Honeywell

V4055A,B,D,E
On-Off Fluid Power Gas Valve Actuator

PRODUCT DATA

APPLICATION

The V4055 Gas Valve Actuator, in combination with a VE5000[a], V5055 or V5097 Gas Valve, controls the gas supply to commercial and industrial burners.

When replacing a V4034 with a V4055, the V5034 gas valve must also be replaced with a V5055 or V5097 gas valve.

FEATURES

- The V4055 Actuator, when used with the VE5000[a], V5097 or V5055 Valve, is rated for final safety shutoff service.
- The V4055 Actuator can be used with the characterized guide model of the V5055 or V5097 Gas Valve to enhance lightoff smoothness.

NOTICE: Per Industry Standards, the actuator is required a conduit seal or a cable type that is sealed be installed in a device that can result in a flammable liquid flow through a conduit or cable to an electrical ignition source in the event of a seal leakage or diaphragm failure.

- The standard model has an opening time of 26 seconds at 60 Hz or 32 seconds at 50 Hz. A fast-opening model is available with timings of 13 seconds at 60 Hz or 16 seconds at 50 Hz.
- Maximum closing time is one second, which meets code, standard and insurer requirements.
- Models available with damper shaft, with or without spring return; shaft extends out both sides and rides in Teflon-like Delrin bushings; used with standard 7616BR Damper Crank Arm.
- Red OPEN indicator attached to actuator stem shows when valve is even slightly open; yellow SHUT indicator on valve stem shows only when gas valve is fully closed.
- Models available with adjustable max flow limit switch.
- Ambient temperature rating is -40°F to +150°F (-40°C to +66°C) for 60 Hz models and -10°F to +158°F (-23°C to +70°C) for 50 Hz and 50/60 Hz models.
- Valve and actuator combinations can be mounted in any position, with the exception of the 220 to 240 Vac, 50/60 Hz models, which are mounted vertically.
- Models available with factory-installed single pole double throw (spdt) field-adjustable Auxiliary Switch. Field-addable Auxiliary Switch kits are also available.
- Standard enclosure meets NEMA 1 (IP30) requirements; models available with NEMA 4 (IP54) weatherproof enclosure.
- V4055D and high pressure V4055E with Proof-of-Closure Switch and V5055/V5097C or E with valve seal overtravel interlock (double seal) to meet specific code, standard and insurer requirements.

[a] VE5000 is a European manufactured and approved valve for European use only.

Contents

60-2309-14

SPECIFICATIONS

Models:
V4055A Actuator, with V5055, V5097 or VE5000 Gas Valves, provides on-off control of fuel. With proper adapter (see Accessories), it replaces the V4034 Actuator on a V5034 Gas Valve.
V4055B Actuator is a high pressure version of V4055A.
V4055D Actuator is identical to V4055A, except has a Proof-of-Closure Switch. Used with V5055C/V5097C (double seal) for valve seal overtravel interlock.
V4055E Actuator is identical to V4055B, except has a Proof-of-Closure Switch. Used with V5055E/V5097E (double seal) for valve seal overtravel interlock.
NEMA 4 weatherproof models available.

Nominal Opening Time: See Table 1.

Table 1. Nominal Opening Time (seconds).

Model	50 Hz	60 Hz
Standard	32	26
Fast-opening	16	13

Maximum Closing Time: One second when de-energized.

Ambient Operating Temperature Ratings:
60 Hz Models: -40°F to +150°F (-40°C to +66°C).
50 Hz, 50/60 Hz Models: -10°F to +158°F (-23°C to +70°C).

Mounting: V4055 Actuator attaches directly to V5055/V5097 Valve with two sets of screws positioned 90 degrees apart. Combination is multipoise.

NOTE: 220 to 240 Vac, 50/60 Hz models are vertical mount only.

Pressure Ratings: See Table 2.

Table 2. Pressure Ratings of Valve-Actuator Combinations.

Model	Pipe Size	STANDARD PRESSURE ACTUATORS V4O55A, D, F, G				HIGH PRESSURE ACTUATORS V4O55B, E			
		M.O.P.D.[a]		Max. Rated Pressure[b]		M.O.P.D.[a]		Max. Rated Pressure [b]	
STANDARD PRESSURE VALVES V5055A, B, C, F, V5097A, B, C	3/4” to 1-1/2”[c]	5 PSI	340 mbar	15 PSI	1.0 Bar	15 PSI	1030 mbar	15 PSI	1.0 Bar
	2” to 3”[d]	5 PSI	340 mbar	15 PSI	1.0 Bar	15 PSI	1030 mbar	15 PSI	1.0 Bar
	4” flanged[e]	3 PSI	207 mbar	15 PSI	1.0 Bar	5 PSI	340 mbar	15 PSI	1.0 Bar
HIGH PRESSURE VALVES V5055D, E, V5097D, E	3/4” to 1-1/2”[c]	5 PSI	340 mbar	75 PSI	5.0 Bar	25 PSI	1720 mbar	75 PSI	5.0 Bar
	2” to 3”[d]	5 PSI	340 mbar	45 PSI	3.0 Bar	15 PSI	1030 mbar	45 PSI	3.0 Bar

[a] Max Operating Pressure Differential (UL) or Max Operating Pressure (CSA): maximum allowable pressure drop from inlet to outlet for proper operation.

[b] Max rated pressure (UL) or Max Close-off Pressure (CSA): maximum pressure that the valve can be exposed to without leakage or damage to the valve.

[c] Applies for small-body V5097 valves 3/4” up to 2” pipe size.

[d] Applies for large-body V5097 valves 2” up to 3” pipe size.

[e] V5055A, B, C only.

Electrical Ratings: See Tables 3 and 4.

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number. If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Environmental and Combustion Controls Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
   1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386
3. http://customer.honeywell.com or http://customer.honeywell.ca

International Sales and Service Offices in all principal cities of the world. Manufacturing in Belgium, Canada, China, Czech Republic, Germany, Hungary, Italy, Mexico, Netherlands, United Kingdom, and United States.

Table 3. V4055A,D Electrical Ratings.

Voltage and Frequency	Opening (Standard)				Opening (Fast)				Holding		
	Inrush	(W)	(A)	VA)	Inrush	(W)	(A)	(VA)	(W)	(A)	(VA)
100/50-60[a]	—	43.0	0.91	91	—	58.0	1.30	130	10.4	0.16	16
100/50-60[b]	—	33.0	0.6	67	—	43.0	0.91	91	8.4	0.14	14
120/60	3.9	50.0	0.94	115	5.4	71.0	1.33	160	9.5	0.12	14
200/50-60[a]	—	68.0	0.79	158	—	88.0	1.10	220	10.6	0.09	18
200/50-60[b]	—	48.0	0.52	104	—	63.0	0.72	144	9.0	0.07	14
220/50	1.6	55.5	0.55	121	3.0	76.0	0.80	176	9.0	0.06	14
240/50	—	81.5	0.79	190	—	95.0	1.00	240	9.1	0.06	14
240/60	2.6	51.0	0.45	115	4.0	71.5	0.68	160	9.2	0.06	14
220-240/50-60[c]	—	—	—	—	—	70.3	0.59	136	7.2	0.07	16
220-240/50-60[d]	—	—	—	—	—	58.6	0.46	106	5.9	0.06	14

[a] 50 Hz power supply.
[b] 60 Hz power supply.
[c] 230 Vac, 50 Hz power supply.
[d] 230 Vac, 60 Hz power supply.

Table 4. V4055B,E Electrical Ratings.

Voltage and Frequency	Opening (Standard)				Opening (Fast)				Holding		
	Inrush	(W)	(A)	(VA)	Inrush	(W)	(A)	(VA)	(W)	(A)	(VA)
120/60	—	60	0.94	115	—	60.0	0.94	115	9.5	0.16	19
220-240/50-60[a]	—	—	—	—	—	68.9	0.58	133	6.7	0.08	18
220-240/50-60[b]	—	—	—	—	—	58.2	0.46	106	5.3	0.06	14

[a] 230 Vac, 50 Hz power supply.
[b] 230 Vac, 60 Hz power supply.

Auxiliary Switch and Proof-of-Closure Switch Ratings: See Table 5.

Table 5. Auxiliary Switch and Proof-of-Closure Switch Ratings (1/2 hp [0.37kW][a]).

Load	120V	240V
Full Load	9.8A	4.9A
Locked Rotor	58.8A	29.4A

[a]Maximum total connected power to both switches (if used) is 1800 VA.

Mounting Dimensions: See Fig. 1 and Table 7.

Damper Shaft: Shaft is 3/8 in. (9.5 mm) square, for use with 7616BR Damper Crank Arm (ordered separately) and with or without damper shaft return spring.

Maximum Damper Shaft Rotation: 52 angular degrees.

Maximum Force: 2-11/16 in. (68.3 mm) radius for 7616BR Damper Crank Arm ordered separately (see Accessories section).

