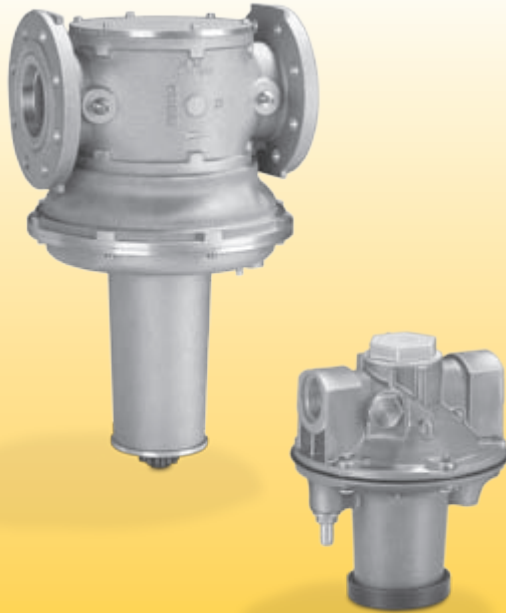


AIR/GAS RATIO CONTROLS GIK, GIK..B

Technical Information

T-Product 2004 November



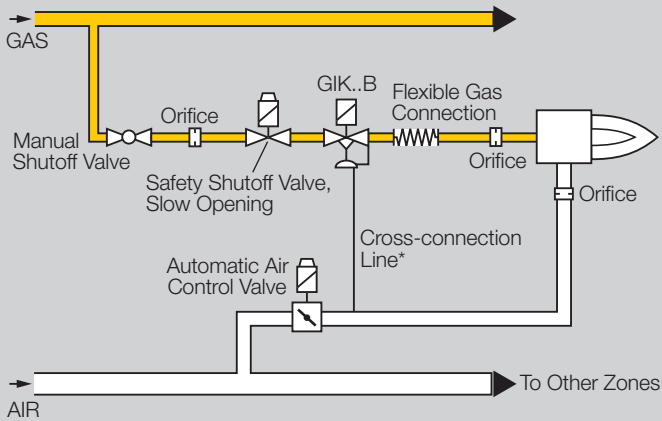
- // For maintaining constant gas/air ratios
- // Cross-connected operation with modulating or high-low control of nozzle mix burners
- // Zero regulator operation for premix burners
- // Precise pressure regulation over wide turndown ranges
- // Low maintenance
- // Valve seat design for consistent low fire repeatability
- // Balanced double diaphragm design allows regulator to operate over a wide range of inlet pressures while minimally affecting outlet pressure
- // CE certified models available

krom //
schroder

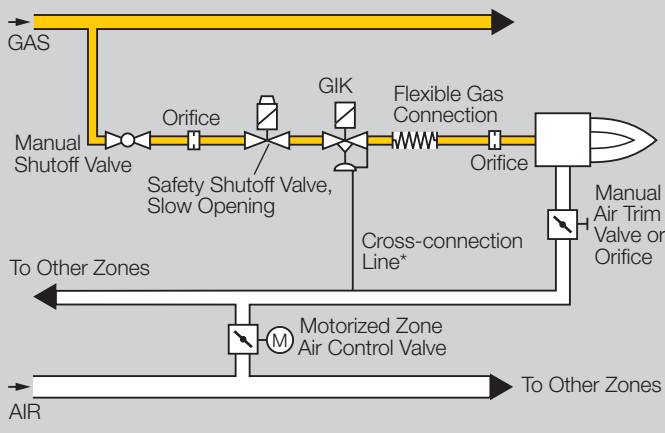
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Nozzle Mix Burners with High-Low Control, including Pulse Firing



Nozzle Mix Burners with Modulating Control



Application

GIK Regulators hold constant gas/air ratios as cross-connected ratio regulators with modulating or high-low control of nozzle mix burners or as zero governors on premix systems.

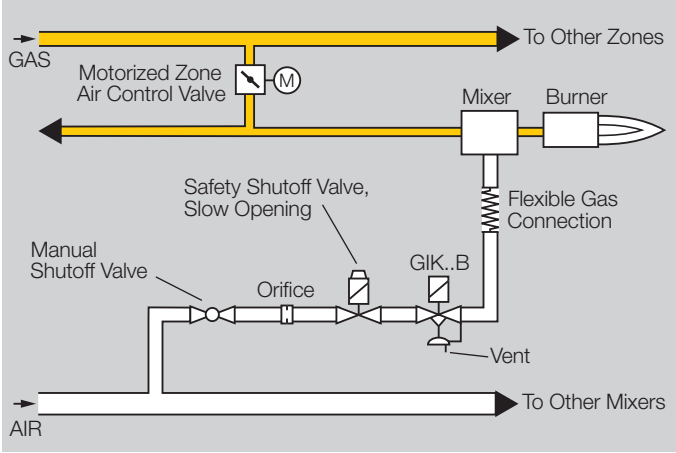
When used as cross-connected regulator for nozzle mix burners, GIK regulator provide outlet gas pressure at a 1:1 pressure ratio with air loading. For leaner or richer low fire ratios, the bias spring can be adjusted to provide an outlet pressure up to 1.2" WC (3 mbar) higher or lower than the loading pressure.

