

INFRARED GAS HEATER

VAL6

GN5
GP5

Service Manual



Shizuoka Seiki Co., Ltd.

Main Components

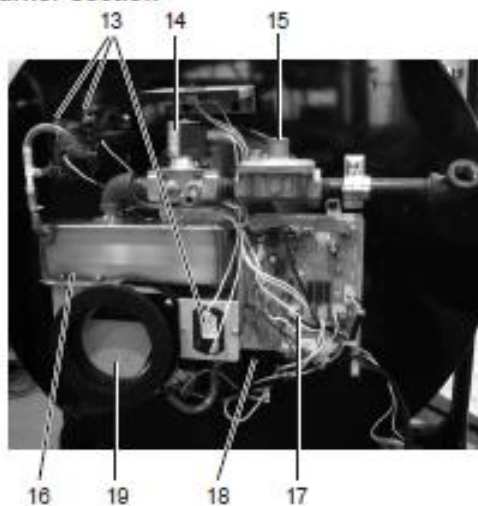


- 1 Radiation disk
- 2 Protector
- 3 Wheel
- 4 Knob bolt



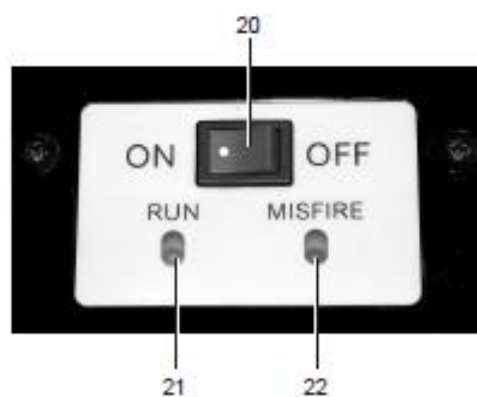
- 5 Burner grip
- 6 Burner cover
- 7 Switch section
- 8 Handle
- 9 Blower
- 10 Tip-over switch
- 11 Legs
- 12 Filter

Burner Section



- 13 Air switch
- 14 Solenoid valve
- 15 Regulator
- 16 Gas mixing box
- 17 Fuse
- 18 Ignition transformer
- 19 Combustion fan

Switch Section



- 20 Operating switch
- 21 Operating lamp
- 22 Misfire lamp

※GN5/GP5 have three air switches.

- Air switch A detects rolling of combustion fan.
- Air switch B detects clogging of burner head.
- Air switch C detects clogging of filter.

Specifications

Heater Specifications

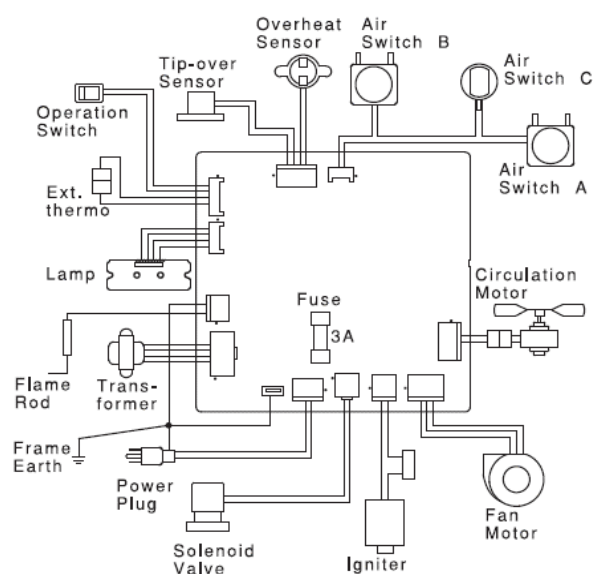
	VAL6 GN5	VAL GP5
Type	Radiated direct flame	
Ignition System	High intensity discharge	
Fuel	Natural gas	Propane gas
Fuel Consumption	137 CFH / 6.1 lbs/h	55.8 CFH / 6.6 lbs/h
Heat Output	144,000 BTU/h / 42.2 kW	
Dimensions (HxDxW)	35.3 x 31.7 x 30.3 inch / 898 x 804 x 770 mm	
Dry Weight	112.4 lbs / 51 kg	
Power Supply	120 V 60 Hz	
Power Consumption	When igniting: 107 W When burning: 93 W	
Fuse Type	3.0 A	
Noise Level	60 dB (A)	
Safety Systems	Flame monitor (Flame-rod) Air switch Overheat protection Tip-over switch	
Accessory	Hose (GN5/GP5)	

Gas Requirement

	GN5 (Natural gas)	GP5 (Propane gas)
Inlet pressure	Max. 7.0 IN. WC.	Max. 11.0 IN. WC.
	Min. 5.0 IN. WC.	Min. 10.0 IN. WC.
Manifold pressure	1.8 IN. WC.	1.5 IN. WC.