NOTE: Damper shaft drives damper crank arm in one direction only; optional return spring is available on damper shaft to turn damper crank arm in opposite direction. See Table 6.

Table 6. Actuator Torque (With and Without Return Spring).

V4055 Model	-40°F to +20°F (-40°C to -7°C)		20°F to 150°F (-7°C to +66°C)	
	lb	N	lb	N
With return spring	5	22.2	10	44.5
Without return spring	5	22.2	20	89.0

Approvals:
Underwriters Laboratories Inc. Listed: File No. MH1639, Guide No. YIOZ.
Factory Mutual: Listed.
Canadian Standards Association certified: General Listed file numbers 158158 Class 3371
For U.S.A. and Canada: certified 60 Hz models only.
Swiss Re (Formerly GeGap/IRI) Acceptable.
Some V4055 Actuators are approved as Class A valves in accordance with EN161:
When used with V5055 Valves: Pin: CE-0063AR1359.
When used with VE5000 Series Valves: Pin: CE-0063AP3075.

Accessories:
133568 Auxiliary Switch Bag Assembly (not for models with maximum flow limit switch).
133569 Valve-Closed Indication Switch Bag Assembly.

NOTE: Check local codes for acceptance of adding the switch and using the valve seal overtravel V5055C or V5055E valves.

7616BR Damper Crank Arm (damper arm and clip).

Available Models: V4055 with NEMA 4 enclosure (weatherproof).

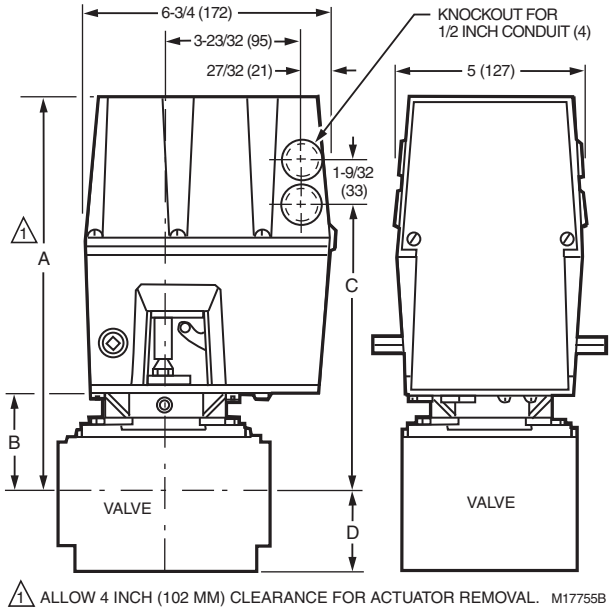

Fig. 1. Approximate mounting dimensions of V4055 Actuators in in. (mm).

Table 7. Approximate Mounting Dimensions of V4055 Actuators with V5055 and V5097 Valves.

Valve Size[a] (in.)		V5055								V5097							
		Dim. A		Dim. B		Dim. C		Dim. D		Dim. A		Dim. B		Dim. C		Dim. D	
		in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
Small Body	3/4	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	11-1/8	283	2-3/4	70	8-3/16	208	2-1/2	64
	1	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	11-1/8	283	2-3/4	70	8-3/16	208	2-/12	64
	1-1/4	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	11-1/8	283	2-3/4	70	8-3/16	208	2-1/2	64
	1-1/2	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	11-1/8	283	2-3/4	70	8-3/16	208	2-1/2	64
	2	11-1/8	286	2-7/8	73	8-5/16	211	8-3/8	213	11-3/4	298	3-3/8	86	8-3/8	213	4	102
Large Body	2	11-3/4	298	3-3/8	86	8-13/16	224	9-1/4	235	1-3/4	298	3-3/8	86	8-3/8	213	4	102
	2-1/2	11-3/4	298	3-3/8	86	8-13/16	224	9-1/4	235	11-3/4	298	3-3/8	86	8-3/8	213	4	102
	3	11-3/4	298	3-3/8	86	8-13/16	224	9-1/4	235	11-3/4	298	3-3/8	86	8-3/8	213	4	102
	4	14-1/8	359	5-13/16	148	11-7/32	285	12-1/2	318	—	—	—	—	—	—	—	—

[a] Valve size using accessory pipe adapter fitting.

INSTALLATION

When Installing This Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced flame safeguard control technician.
4. After installation is complete, check out product operation as provided in these instructions.

⚠ WARNING

Electrical Shock Hazard.
Can cause serious injury or death.
Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.

IMPORTANT:

1. *All wiring must comply with all applicable electrical codes, ordinances, and regulations. All wiring must be NEC Class 1.*
2. *Voltage and frequency of the power supply connected to this control must agree with those marked on the device.*
3. *Loads connected to the Auxiliary Switch and/or Proof-of-Closure Switch, if used, must not exceed the ratings given in the Specifications section.*

NOTICE: Per Industry Standards, the actuator is required a conduit seal or a cable type that is sealed be installed in a device that can result in a flammable liquid flow through a conduit or cable to an electrical ignition source in the event of a seal leakage or diaphragm failure.

Install Valve

The actuator is mounted directly on the valve bonnet after the valve is installed in the gas supply line. Refer to the instructions packed with the gas valve for installation details. When installing the gas valve, make sure:

1. Sufficient clearance is left to install and service the actuator.
2. Ambient temperatures at the valve location do not exceed actuator ratings. See Specifications section.
3. Position of the valve permits hookup to the damper if one is controlled.

Install Accessory Switches (If Needed)

An spdt switch can be installed to operate an auxiliary load up to 1/2 hp (0.37 kW). See Table 5. The switch can be adjusted to operate at any point in the valve stroke.

A Proof-of-Closure Switch can also be installed with a V5055/V5097C or E Valve (with double seal) on any V4055 Actuator to provide a valve seal overtravel interlock.
The Proof-of-Closure Switch is installed to make or break a circuit when the valve is in the closed position. The switch is not adjustable.

NOTE: Mark the actuator or valve to indicate any changes made.

To install the switches:

1. Remove the actuator faceplate (two screws).
2. Remove the silver-colored barrier to expose the actuator stem.
3. Insert the Auxiliary Switch in the position indicated in Fig. 2. Fasten with two screws through the actuator base.
4. Insert the Proof-of-Closure Switch in the position shown in Fig. 2. The switch mounts against the side of the actuator housing. The mounting holes are spaced to assure mounting the switch in the correct position. Fasten with two screws through the actuator base. (The Proof-of-Closure Switch is not adjustable.)
5. If only one switch is used, install the narrow barrier included with the switch in the unused space.
6. Mount the actuator before making wiring connections and adjustments to the Auxiliary Switch.

Mount Actuator on Valve

1. Check the final position of the valve body to be sure that the actuator is in the proper position when mounted on the valve. This is especially important when the actuator is used to drive a damper.
2. If two smaller sized valves are mounted very closely together, as in an Industrial Risk Insurers approved type of valve train, it may be necessary to mount the actuators off center to provide adequate clearance.

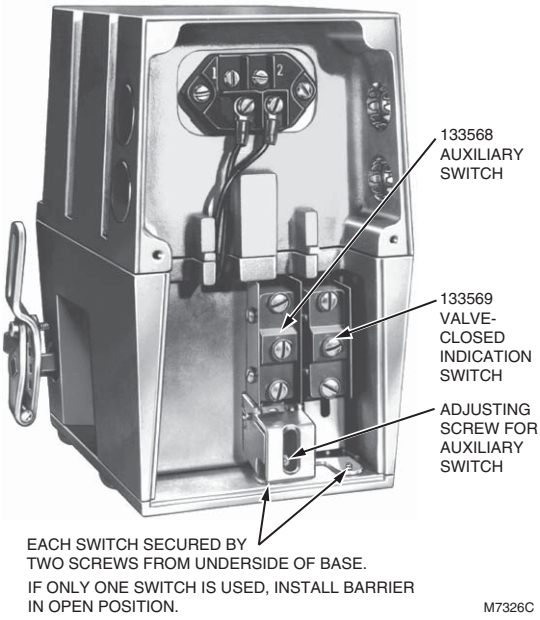

Fig. 2. V4055 Actuator with cover removed.

3. Slip the bottom collar of the actuator over the valve bonnet assembly. Rotate the actuator to the desired position and use a 5/32 in. Allen wrench to securely tighten the two setscrews to 50 to 60 lb-in. (5.7 to 6.8 N•m).
4. Connect the damper linkage, if used. Refer to the instructions packed with the damper arm.

Mount and Adjust 7616BR Damper Crank Arm (If Used)

IMPORTANT:

When a damper crank arm is used with a NEMA 4 actuator that is exposed to ice or sleet, a suitable shield must be installed to prevent ice or sleet buildup.

Follow installation and adjustment directions included with damper crank arm. Maximum push rod travel is 2-5/16 in. (59 mm) through a stroke of 52 degrees. See Fig. 3.