For repeatable control of extremely small low fire inputs (frequently, only the pilot), the GIK..B Regulator, with a fixed internal Bypass (1/2" to 2"), is recommended. When the system drives to low fire, the regulator valve closes completely, and the low fire gas flow is controlled accurately by precision-machined internal orifice.

Typical air and gas piping layouts for nozzle-mixing and premix systems are shown in the pictures "Nozzle Mix Burners" and "Premix Burners". These schematics contain only those components related to the gas-air ration control system. A complete combustion system must also contain a suitably-sized combustion air source and safety-related components, such as safety shutoff valves, air and gas pressure switches and flame supervisor components. Consult the latest versions of the standards which apply to your installation, such as NFPA 86 or CAN/CGA-B149.1, for guidance. If in doubt about which components are required, contact Kromschroder for assistance.

* Cross connection line should be no smaller than 1/4" pipe or 3/8" OD tubing, as short and with as few bends as possible.

Premix Burners



Nozzle Mix Burner

The cross connection line should be no smaller than 1/4" pipe or 3/8" OD tubing, as short and with a few bends as possible.

See installation instructions for other recommendations.

Premix Burners

If burner is sealed in and combustion chamber pressure is other than zero, connect vent to combustion chamber. Otherwise leave it open to atmosphere.

Specifications

Operating Limits

Type of gas:	Natural, LPG, clean coke oven gas and clean biogas
Ambient temperature range:	GIK ½" to 2" = -4 °F to 158 °F (-20 °C to 70 °C) GIK 2½" to 4" = 5 °F to 140 °F (-15 °C to 60 °C)
Maximum inlet pressure:	3 psig (200 mbar)
Maximum operational inlet-to-outlet differential pressure:	1.5 psig (100 mbar)
Combustion air loading pressure:	0.2" to 48" WC (0.5 to 120 mbar)
Outlet pressure range:	0.1" to 47.6" WC (0.2 to 119 mbar)
Adjusting range at min. flow:	GIK ½" to 2" = -1.2" to +1.2" WC (-3 to +3 mbar) GIK 2½" to 4" = -0.8" to +0.8" WC (-2 to +2 mbar)
Connection for Control line:	GIK ½" to 2" = ¼" NPT GIK 2½" to 4" = ½" NPT

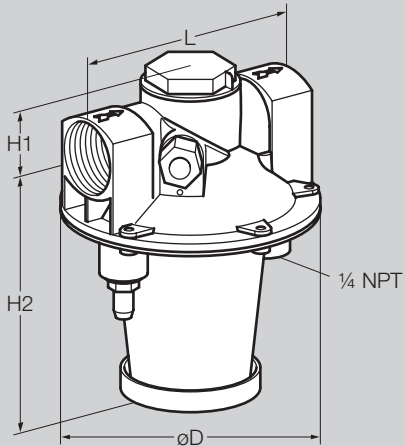
Mechanical Data

Available pipe sizes NPT-threaded:	½", ¾", 1", 1½", 2"
ANSI flanged:	2½", 3", 4"

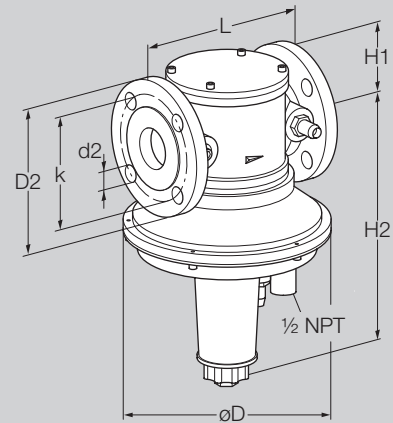
Materials of Construction

GIK ½" to 2":	Pressure die-cast aluminium alloy valve bodies and diaphragm housings. Diaphragms and valve discs are nitrile rubber. Valve stems are precision molded plastic.
GIK 2½" to 4":	Sand-cast aluminium alloy valve bodies and diaphragm housings. Diaphragms and valve discs are nitrile rubber. Valve stems are made of aluminium.