Be sure to use regulator for cylinder which inlet pressure range is 25 - 250psi

Wiring Diagram



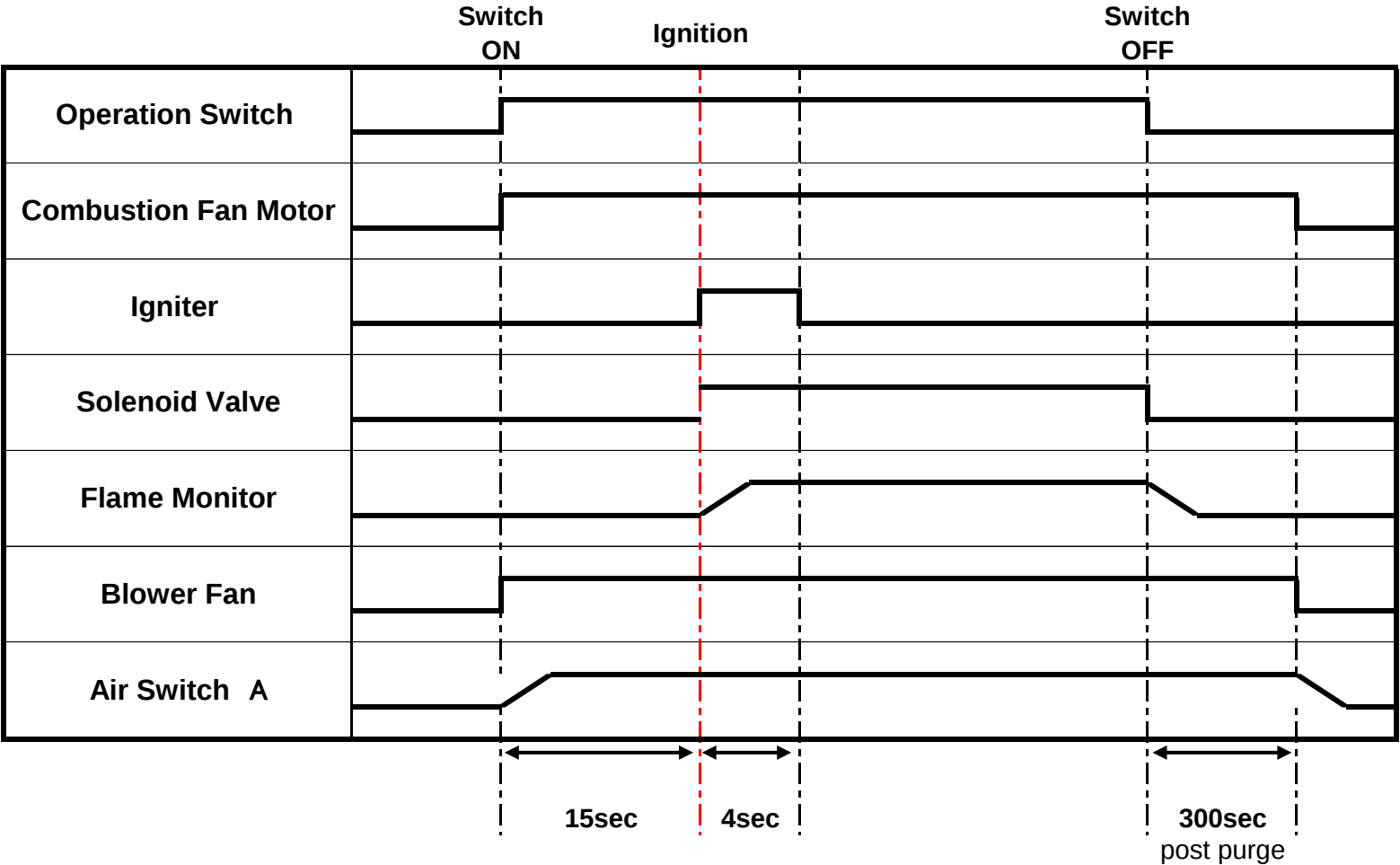
※GN5/GP5 have three air switches.