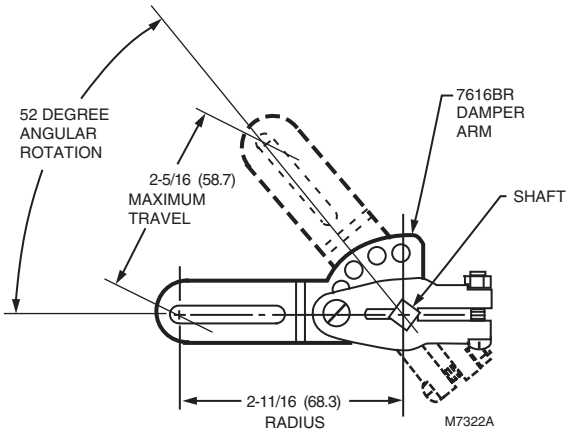

Fig. 3. 7616BR Damper Crank Arm can be attached to actuator shaft to drive a damper when valve is open.

WIRING

⚠ WARNING

Electrical Shock Hazard.
Can cause serious injury or death.
Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.

NOTICE: Per Industry Standards, the actuator is required a conduit seal or a cable type that is sealed be installed in a device that can result in a flammable liquid flow through a conduit or cable to an electrical ignition source in the event of a seal leakage or diaphragm failure.

Wiring must comply with all applicable electrical codes, ordinances and regulations. Wiring to the actuator must be NEC Class 1.

Connect the power supply to terminals 1 and 2 on the V4055 terminal strip. Refer to Fig. 4 for Auxiliary Switch connections and Fig. 5 for Max Flow Limit Switch connections. For typical system hookups, refer to instructions packed with the device used to control the valve.

When all wiring connections are complete, replace the actuator faceplate.

⚠ CAUTION

Operation Hazard.
Improper wiring can cause improper and dangerous operation.
Label all wires prior to disconnection when servicing valves. Wiring errors can cause improper and dangerous operation.

NOTE: Pipe sealant is required on the conduit threads of actuators with NEMA 4 enclosures.

Adjust Auxiliary Switch (If Used)

The Auxiliary Switch is adjustable throughout the stroke of the actuator. With the switch installed in the actuator, turn the adjusting screw (see Fig. 2) clockwise ↷ to cause the switch to operate earlier in the stroke or counter-clockwise ↶ to cause the switch to operate later in the stroke.

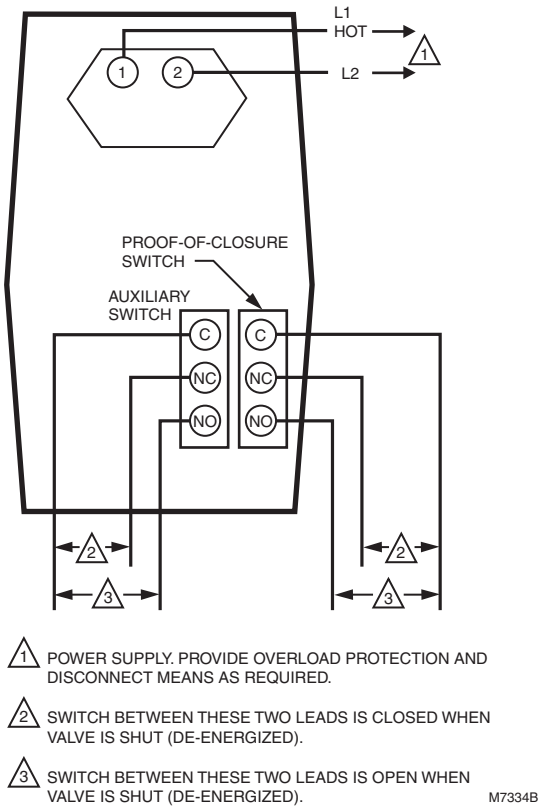

Fig. 4. External connections to the V4055 Actuator.

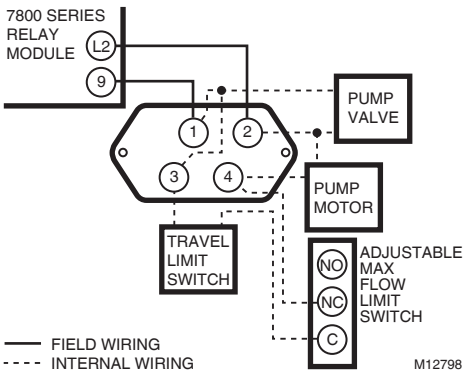

Fig. 5. Connecting the Max Flow Limit Switch to the actuator.

NOTE: The Proof-of-Closure Switch is not adjustable.

Adjust Max Flow Limit Switch (If Used)

The Max Flow Limit Switch is adjustable throughout the stroke of the actuator. With the switch installed in the actuator, turn the adjusting screw clockwise ↷ to cause the switch to operate earlier in the stroke or counter-clockwise ↶ to cause the switch to operate later in the stroke.

CHECKOUT AND SERVICE

⚠ CAUTION

Equipment Damage Hazard.
Unskilled technicians can cause equipment damage.
Only a trained, experienced, flame safeguard technician should check out and service this control.

Checkout

After the installation is complete, cycle the valve several times with the manual fuel shutoff cock closed before testing the system in actual operation.

Service

The actuator is not field repairable except for replacing the Auxiliary Switch, Max Flow Limit Switch or Proof-of-Closure Switch. See Installation section for procedure. Do not disassemble the valve actuator.

If the actuator fails to operate properly, replace it.

1. Turn off the gas supply at the manual shutoff valve located upstream from the valve(s) being serviced.
2. Shut off all electrical power to the valve actuator(s).
3. Mark and disconnect the wires from the actuator terminals. Remove conduit and disengage the damper linkage assembly (if applicable).
4. Loosen the two set screws from the valve to lift off the actuator.
5. If the actuator is to be replaced and it did not leak hydraulic fluid, skip to Step 11.

   NOTE: It is good practice to inspect the inside of the valve whenever the actuator is replaced. To do so, remove the bonnet assembly, inspect the valve and bonnet. If all is well, proceed to Step 7.

6. If the actuator leaked hydraulic fluid onto the valve (the fluid is red), it must be cleaned off from the valve and bonnet assembly.
   a. Wipe off the outer valve body.
   b. Remove the valve bonnet bolts and lift off the bonnet.

   NOTE: V5055/V5097C and E Valves have additional internal springs that will push the bonnet up as the bolts are loosened.

   c. Inspect the inside of the valve.

IMPORTANT:

If fluid is present on the inside surfaces of the valve body or bonnet surfaces, the bonnet assembly or entire valve must be replaced. See Table 8 below for the bonnet assembly part number.

   d. If the inside surfaces are clear of hydraulic fluid, clean the bonnet assembly and be sure to remove all hydraulic fluid from the inside and outside of the actuator mounting curb. This is the “cup-like” area around the valve stem. Avoid using a cleaning solution as it may damage the rubber seals used in the valve.
7. If the valve bonnet assembly is in good condition and is not replaced, replace the bonnet seal. Do not reuse the old bonnet seal. See Table 9 below for the seal number.
8. Coat seals with grease provided and position in valve body/bonnet assembly.
9. Carefully seat the bonnet assembly on the valve body. Be sure the seals are in their proper position. On those valves with a spring below the disc, be sure the spring is centered in the indentation on the inside of the valve body.
10. After positioning the bonnet assembly, replace the screws removed earlier.

    NOTE: When replacing the bonnet assembly on the 4-inch valve, draw it evenly into the valve body. Finger-tighten the eight bolts. Draw the bonnet assembly into the valve by tightening, in order, bolts 1, 5, 7 and 3 (two turns each). Repeat until the bonnet assembly is seated. Tighten the remaining bolts. Torque the bolts as follows:

Valve Size	Torque
3/4 in. (19 mm) to 1-1/2 in. (38 mm)	55 in.-lb.
2 in. (51 mm) to 4 in. (102 mm)	75 in.-lb.

11. Remount the actuator on the bonnet assembly. Tighten the two set screws (50-60 inch pounds).
12. Replace the damper crank arm assembly.
13. Re-attach the wires removed from the actuator terminals and turn on the electrical power.
14. With the gas still off, cycle the actuator to check for proper mechanical operation.

⚠ CAUTION

Be sure to perform a bonnet seal and seat leak check after installation.
Be sure to read and follow all instructions that come with the actuators, valves, seal and bonnet kits.

Table 8. Replacement Bonnets for V5055/V5097 Gas Valves.