Dimensions and Weights



GIK 15-50TN



GIK 65-100TA

Type	Connection	max. inlet pressure		Dimensions								Flange				Drilling			Weight	
				L		D		H1		H2		D2		k		d2		No.	lbs	kg
		psig	mbar	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm			
GIK 15TN	NPT 1/2"	3	200	4.72	120	5.28	134	1.34	34	5.20	132	-	-	-	-	-	-	-	2.20	1.0
GIK 20TN	NPT 3/4"	3	200	4.92	125	5.28	134	1.34	34	5.20	132	-	-	-	-	-	-	-	2.20	1.1
GIK 25TN	NPT 1"	3	200	4.92	125	5.28	134	1.34	34	5.20	132	-	-	-	-	-	-	-	2.20	1.1
GIK 40TN	NPT 1 1/2"	3	200	6.10	155	7.29	185	1.77	45	5.87	149	-	-	-	-	-	-	-	4.19	1.8
GIK 50TN	NPT 2"	3	200	7.87	200	9.21	234	2.03	52	6.57	167	-	-	-	-	-	-	-	6.82	2.8
GIK 65TA	ANSI 2 1/2"	3	200	11.42	290	10.24	260	3.50	89	16.22	412	7.01	178	5.51	140	0.75	19	4	26.46	12.0
GIK 80TA	ANSI 3"	3	200	12.20	310	12.20	310	3.94	100	17.56	446	7.52	191	5.98	152	0.75	19	4	35.50	16.1
GIK 100TA	ANSI 4"	3	200	13.78	350	15.35	390	4.53	115	19.72	501	9.02	229	7.52	191	0.75	19	8	57.33	26.0

Sizing Selection

For premix and modulating control of nozzle mix burners, select the GIK. For high-low control of nozzle mix burners, including pulse firing, use the GIK..B regulator with the internal bypass.

When used as cross-connected regulators, GIK turn-down depends on the range of their outlet (loading) pressures between high and low fire. The greater the range, the greater the turndown. Always figure the turndown before sizing the regulator, because this determines the inlet pressure required.

Flow Turndown Ratio	High Fire Outlet or Loading Pressure Required to get Turndown if Low Fire Loading Pressure is 0.2" WC (0.5 mbar)
10 to 1	20" WC (50 mbar)
8 to 1	12.6" WC (32 mbar)
6 to 1	7.1" WC (18 mbar)
5 to 1	4.9" WC (12.5 mbar)

GIK..B Regulator turndown will depend on the sizing of the internal bypass orifice.

1. Determine the gas pressure that will be supplied to the regulator inlet and convert it from psig to " WC (psig x 27.7 = " WC). It should be at least equal to the regulator's high fire outlet pressure plus the pressure drop across the regulator itself. The high fire outlet pressure will be 0 for zero governors. On cross-connected nozzle-mixing applications, it will equal the high fire outlet pressure determined under Turndown above. For best results, the pressure drop across the

regulator should be about 10" WC. If the inlet pressure is considerably less than what's needed, try to obtain higher supply pressure. If this isn't possible, use a lower pressure drop across the regulator, but don't go below 2" WC.

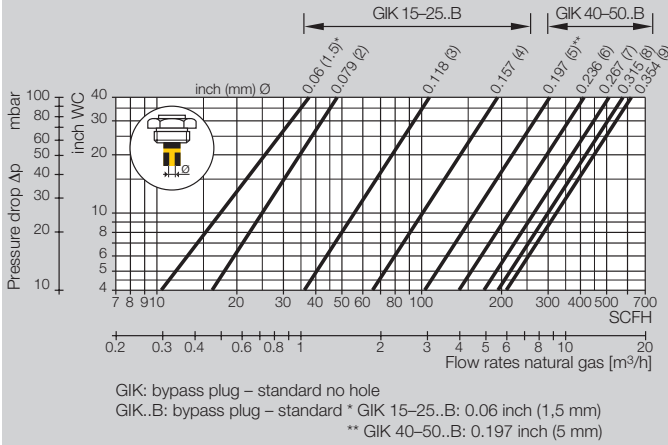
2. Multiply the maximum gas flow through the regulator by the correction factors for specific gravity, temperature and altitude/line pressure from the tables below. This is the **corrected flow**.

Flow Correction Factors

Specific Gravity	Factor
Air (1.0 s. g.)	1.27
Propane (1.56 s. g.)	1.61
Butane (2.00 s. g.)	1.83
Propane/Air (1.29 s. g.)	1.47
Coke Oven (0.45 s. g.)	0.87
Temperature	Factor
60°F (16°C)	1.0
100°F (38°C)	0.96
120°F (46°C)	0.95

Altitude	Line Pressure [psig]		
	1	2	3
Sea Level	1.00	1.03	1.06
1000' (305 m)	0.98	1.01	1.05
2000' (610 m)	0.97	1.00	1.03
3000' (915 m)	0.95	0.98	1.01
4000' (1220 m)	0.93	0.97	1.00
5000' (1525 m)	0.92	0.95	0.98
6000' (1830 m)	0.90	0.94	0.97
7000' (2135 m)	0.88	0.92	0.95

