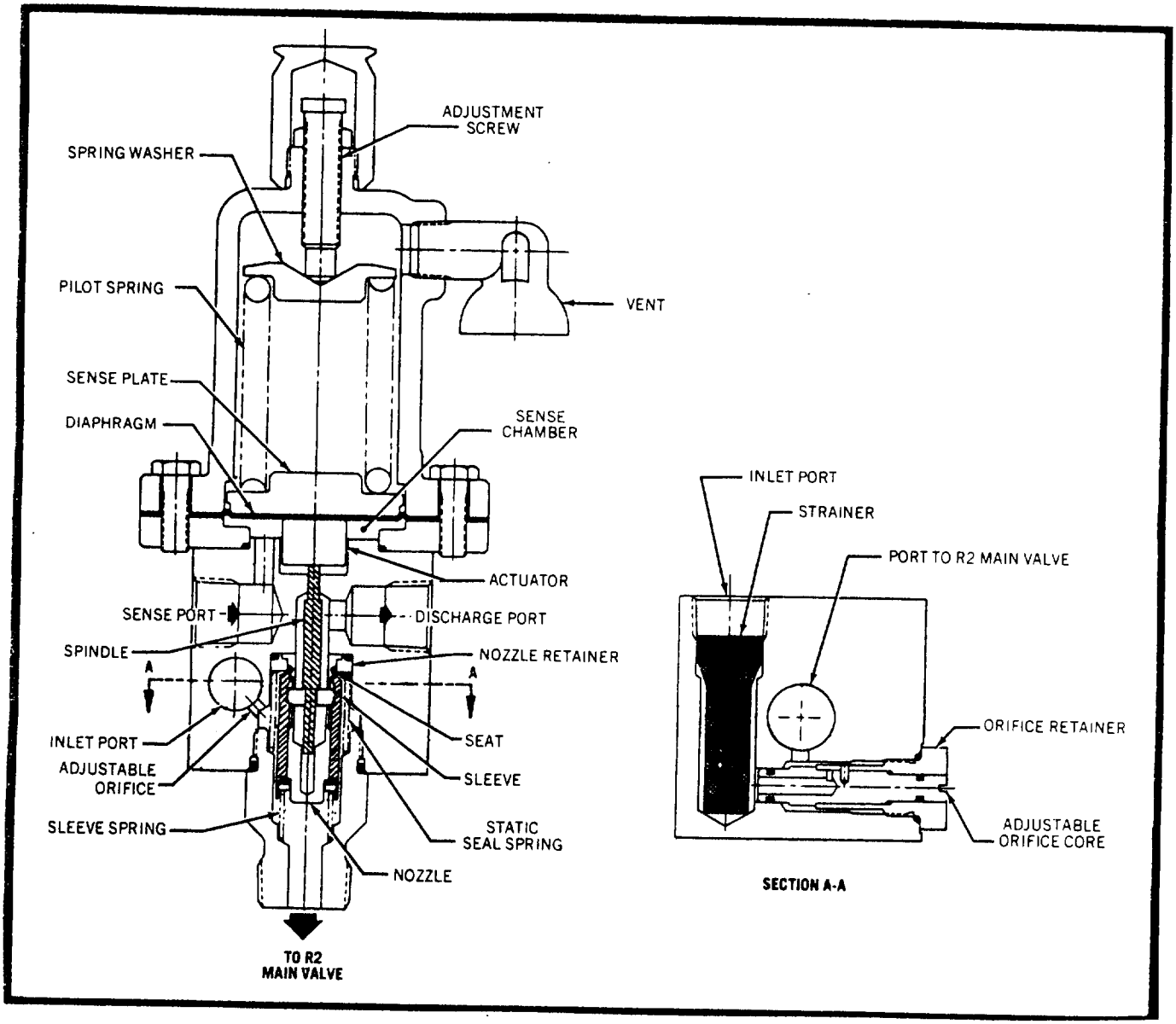


FIGURE 2B

Detailed description and more complete data for this type of regulator are contained in manufacturer's Catalog No. 7000, dated May 1975 and Reports No. 2-0175-54, dated October 29, 1971 and No. 2-0175-67, dated June 8, 1972, Rev. D, 1-8-73.

For field test procedure, refer to Technical Gas Circular G-75-3.