Replacement Bonnet**	Valve		Valve Size (in in.)
133398AA	V5055A	V5097A	3/4, 1, 1-1/4, 1-1/2
133417AA			2, 2-1/2, 3
Not available	(On-Off)		4
133398BA	V5055B	V5097B	3/4, 1, 1-1/4, 1-1/2
133417BA			2, 2-1/2, 3
Not available	(Characterized Guide)		4
133398CA	V5055C	V5097C	3/4, 1, 1-1/4, 1-1/2
133417CA			2, 2-1/2, 3
136911CA	(Proof of Closure)		4
Not available	V5055D	V5097D	3/4, 1, 1-1/4, 1-1/2
Not available			2, 2-1/2, 3
136308BA	V5055E	V5097E	3/4, 1, 1-1/4, 1-1/2
Not available			2, 2-1/2, 3

****Each replacement assembly contains the bonnet assembly, two rubber seals, and a tube of grease. It must be used only on the type of valve indicated above.**

Table 9. Gas Valve Replacement Seals.

Replacement Seal Assy #	Valve Size (in in.)
133393A	3/4, 1, 1-1/4, 1-1/2
133392A	2, 2-1/2, 3
137253A	4

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Honeywell

V5055A-F
Industrial Gas Valves

PRODUCT DATA

APPLICATION

The V5055 Gas Valves are used with the V4055, V4062, and V9055 Fluid Power Actuators to control gas flow to commercial and industrial burners.

While it is possible to combine any V5055 gas valve with any V4055, V4062, V9055 fluid actuator, a limited range of combinations apply to the applications most often used. See Table 1.

FEATURES

- Used with natural or liquefied petroleum (LP) gases.
- V5055 normally closed valves are rated for final shutoff service (safety shutoff).
- V5055A,C,D,E,F Valves are for On-Off service.
- V5055B Valve has a characterized guide and in combination with the V4055, V4062, and V9055 Fluid Power Actuators, provides slow-opening, hi-lo-off, and modulating functions respectively.
- V5055C,E Valves have a double seal and are used with V4055D,E Actuators to provide proof-of-closure switch and valve seal overtravel interlock.
- V5055D,E Valves are for high pressure applications (see Table 2).
- Seven valve sizes from 3/4 to 3 inches have NPT threaded connections. Models are available with BSP-PL threads. V5055A,B,C Valves are available in a 4 inch size and have flange connections.
- Most models have 1/4 inch upstream and downstream tap and plug. BSP-PL thread models have 1/4 inch upstream tap and plug.
- Yellow SHUT indicator attached to the valve stem provides an indication of the valve closed position.
- Unpainted, die-cast aluminum body.

NOTICE: Per Industry Standards, the actuator is required a conduit seal or a cable type that is sealed be installed in a device that can result in a flammable liquid flow through a conduit or cable to an electrical ignition source in the event of a seal leakage or diaphragm failure.

Contents

60-2307-19

SPECIFICATIONS

Table 1. Usual Combinations of Fluid Power Actuators and V5055 Industrial Gas Valves.

Fluid Power Actuators/ Industrial Gas Valves			Standard pressure[a]			High Pressure[a]	
			V5055A, F[b]	V5055B	V5055C	V5055D	V5055E
Type	Model	Pressure Rating[a]	On-Off	Characterized Guide[c]	VSOI[d]	On-Off	VSOI[d]
V4055 On-Off	A,G[e]	Standard	•	•		•	
	B	High	•[f]	•[f]		•	
	D[c],F[d e]	Standard			•		•
	E[d]	High			•[f]		•
V4062 High-Low-Off	A	Standard		•	•		
	B	High		•[f]	•[f]		•
	D[d]	Standard			•		
V9055 Modulating	A	Standard		•			
	D[d]	Standard			•		

[a] Refer to Table 2 for actual pressure ratings of the various combinations of valves and actuators.

[b] V5055F models meet EN161 leakage requirements.

[c] Characterized guide provides a more linear relationship between the stem travel and gas flow. Check Honeywell form 70-8311 to verify that flow curve characteristics match application requirements.

[d] Valve Seal Overtravel Interlock. Valve has two shutoff seals, actuator has proof-of-closure switch.

[e] V4055F, G models include switch for manual control.

[f] These combinations have higher pressure ratings; see Table 2.

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number. If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Environmental and Combustion Controls Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
   1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386
3. http://customer.honeywell.com or http://customer.honeywell.ca

International Sales and Service Offices in all principal cities of the world. Manufacturing in Belgium, Canada, China, Czech Republic, Germany, Hungary, Italy, Mexico, Netherlands, United Kingdom, and United States.

Table 2. V5055 Pressure Ratings

Model	Pipe Size	STANDARD PRESSURE ACTUATORS V4055A, D, F, G V4062A, D V9055A, D				HIGH PRESSURE ACTUATORS V4O55B, E V4062B			
		M.O.P.D. [a]		Max. Rated Pressure [b]		M.O.P.D. [a]		Max. Rated Pressure [b]	
STANDARD PRESSURE VALVES V5055A, B, C, F	3/4" to 1-1/2"	5 PSI	340 mbar	15 PSI	1.0 Bar	15 PSI	1030 mbar	15 PSI	1.0 Bar
	2" to 3"	5 PSI	340 mbar	15 PSI	1.0 Bar	15 PSI	1030 mbar	15 PSI	1.0 Bar
	4" flanged	3 PSI	207 mbar	15 PSI	1.0 Bar	5 PSI	340 mbar	15 PSI	1.0 Bar
HIGH PRESSURE VALVES V5055D, E	3/4" to 1-1/2"	5 PSI	340 mbar	75 PSI	5.0 Bar	25 PSI	1720 mbar	75 PSI	5.0 Bar
	2" to 3"	5 PSI	340 mbar	45 PSI	3.0 Bar	15 PSI	1030 mbar	45 PSI	3.0 Bar

[a] Max Operating Pressure Differential (UL) or Max Operating Pressure (CSA); maximum allowable pressure drop from inlet to outlet for proper operation.

[b] Max rated pressure (UL) or Max Close-off Pressure (CSA); maximum pressure that the valve can be exposed to without leakage or damage to the valve.

Models: See Table 3.

Table 3. Industrial Gas Valve Models.

Model Number	Features
V5055A	Industrial Gas Valve for On-Off service.
V5055B	Industrial Gas Valve with characterized guide for slow opening, HI-LO-OFF, or modulating service.
V5055C	Same as V5055A but incorporates a double seal. Used with the V4055D Actuator to a provide proof-of-closure switch and a valve seal overtravel interlock.
V5055D	Same as V5055A but for high pressure applications.
V5055E	Same as V5055C but for high pressure applications.
V5055F	Same as V5055E but meets the intent of EN161 leakage requirements.

Type of Gas: Natural or liquefied petroleum (LP) only.

Pipe Size: 3/4, 1, 1-1/4, 1-1/2, 2, 2-1/2, 3, and 4 in. (only V5055A,B,C available in 4 in. size).

Pipe Threads: NPT or BSP-PL Threads (equivalent to ISO R7 and DIN 2999). Available on inlet and outlet of 3/4 to 3 inch valves. Four inch valves have flange connections.

Pressure Ratings: See Table 2.

Valve Capacities: See Table 4.

Upstream Tapping and Plug: 1 /4 in. NPT or BSP-PL is standard.

Downstream Tapping and Plug:
1/4 in. NPT on most domestic models.
1/8 in. NPT on V5055C1182.

Ambient Operating Temperature Rating:
-40°F to 150°F (-40°C to 66°C); -40°F to 125°F (-40°C to 52°C) when used with V9055.

Table 4. Valve Rated Capacity at 1 in. (2.5 mbar) pressure drop; based on gas with specific gravity of 0.64.

Valve Size (in.)	CSA Rated Capacity	
	cf/h	cu m/hr
3/4	665	18.8
1	960	27.2
1-1/4	1406	39.8
1-1/2	1717	48.6
2	3620	102.5
2-1/2	4250	120.3
3	5230	148.1
4 (V5055A)	10200	288.8
4 (V5055B,C)	9180	259.9

Material: Die-cast aluminum.

Mounting: Mounts directly in the gas supply line.

Dimensions: See Fig. 2 and 3.

Weight:
3/4, 1, 1-1/4, 1-1/2, in. valve: 4 lb. (1.8 kg).
2 in. valve: 8 lb. (3.6 kg).
2-1/2, 3 in. valve: 11 lb. (5.0 kg).
4 in. valve: 28 lb. (12.7 kg).