Bypass screw GIK..B

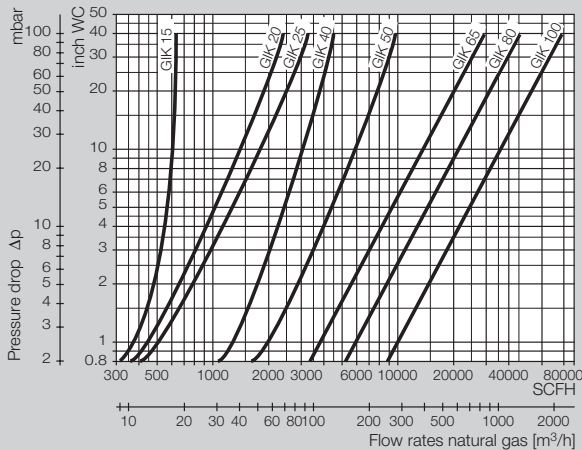


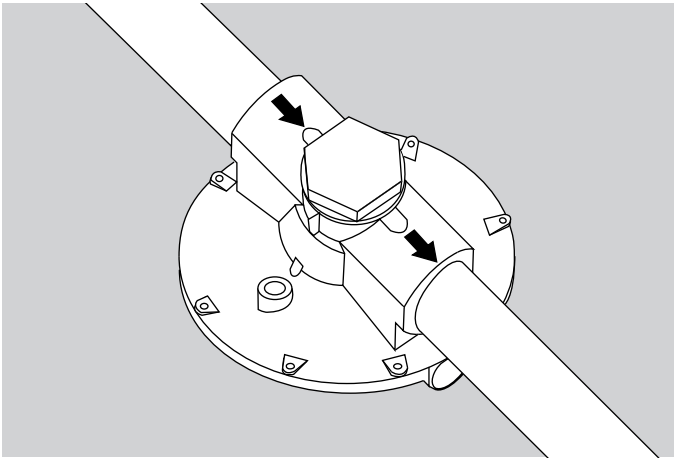
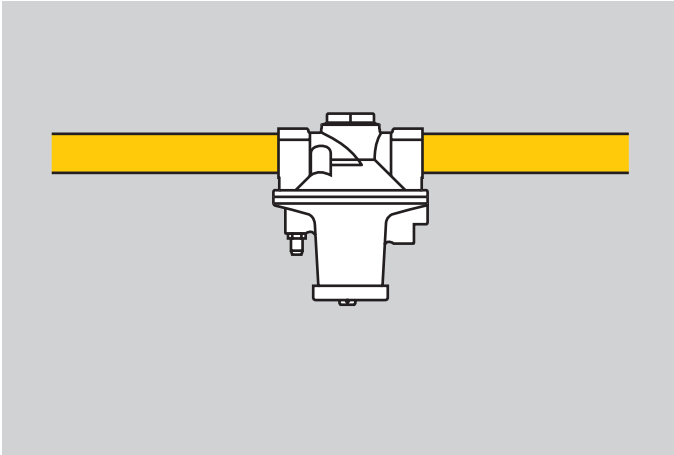
3. On the sizing chart, find where the corrected flow in-tersects the pressure drop from Step 1. Move down from this point. The first regulator curve you come to is the size to use.

Bypass Sizing

1. Correct the low fire bypass flow you want with the same factors used to size the regulator.
2. Find this flow at the bottom of the bypass orifice sizing chart and read up to the pressure drop that will be available across the regulator. (At low fire, this nearly equals the inlet pressure to the regulator, so you can simply use the inlet pressure.)
3. Move down from this point. The first orifice curve you come to is the size to use.

Flow rate



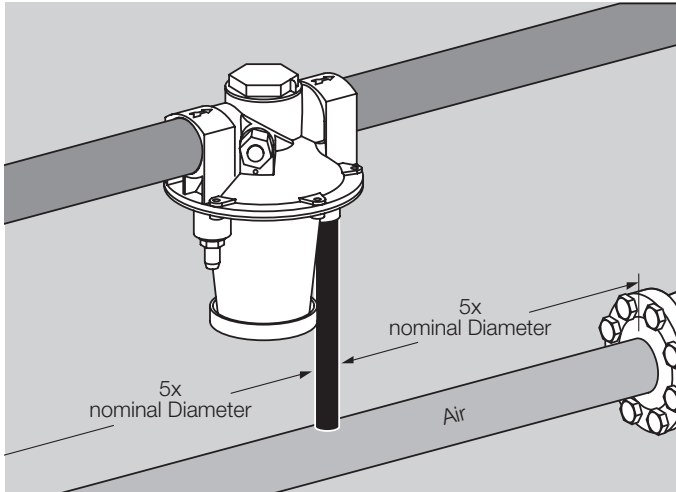


Installation

WARNING: Improper installation, adjustment, modification, operation or maintenance could lead to injury or damage. All adjustments must be made by a qualified technician.