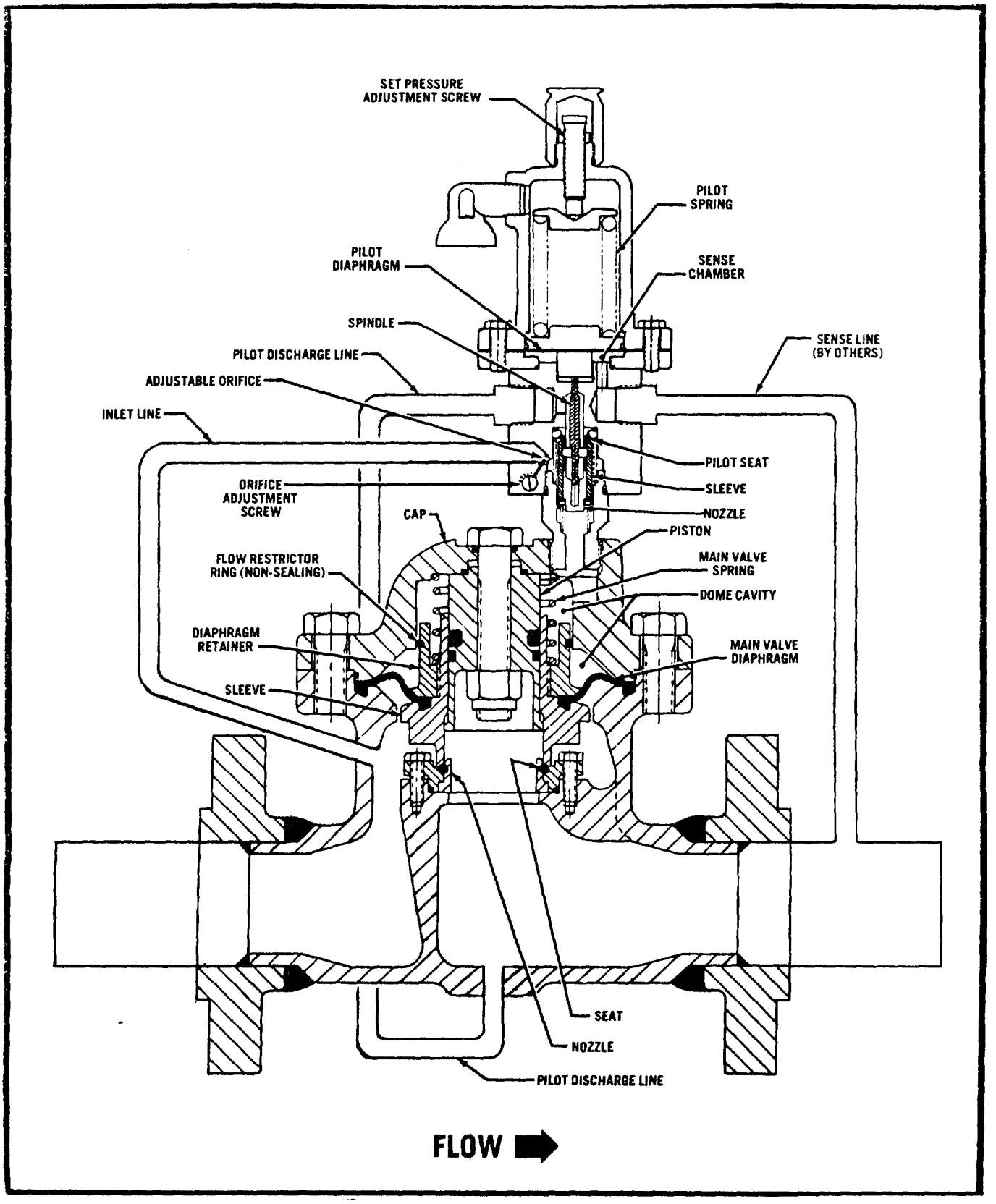
Approval granted to:

Cantech Controls Ltd.,
Calgary, Alberta.

J. L. Armstrong,
Chief, Standards Laboratory,

D.L. Smith,
Chief, Electricity & Gas Division,
Metrology and Laboratory Services

Ref:GL 1147-57/C688-172



TYPE R2/P1 PRESSURE REDUCING REGULATOR SHOWN

FIGURE 2C

VALVE TYPE: AGCO R2/P1
VALVE SIZE: 1 Inch
NOZZLE SIZE: 100%

PILOT INFORMATION				SET POINT CONDITIONS		LOCK UP PRESS. (PSIG)	OUT-LET PRESS. (PSIG)	CAPACITIES IN 1,000 SCFH OF 0.6 S.G. NATURAL GAS @ OUTLET PRESSURE LIMITS OF ± 1% ABSOLUTE						
								INLET PRESSURE (PSIG)						
BASIC PILOT TYPE	ORIFICE SETTING	DAMPER VALVE SETTING	SPRING COLOR CODE	INLET PRESS. (PSIG)	FLOW RATE (SCFH)			20	30	40	60	80	100	125
Type P1 Pilot 0.6-6.0 PSIG Range (50 sq.in. Sense Area)	"2"	Closed	Blue	40	4,928	1.07	1	13.9	19.3	23.5	27.0	27.3		
			Violet	40	5,055	2.09	2	13.1	18.8	23.3	28.0	28.0		
			Violet	40	4,573	3.05	3	12.6	18.5	23.2	28.8	28.9		
			White	40	5,754	5.15	5	10.5	16.1	22.9	25.3	27.2	26.8	
Type P1 Pilot 5-300 PSIG Range (3 sq.in. Sense Area) With The Same Internal Parts As Above	"2"	Closed	Red	40	7,277	10.6	10		10.9	18.2	29.7	31.1	30.5	
			Orange	40	7,748	15.5	15		11.0	15.1	22.4	22.2	13.9	15.7
			Orange	40	5,325	20.5	20			14.6	18.9	19.0	16.8	17.0
		1/8 Turn Open (Built-In Type)	Green	80	5,466	30.6	30				21.1	23.7	23.8	23.4
			Green	80	5,675	40.4	40				17.6	33.0	33.7	33.7
			Blue	80	7,051	50.5	50					30.0	40.4	40.4
			Blue	80	5,920	60.6	60					23.1	38.0	38.0

TABLE I

MANUFACTURER'S RECOMMENDED SETTINGS

AND MAXIMUM CAPACITIES