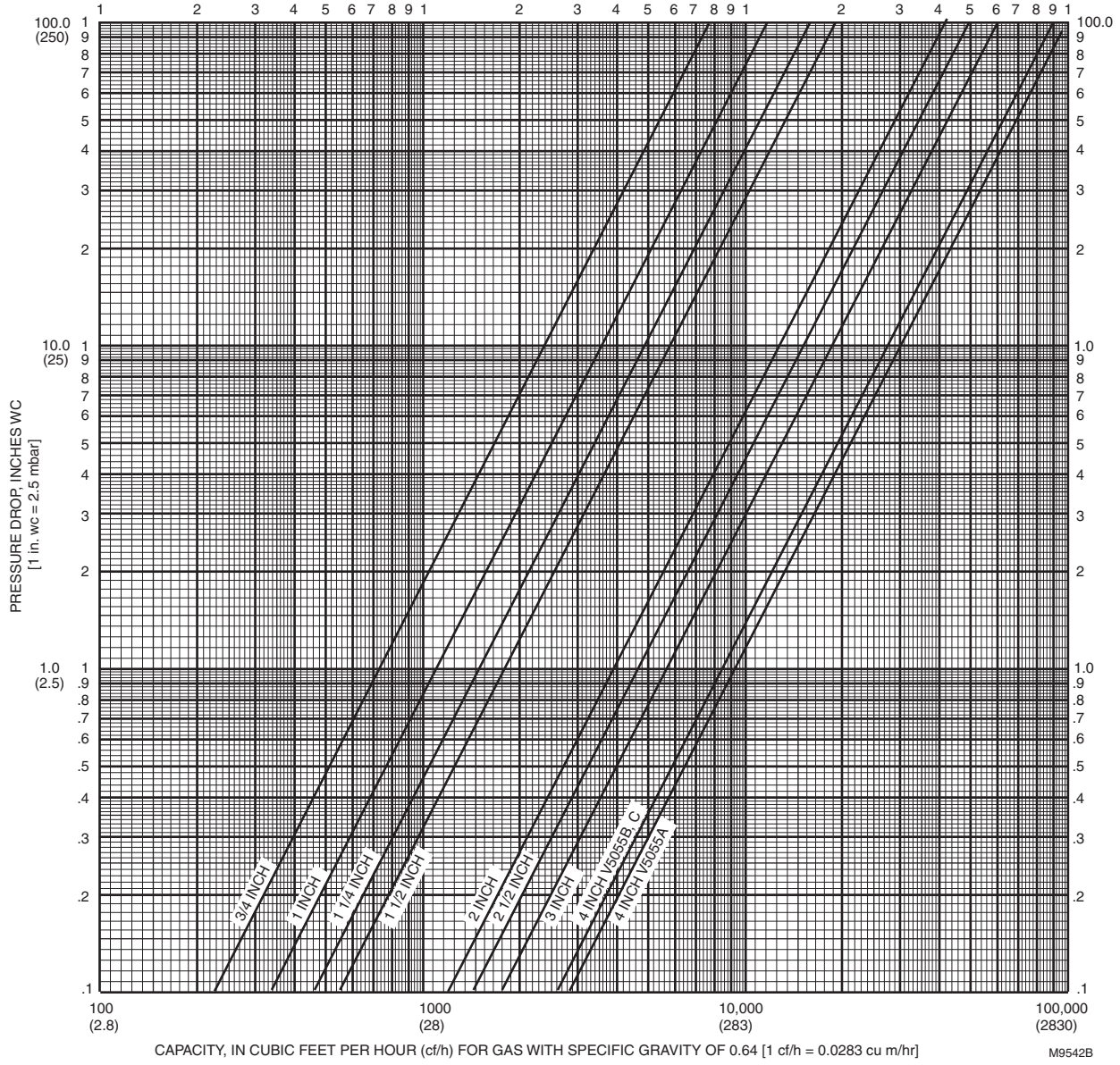


Fig. 1. Flow curves for V5055 Valves.

Replacement Parts:
Replacement Seal Assembly: Includes valve seal, bonnet seal, and tube of lubricant.

133393A: for 3/4, 1, 1-1/4, and 1-1/2 in. valves
133392A: for 2, 2-1/2, and 3 in. valves.
137253A: for 4 in. valves.

Replacement Bonnet Assembly: Includes complete bonnet assembly, plus the required replacement seal assembly. See Table 5.

Table 5. Replacement Bonnet Assemblies.

Valve Model	Valve Size (in.)	Replacement Bonnet Assembly
V5055A (On-Off)	3/4, 1, 1-1/4, 1-1/2	133398AA
	2, 2-1/2, 3	133417AA
	4	Not Available
V5055B (Characterized guide)	3/4, 1, 1-1/4, 1-1/2	133398BA
	2, 2-1/2, 3	133417BA
	4	Not Available
V5055C (Valve-closed indicator)	3/4, 1, 1-1/4, 1-1/2	133398CA
	2, 2-1/2, 3	133417CA
	4	136911CA
V5055D (High pressure On-Off)	3/4, 1, 1-1/4, 1-1/2	Not Available
	2, 2-1/2, 3	Not Available
V5055E (Valve Closed Indicator)	3/4, 1, 1-1/4, 1-1/2	136308BA
	2, 2-1/2, 3	Not Available

Approvals:

The following combinations of V5055 Valves (3/4 through 4 in.) and V4055, V4062 and V9055 Fluid Power Actuators are approved by these agencies:

Underwriters Laboratories Inc. Listed: (File No. MH1639, Guide No. YIOZ):

V4055A,B,D,E/V5055A,B,C,D,E,F
V4062/V5055A,B,C,E,F
V9055/V5055A,B,C,E,F

Swiss Re (Formerly GeGap/IRI) Acceptable:

V4055A,B,D,E/V5055A,B,C,D,E,F
V4062/V5055A,B,C,E,F
V9055/V5055A,B,C,E,F

Factory Mutual Approved (Report No. ID9AZ.AF).

CSA File No. 158158, Class 3371 for USA and Canada:

V4055A/V5055A,B	V4055E/V5055E
V4055B/V5055D	V4062/V5055B,C
V4055D/V5055C	V9055/V5055B,C

NOTE: CSA does not certify models equipped with BSP threads.

British Gas Corporation and Dutch Gas Institute Approved:

V4055 or V4062 with V5055A1145, A1152, A1178, B1218.

DIN-DVGW Approved (Germany):

V5055A1145, A1152, A1178, and B1218.

GAS VALVE SIZING

1. Check the burner nameplate for (a) the type of gas used, and (b) the gas flow capacity. The capacity will be listed in Btu/h (Btus per hour) or in cf/h (cubic foot per hour).
2. Call the gas utility for information on (a) the specific gravity (sp gr) and (b) Btu per cubic foot (Btu/cu ft) for type of gas used.

   Find the capacity in cf/h. If the capacity is listed in Btu/h, convert to cfh by the following formula:

$$\text{Capacity in cf/h} = \frac{\text{Btu/h (from burner nameplate)}}{\text{Btu/cu ft (from gas utility)}}$$

3. For gases with specific gravities other than 0.64, multiply the burner cfh by the proper conversion factor. See Table 6.

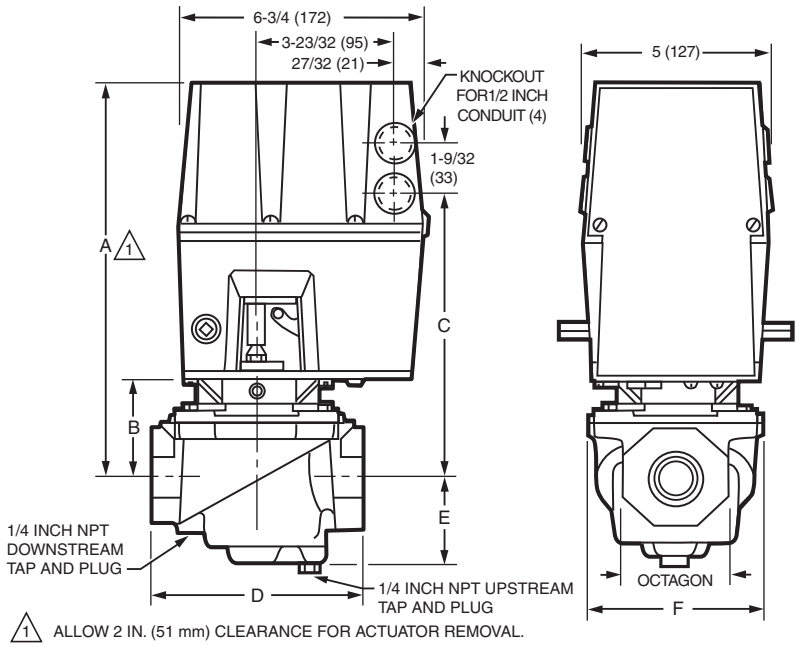
Table 6. Gas Conversion Factors.

Type of Gas	sp gr (average)	Multiply cf/h by:
Manufactured	0.60	0.968
Mixed	0.70	1.046
Propane	1.53	1.546
Butane	1.98	1.759

4. Use the corrected burner capacity in cf/h when determining the gas valve size in Fig. 1.
5. Determine the available pressure drop across the valve and draw a horizontal line at this pressure in Fig. 1.
6. Draw a vertical line in Fig. 1 at the capacity (cf/h) previously determined. Use the corrected capacity for a gas with a specific gravity other than 0.64.
7. Use the valve size at the intersection of the horizontal and vertical lines. If the intersection is between valve sizes, use the next higher size to the right.