Wiring must comply with local codes and National Electrical Codes. To prevent the possibility of property damage, turn off electrical power, depressurize installation, vent fluid to safe area before servicing.

- Remove thread protectors
- Observe direction of flow: arrow on housing
- Spring dome must point vertically downwards
- The housing must have clearance of $\frac{3}{4}$ " from any vertical surface. Allow access to spring adjustment at top of housing
- Use suitable sealant, apply sparingly, only to outer threads.
- Check for gas leaks. Apply pressure to regulator (do not exceed name plate rating) – measured at test point.
- Soap pipe joints and check for leaks.



How to install the air control line

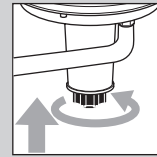
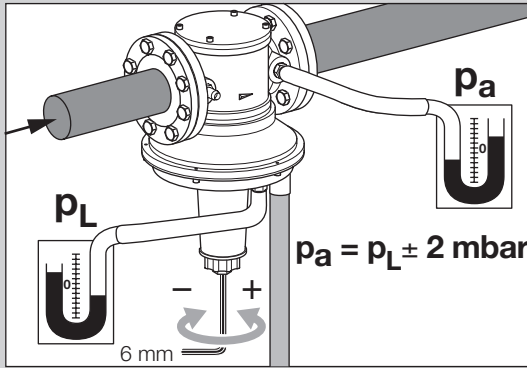
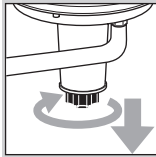
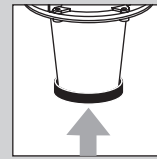
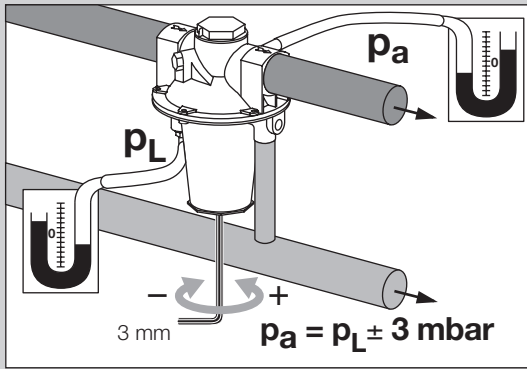
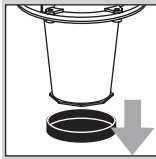
GIK ½" to 4"

The connection of the air control line must be at a distance of 5 × nominal Diameter from other air control elements.

Connection of the air control line

GIK ½" to 2": NPT ¼"

GIK 2 ½" to 4": NPT ½"



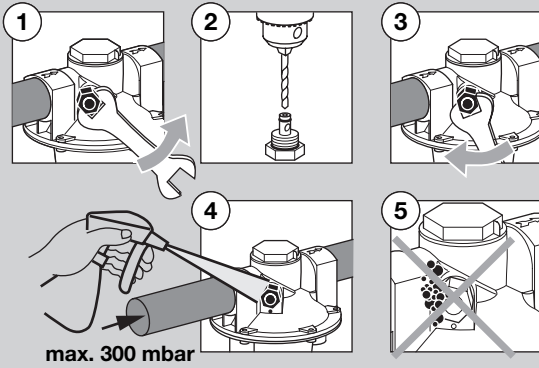
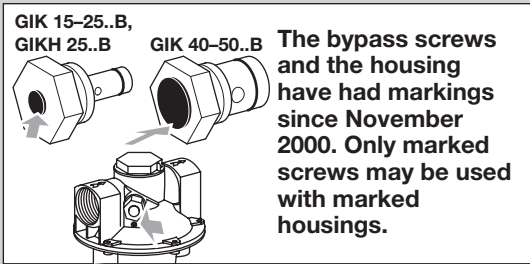
Operation

To adjust the low fire position at GIK

- Set the high fire rate using restricting orifices or adjustment element on the burner
- At low fire position: Control pressure at least 0.2 "WC (0,5 mbar).
- Factory setting without Bypass: outlet pressure = control line pressure

Factory setting with Bypass: outlet pressure = control line pressure - 0.8" WC (2 mbar) → to keep the valve closed for constant low fire

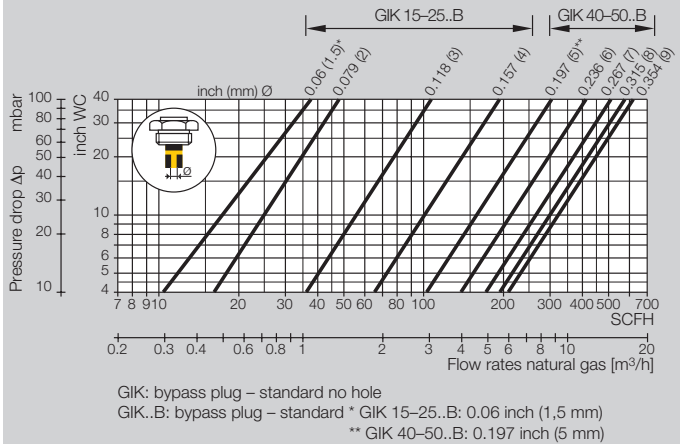
- GIK 1/2" to 2" the outlet pressure is adjustable between ± 1.2 " WC (3 mbar)
- GIK 2 1/2" to 4" the outlet pressure is adjustable between ± 0.8 " WC (2 mbar)