TO SIZE TWO IDENTICAL VALVES PIPED IN SERIES

1. Find the cf/h for the type of gas used.
2. Consider both valves as one unit. Determine the total maximum pressure drop across the unit.
3. Find the pressure drop across the first valve by assuming it to be 45 percent of the total pressure drop.
4. Find the valve size from Fig. 1.
5. The second valve will be the same size as the first valve.



VALVE SIZE INCH	DIM A		DIM B		DIM C		DIM D		DIM E		DIM F		OCTAGON	
	IN.	MM	IN.	MM	IN.	MM	IN.	MM	IN.	MM	IN.	MM	IN.	MM
3/4	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	2-1/4	57	4-7/8	124	2-13/16	71
1	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	2-1/4	57	4-7/8	124	2-13/16	71
1-1/4	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	2-1/4	57	4-7/8	124	2-13/16	71
1-1/2	11-1/8	283	2-3/4	70	8-3/16	208	5-3/4	146	2-1/4	57	4-7/8	124	2-13/16	71
2	11-1/4	286	2-7/8	73	8-5/16	211	8-3/8	213	2-3/4	70	7-19/32	193	3-1/2	89
2-1/2	11-3/4	299	3-3/8	86	8-13/16	224	9-1/4	235	2-3/4	70	7-19/32	193	4-1/2	114
3	11-3/4	299	3-3/8	86	8-13/16	224	9-1/4	235	2-3/4	70	7-19/32	193	4-1/2	114

M27268A

Fig. 2. Approximate dimensions of the 3/4 through 3 in. V5055 Valves, with valve actuator, in in. (mm).

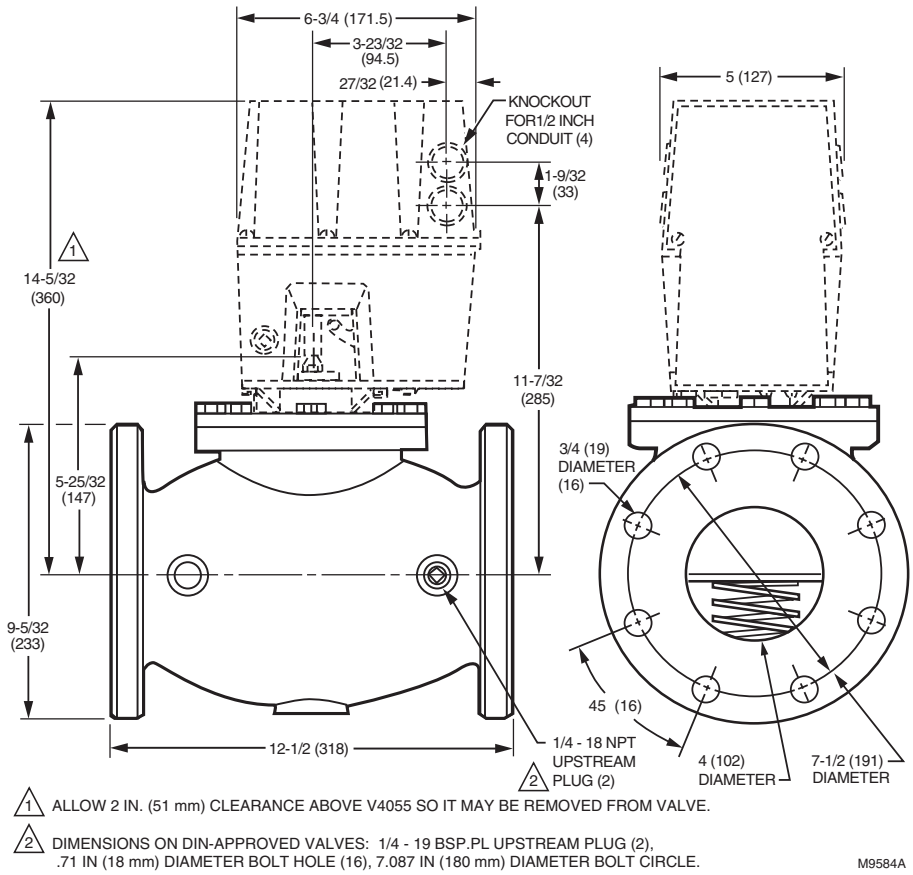


Fig. 3. Approximate dimensions of the 4 in. V5055 Valves, with valve actuator, in in. (mm).

INSTALLATION

IMPORTANT:

The V5055 Valve is designed to provide control of gaseous fuel (natural and LP gas) flow in applications in which there is minimal exposure to water. V5055 Valves used in maritime, beverage, food processing, outdoor and other installations in which occasional exposure to water is experienced may be subject to valve stem and spring corrosion. The presence of corrosion decreases the operating life of the valve. V5055 Valves used in such installations should be inspected at least annually and should have the valve bonnets replaced if corrosion is noted.

A V4055 Valve Actuator with a NEMA 4 rating is also recommended for such installations. The water-tight design of the NEMA 4 rated V4055 Actuator prevents water from entering the V4055 valve stem and spring chamber through the actuator. Under certain conditions, some water may be retained by the external upper portion of the valve body. The retained water is effectively excluded from the valve stem and spring chamber by a functional seal that is incorporated into the NEMA 4 rated actuator.

When Installing This Product…

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced, flame safeguard control technician.
4. After installation is complete, check out product operations as provided in these instructions.

⚠ WARNING

Electrical Shock Hazard and Explosion Hazard.
Can cause serious injury, death or property damage.

1. Turn off gas supply before starting installation.
2. Disconnect power supply for valve actuator before beginning installation to prevent electrical shock and equipment damage.
3. Be sure the valve is installed so the arrow on the valve points in the direction of gas flow. (Gas pressure helps to close the valve.)

Location

Install the valve in the gas supply line downstream from the pressure regulator. The valve and actuator may be mounted in any position that allows sufficient clearance for installation and for repair or replacement.

1. The valve position indicators should be easily visible with the valve and actuator in the final position.
2. The final position of the valve and actuator must allow for damper linkage, if used.

IMPORTANT:

Allow room for turning the valve body (actuator not attached) onto the gas piping. Swing dimensions, measured from the center of the pipe are:

3/4 through 1-1/2 in. valves: 4 in. (101.6 mm).
2 through 3 in. valves: 5 in. (127.0 mm).
4 in. valves: 7 in. (177.8 mm).

Mounting (Figs. 4 through 6)

⚠ WARNING

Explosion Hazard.

Can cause serious injury, death or property damage.

If flow is not in the direction of the arrow on the valve body, the valve may not shut off.

1. Use new, properly reamed, pipe, free from chips.
2. Do not thread pipe too far (Fig. 4). Valve distortion or malfunction may result from excess pipe in the valve.

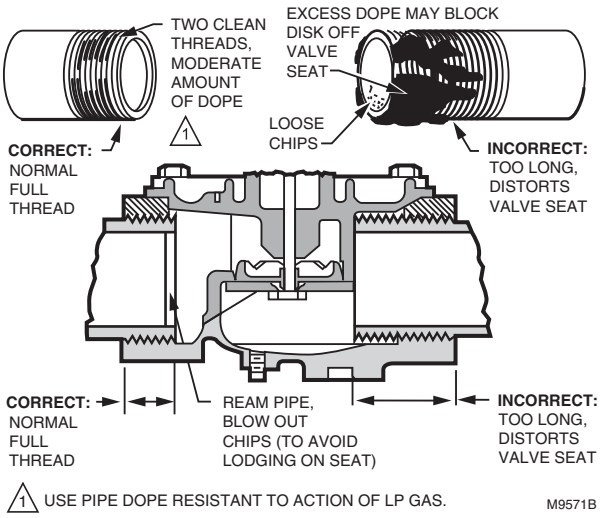


Fig. 4. Preparing the pipes.

3. Remove the protective caps from the ends of the valve. Do not attach the valve actuator until the valve body installation is complete.
4. Apply good quality pipe dope resistant to action of LP gas, putting a moderate amount on the male threads only. Use dope sparingly; if pipe dope lodges on the valve seat, it will prevent proper closure.
5. Install valve with the gas flow in the direction indicated by the arrow on the casting.
6. Apply a parallel jaw wrench only to the flat next to the pipe being inserted (Fig. 5). A wrench applied to the valve body itself, or to the end farthest from the pipe being inserted, may distort the casting, causing a malfunction. Do not use the valve for a lever.
7. Be sure the gas flow is in the same direction as the arrow on the bottom of the valve body.
8. Use two threaded companion flanges, two gaskets (included with valve), and 16 bolts (with washers and nuts) for mounting a 4 in.-V5055 Valve. Mount a threaded flange and gasket on each end of the valve as shown in Fig. 6. Then screw the pipes into the threaded flanges. Apply dope sparingly, and use wrenches and vises properly as shown in Fig. 4 and 5.
9. *Make sure the power supply is disconnected from the valve actuator.* Then mount the actuator on the valve body and complete the electrical and linkage connections following the instructions packed with the actuator.