Order-No. Bypass Screws

For GIK 15 to 25 (½" to 1")	
Bypass screw Ø 0.059" (1.5 mm)	03089217
Bypass screw without orifice	03089215
Bypass variable	74919806
For GIK 40 to 50 (1½" to 2")	
Bypass screw Ø 0.2" (5 mm)	03089218
Bypass screw without orifice	03089216
Bypass variable	74919821

Bypass screw GIK..B

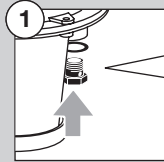
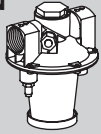


To adjust the low fire position at GIK..B (with internal Bypass)

- The air control line (air control pressure) must be less than 0.8" WC (2 mbar) at low fire position
- The bypass screw and the housings have been marked since Nov. 2000. Only marked screws may be used with marked housings
- The bypass orifices determines the low fire rate. Standard:
 GIK 15 to 25 (½" to 1") = 0.059 " (1.5 mm)
 GIK 40 to 50 (1½" to 2") = 0.20 " (5 mm)
 GIK 65 to 100 (2½" to 4") = use external Bypass
- Enlarge the orifice if necessary (max.)
 GIK 15 to 25 (½" to 1") = 0.16 " (4 mm)
 GIK 40 to 50 (1½" to 2") = 0.35 " (9 mm)

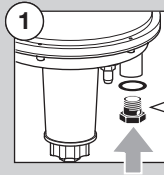
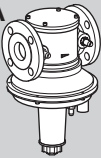
Special Features Conversion Kit for zero Pressure

GIK..N

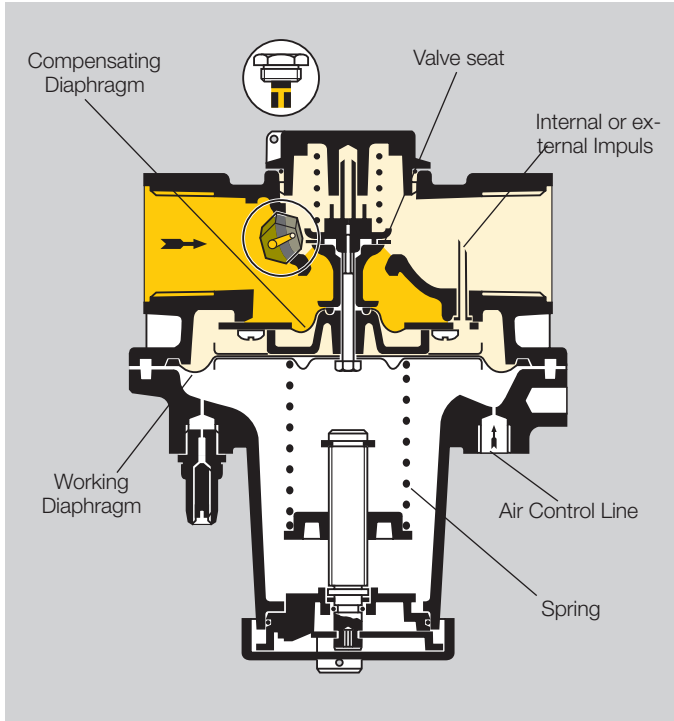


Order No.:
03351039

GIK..A



Order No.:
74910853



Function

The GIK has 4 basic elements that allow to operate. These are:

1 Valve seat

A valve seat or orifice through which the gas supply will flow. This has a disc or plug that can close against the seat to limit the flow of gas. By moving the disc, the outlet flow and pressure can be altered from fully open to fully closed. The position of the disc will determine the flow and pressure the outlet of the regulator.

2 Internal or external impulse

Usually a tube located on the regulator outlet senses the outlet pressure. The diaphragm is linked to the valve stem. A change in the sensed pressure above the diaphragm causing the restricting element to alter it's position.

3 Air control line

The air control pressure acts against the force of the measuring element. When state of equilibrium is achieved between the measuring element and the loading element the resulting position of the restricting element will determine the outlet pressure. The spring is for fine adjusting at low fire.

4 Compensating diaphragm

A secondary diaphragm is used in compensated regulators. This diaphragm has the same area as the valve, so it compensates the effect of varying inlet pressures on the valve.