OPERATION AND CHECKOUT

Operation

A V5055 Industrial Gas Valve is operated by a V4055, V4062, or V9055 Fluid Power Gas Valve Actuator. The valve opens when the actuator is energized, and closes when power is removed. When closed, the valve seals off against the rated close-off pressure with no power applied. For further information, refer to the Instructions for the actuator.

Checkout

⚠ WARNING

Explosion Hazard.

Can cause serious injury, death or property damage.

Do not allow fuel to accumulate in the combustion chamber. If fuel is allowed to enter the chamber for longer than a few seconds without igniting, an explosive mixture could result.

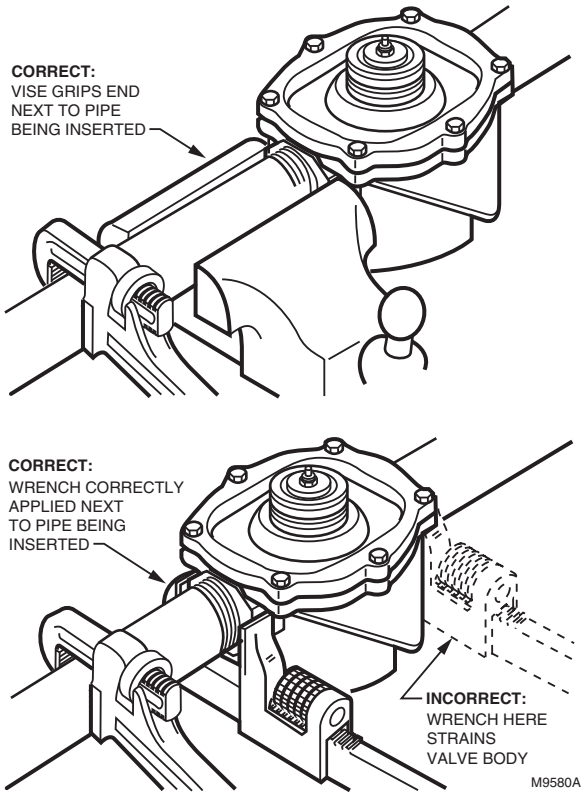


Fig. 5. Installing a 3/4 through 3 in. V5055 Valve.

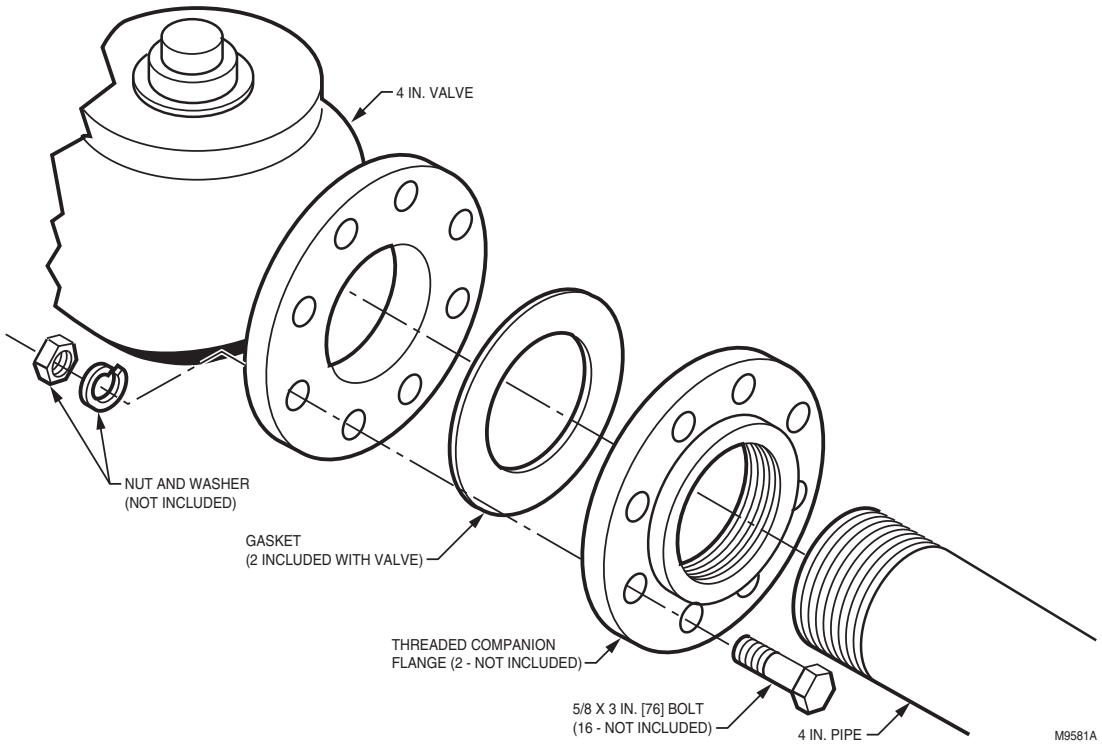


Fig. 6. Installing a 4 in. V5055 Valve.

⚠ CAUTION

Equipment Damage Hazard.
Operation without proper checkout can damage the equipment.

1. Do not put the system into service until you have satisfactorily completed the following Valve Leak Test, all applicable tests described in the Checkout section of the Instructions for the flame safeguard control, and any other tests required by the burner manufacturer.
2. All tests must be performed by a trained, experienced flame safeguard control technician.
3. Close all manual fuel shutoff valves as soon as trouble occurs.

After the installation is complete, cycle the valve several times with the manual fuel shutoff cock closed. Make sure the valve and actuator function properly. Also perform the Valve Leak Test that follows before putting the valve into service.

Valve Leak Test (Fig. 7)

This is a test for checking the closure tightness of a gas safety shutoff valve. It should be performed by qualified personnel during the initial startup of a burner system, or whenever the valve or valve bonnet is replaced (see Service Information section). It is recommended that this test also be included in the scheduled inspection and maintenance procedures. For a periodic inspection test, follow steps 1, 3, 4, 5, 8, 9, 10, 12, 13, 16, and 17.

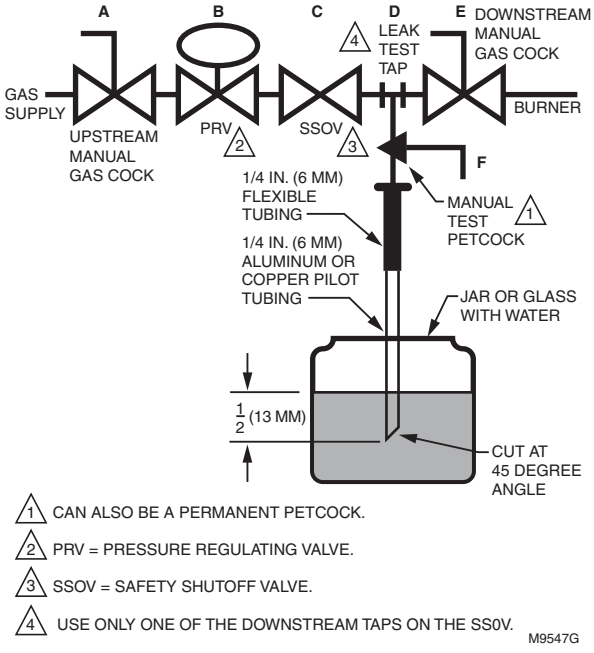


Fig. 7. Valve leak test.

1. De-energize the control system to assure that there is no power to the safety shutoff valve (**C**) shown in Fig. 7.
2. Close the upstream manual gas cock (**A**).
3. Make sure the manual test petcock (**F**) is closed in the leak test tap assembly (**D**).
4. Remove the leak test tap plug and connect the test apparatus to the Leak Tap (**D**).
5. Close the downstream manual gas cock (**E**).

6. Open the upstream manual gas cock (**A**).
7. Run the safety shutoff valve (**C**) to its fully open position (through the safety system); then immediately de-energize the system to close the valve.
8. Immerse a 1/4 in. tube vertically 1/2 in. (12.7 mm) into a jar of water.
9. Slowly open the test petcock (**F**).
10. When the rate of bubbles coming through the water stabilizes, count the number of bubbles appearing during a ten-second period. Each bubble appearing during a ten-second period represents a flow rate of approximately 0.001 cfh.

To meet U.S. requirements, leakage must not exceed the values listed in Table 5.

Table 7. Allowable Leakage for V5055 Valves.