GIK 15-50TN



GIK 65-100TA

Order Information

GIK	air/gas ratio regulator
15 – 100 (½" to 4")	nominal diameter
T	T-product
A	ANSI-flanged
N	NPT-internal thread
02	max. inlet pressure 3 psig (200 mbar)
-3	screw plug at the inlet and outlet
-5	pressure test point at the outlet
B	with drilled bypass screw

Designation	Order no.
For continuous control, with NPT internal thread	
GIK 15TN02-5	03155176
GIK 20TN02-5	03155128
GIK 25TN02-5	03155140
GIK 40TN02-5	03155152
GIK 50TN02-5	03155164
For High/Low/Off control, with NPT internal thread	
GIK 15TN02-5B	03155177
GIK 20TN02-5B	03155129
GIK 25TN02-5B	03155141
GIK 40TN02-5B	03155153
GIK 50TN02-5B	03155165
For continuous control, with ANSI flange	
GIK 65TA02-3	85092320
GIK 80TA02-3	85093320
GIK 100TA02-3	85094320

Trouble Shooting

Trouble Shooting is a term used to indicate a systematic approach to locate regulator malfunction. As with installation and maintenance, successful regulator troubleshooting depends on careful analysis and planning before taking action. Regulators are relatively simple devices with few faults. The most common faults are:

Flow at low fire position too high?

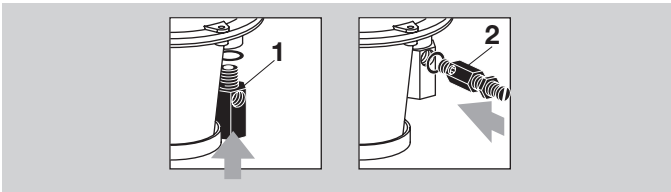
- It sometimes happens that the flow rate at low fire position is too high. This is due to dirt at the valve seat or disc. These parts should be cleaned with suitable solvent.
- Spring adjustment set too high.

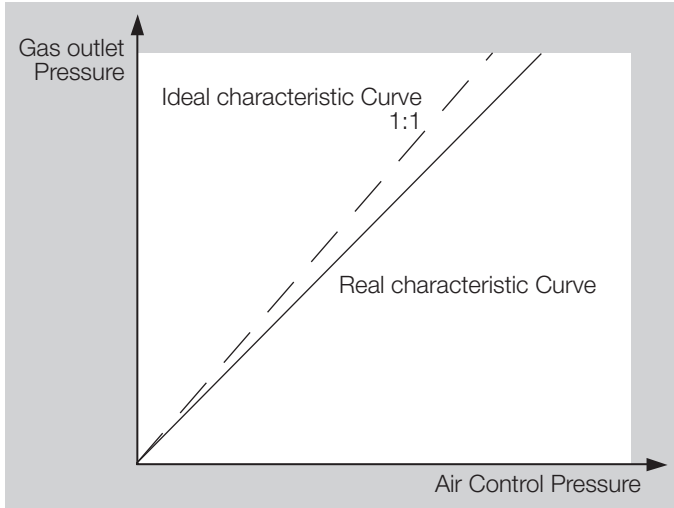
Air control pressure too high?

- The maximum possible gas outlet pressure is lower than the max. air control pressure (air impulse line). Use a reducing fitting
 (Order no. GIK 15 to 50 = 03351040)
 (Order no. GIK 65 to 100 = 74910779)

Regulator is not responding?

- The working or compensating diaphragm could be broken. Should these happen in short intervals check the diaphragms. Always use special air diaphragms for air media.





Gas/Air ratio is not 1:1 at high fire

- For example:
at low fire the air control pressure is **2" WC (5 mbar)**,
the gas outlet pressure is also **2" WC (5 mbar)**
at high fire the air pressure is 40" WC (100 mbar),
the gas outlet pressure is lower **depending on the flow rate.**
- For the gas/air ratio for high fire use gas limiting orifice valve for fine adjustments

Maintenance

All regulators which control the systems pressure are subject to periodic servicing by authorized personnel.