V5055 Pipe Size (in.)	Gas specific gravity	Allowable leakage (cc/hr)[a]	Maximum Number of bubbles per 10 sec.	Minimum Number of Seconds for 10 bubbles
3/4" thru 1-1/2"	0.64 nat'l gas	573	14	6.7
	1.00 air	458	9	10.2
	1.57 propane	366	9	10.5
2" thru 3"	0.64 nat'l gas	940	24	4.1
	1.00 air	752	16	6.2
	1.57 propane	602	15	6.4
4"	0.64 nat'l gas	1254	33	3.1
	1.00 air	1003	21	4.6
	1.57 propane	801	21	4.8
V5055F	0.64 nat'l gas	62	-	62
	1.00 air	50	-	93
	1.57 propane	40	-	96

[a] Based on standard conditions, test pressures provided by ANSI Z21.21, Section 2.4.2 and a maximum of 235 cc/hr (air) per inch of seal-off diameter. Seal-off diameter is not to be confused with pipe size.

NOTE: For international leak test requirements, contact the office of the appropriate approval agency.

After the test:

11. Close the upstream manual gas cock (A).
12. Close the test petcock (F), remove the test apparatus, and replace the leak test tap plug (D).
13. Open the upstream manual gas cock (A) and energize the safety shutoff valve (C).
14. Test with soap bubbles to assure that there is no leak at the test tap (D).
15. De-energize the safety shutoff valve (C).
16. Open the downstream manual gas cock (E).
17. Restore the system to normal operation. If two safety shutoff valves are utilized, each V5055 valve is to be checked for tightness of closure.

SERVICE INFORMATION

⚠ WARNING

Explosion and Electrical Shock Hazard.
Can cause serious injury, death or property damage.

1. Before servicing, turn off the gas supply and disconnect all electrical power to the valve actuator.
2. Only qualified service technicians should attempt to service or repair flame safeguard controls and burner systems.
3. Do not disassemble the valve bonnet assembly; the valve seat is not replaceable.
4. Failure to properly position and seat the seals in the valve body may result in a hazardous gas leak.

Scheduled Inspection and Maintenance

Setup and follow a schedule for periodic inspection and maintenance, including the burner, all other controls, and the valve(s) and actuator(s) for leaking oil. It is recommended that the Valve Leak Test in the Checkout section be included in this schedule. Refer to the Instructions for the primary safety control for more information.

Valve Checkout for Oil Leakage from Actuator

1. Turn off the gas supply at the manual shutoff valve located upstream from the valve(s) being serviced.
2. Shut off all electrical power to the valve actuator(s).
3. Mark and disconnect the wires from the actuator terminals. Remove conduit and disengage the damper linkage assembly (if applicable).
4. Loosen the two set screws from the valve to lift off the actuator.
5. If the actuator is to be replaced and it did not leak hydraulic fluid, skip to Step 11.

   NOTE: It is good practice to inspect the inside of the valve whenever the actuator is replaced. To do so, remove the bonnet assembly, inspect the valve and bonnet. If all is well, proceed to Step 7.

6. If the actuator leaked hydraulic fluid onto the valve (the fluid is red), it must be cleaned off from the valve and bonnet assembly.
   a. Wipe off the outer valve body.
   b. Remove the valve bonnet bolts and lift off the bonnet.

   NOTE: V5055/V5097C and E Valves have additional internal springs that will push the bonnet up as the bolts are loosened.

   c. Inspect the inside of the valve.

IMPORTANT:

If fluid is present on the inside surfaces of the valve body or bonnet surfaces, the bonnet assembly or entire valve must be replaced. For part numbers, refer to "Replacement Parts:" on page 4.

   d. If the inside surfaces are clear of hydraulic fluid, clean the bonnet assembly and be sure to remove all hydraulic fluid from the inside and outside of the actuator mounting curb. This is the "cup-like" area around the valve stem. Avoid using a cleaning solu-

tion as it may damage the rubber seals used in the valve.

7. If the valve bonnet assembly is in good condition and is not replaced, replace the bonnet seal. Do not reuse the old bonnet seal. See “Replacement Parts:” on page 4 for the seal number.
8. Coat seals with grease provided and position in valve body/bonnet assembly.
9. Carefully seat the bonnet assembly on the valve body. Be sure the seals are in their proper position. On those valves with a spring below the disc, be sure the spring is centered in the indentation on the inside of the valve body.
10. After positioning the bonnet assembly, replace the screws removed earlier.

    NOTE: When replacing the bonnet assembly on the 4” valve, it must be drawn evenly into the valve body. Finger tighten the 8 screws. Draw the bonnet assembly into the valve by tightening, in order, screws 1, 5, 7, 3 (two turns each). Repeat until the assembly is seated. Tighten the remaining screws.

11. Remount the actuator on the bonnet assembly. Tighten the two set screws (50-60 inch pounds).
12. Replace the damper crank arm assembly.
13. Re-attach the wires removed from the actuator terminals and turn on the electrical power.
14. With the gas still off, cycle the actuator to check for proper mechanical operation.

⚠ CAUTION

Be sure to perform a bonnet seal and seat leak check after installation.

Be sure to read and follow all instructions that come with the actuators, valves, seal and bonnet kits.

Valve Bonnet Replacement - See Table 5

The entire valve bonnet may be replaced without removing the valve body from the gas line. Do not disassemble the valve bonnet assembly; the valve seat is not replaceable.

For part numbers, refer to Replacement Parts in the Specifications section. Complete instructions for replacing the bonnet assembly are included with the replacement part.

Replacement of Seals (Fig. 8 or 9)

When removing the bonnet to inspect and clean the valve, install new seals (see Replacement Parts in Specifications section). Coat the new seals with the grease provided, and position them in the valve body as shown in Fig. 8 or 9.

Failure to properly position and seat the seals in the valve body may result in a hazardous gas leak.

After the new bonnet assembly is installed, or the bonnet is removed for any reason, check for gas leakage around the bonnet seal. Turn on the gas at the manual valve. Paint the seal area with a rich soap and water solution. Bubbles indicate a gas leak. If a leak is detected, check to see that the bonnet screws are tight. If necessary, turn off the gas again and remove the bonnet to be sure the seals are properly seated.

Table 8. Gas Valve Replacement Seals.

Replacement Seal Assy #	Valve Size (in in.)
133393A	3/4, 1, 1-1/4, 1-1/2
133392A	2, 2-1/2, 3
137253A	4

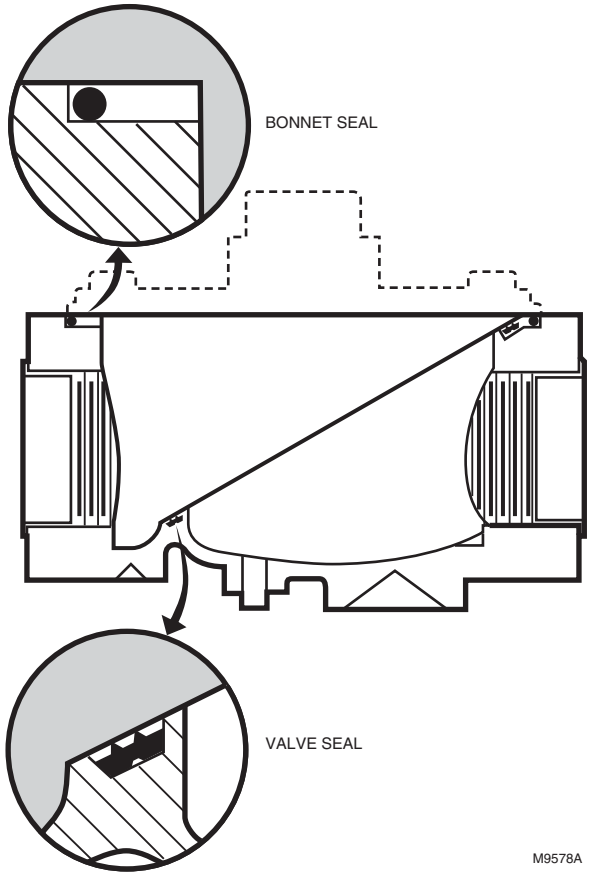


Fig. 8. Proper positions of valve and bonnet seals in 3/4 through 3 in. valves.

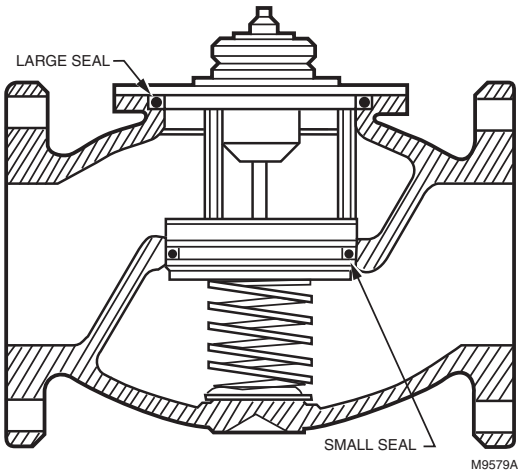


Fig. 9. Proper positions of valve and bonnet seals in 4 in. valves.

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