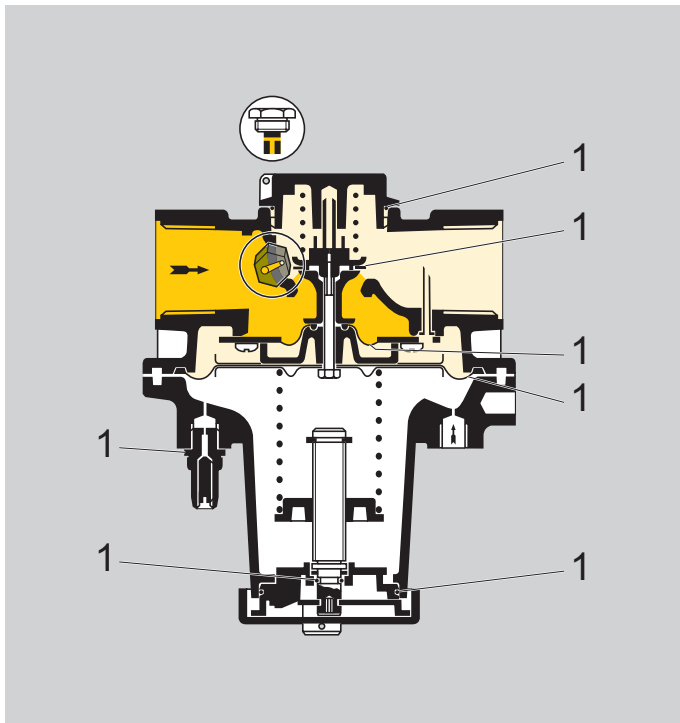
By carrying out a regular maintenance schedule, you can prevent problems from occurring. The regulator type and its service conditions will help you determine how often to conduct inspections. The more severe the working conditions, the more frequently you should examine the regulator.

Generally, small, modern regulators can operate for considerable periods without attention, minimizing the need for periodic maintenance.

When a regulator is serviced, the following general procedure should be followed.

- 1 Check that a shut off valve is located in the area of the regulator.
- 2 Try to ensure that there is a clear working area, and that you have somewhere to put the regulator components, once removed, so they will not be lost or damaged.
- 3 Always use the correct tools, in the proper sizes, to dismantle the regulator. Rough treatment can damage an otherwise useable component.
- 4 If available, follow the maintenance instructions issued by the manufacturer of the regulator.
- 5 Make careful note of the position of each component before removal to aid reassembly.
- 6 Unless the maintenance instructions say otherwise, take off the top cover and remove the loading spring.
- 7 Dismantle the regulator, removing the diaphragm(s) and valve.

- 8 Clean all parts of the body and casings.
- 9 Check the diaphragms and replace if necessary.
- 10 Clean the regulator valve. If it has a rubber seat, check and replace if necessary.
- 11 Examine the orifice or valve seating. Check for burrs and replace if damaged or worn. Avoid the use of abrasives on valve or seats.
- 12 Reassemble the parts in reverse order.
- 13 When reassembling a ring of screws or bolts, tighten gradually and in opposing pairs.
- 14 Check the regulator for leakage.
- 15 Reset outlet pressure to the regulator.
- 16 Update maintenance records for the unit.

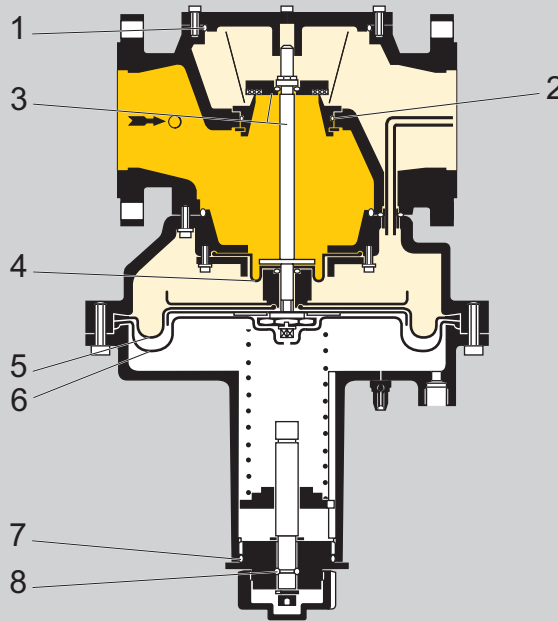


Spare parts

Spare parts GIK ½" to 2"

Spare part kit (1) contains the diaphragms and o-rings.

Type	For Gas	For Air
GIK 15	03089204	03089201
GIK 20	03089204	03089201
GIK 25	03089204	03089201
GIK 40	03089205	03089202
GIK 50	03089206	03089203



Spare parts GIK 2½" to 4"

Pos.	Description	GIK 65 (2½")	GIK 80 (3")	GIK 100 (4")
1	O-ring	03109276	03109277	03109277
2	O-ring	03110203	03109170	03109232
3	Valve train	74960325	74960024	74960316
4	Compensating diaphragm	35454179	34328850	35442690
5	Working diaphragm	34328846	34328856	34212875
6	Safety diaphragm	74324141	74324291	74324201
7	O-ring	03109170	03109170	03109170
8	O-ring	03109159	03109159	03109159

Warning

Situations dangerous to personnel and property can result from the misapplication and incorrect operation of combustion equipment.

Kromschroder advises compliance with the National Fire Protection Association standards that apply for related equipment and Insurance Underwriters recommendation, and care of operation.

We reserve the right to make technical changes designed to improve our products without prior notice. For current product information, visit our website at www.kromschroder.com.

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