- Air switch A detects rolling of combustion fan.
- Air switch B detects clogging of burner head.
- Air switch C detects clogging of filter.

Safety Devices

Description of Safety Devices	
Overheat protection	Automatically extinguishes the flame if the heater overheats. Operating condition: Misfire lamp lights and the post purge sequence runs for about 5 minutes if the heater is in operation.
Electric overload system (Fuse)	This shuts off the power supply in case of excessive electric current due to problems with the devices. Operating condition: The entire operation stops.
Tip-over switch	Automatically extinguishes the flame when motion or an impact is detected during operation. Operating condition: Misfire lamp lights and the post purge sequence runs for about 5 minutes if the heater is in operation.
Air switch	Automatically extinguishes the flame if the combustion fan stops, the burner is clogged with dust, or the filter is clogged with dust. Operating condition: Misfire lamp lights and the post purge sequence runs for about 5 minutes if the heater is in operation.

Sequence Time Chart



Standard resistance & Standard Voltage

Standard resistance of functional parts

Parts	Connector NO		Lead	Condition	Resistance	Memo
					GN5/GP5	
Operating Switch	CN2		Red-Red	On	0 Ω	
				Off	∞ Ω	
Overheat Protection	CN3	1-2PIN	White-White	On	0 Ω	
				Off	∞ Ω	
Tip-over Switch		3-4PIN	Black-Black	On	0 Ω	Operation angle : 50 – 80 °
				Off	∞ Ω	
Air Switch A/B/C	CN19		Black-Black	Co.Fan ON	0 Ω	Check during cooling operation(post purge) *see troubleshooting
Co.Fan OFF				∞ Ω		
Burner clogging						
Filter clogging						
Air Switch B						
Air Switch C						
Transformer	CN24	1-5PIN	White-Red	Input	about 260 Ω	
		3-7PIN	Green-Green	Output	about 365 Ω	
		4-8PIN	Purple-Purple		about 4 Ω	
Ignition transformer	CN7		White-White	Input	–	Measure between transformer and earth
				Output	about 5.5k Ω	
Solenoid Valve	CN8		White-Groud	–	about 15M Ω	
Combustion fan motor	CN5		White-Black	–	about 8 Ω	Normal scale 0.5
Blower fan motor	CN20		White-Black	–	about 16 Ω	

Standard resistance & Standard Voltage

Input & Output of Burner Control

Parts	Connector NO	Lead	Condition	Voltage	Memo
				GN5/GP5	
Power Cable	CN16	Black-White	-	AC 120V(±10%)	
Transformer	CN24	White-Red	Input	AC 120V(±10%)	
		Green-Green	Output	AC120V	
		Purple-Purple		AC12V	
Ignition toransformer	CN7	Yellow-Yellow	Input	AC 120V(±10%)	
Solenoid Valve	CN8	White-White	-	AC 120V(±10%)	
Flame Rod	CN23	White-Groud	-	AC 120V(±10%)	
Combustion fan	CN5	White-Black	-	AC 120V(±10%)	Normal scale 0.5
Blower	CN20	White-Black	-	AC 120V(±10%)	

Phenomenon

page

1	The heater does not start	The lamp does not light on	
		Operation lamp is lit	
		Misfire lamp is lit	
2	The heater does not ignite (though the heater is working)	Solenoid Valve does not operate at all	
		No fuel or a little fuel is pumped up	
		Igniter does not spark. [Igniter does not operate]	
		Sequence of operation is normal, but it doesn't ignite	
3	Misfire within 4 seconds after ignition	Misfire lamp is lit	
4	Combustion stop during the operation	Misfire lamp is lit	
5	Combustion is not stable		
6	Gas leaks		
7	Fuse blows out	When the plug is put into the socket	
		When the switch is turned on	
		About 15 seconds after turning on	

Phenomenon		Possible Cause	How to check	Result	Remedy
1. The heater does not start.	The lamp does not light on.	No power source supplied	Measure voltage of AC outlet. Standard: AC 120V	If circuit tester indicates 0V, power source is disconnected	Connect power source
		Fuse blow out	Take fuse out from fuse box, and then check each lead with circuit tester	If multimeter reads $\infty\Omega$, fuse blows out	Find a cause of blown fuse and replace with a new one
		Disconnection of power cable	Take power source connector (CN1) out from burner controller, and then check each lead with multimeter	If either of the lead is broken, power cable is broken	Make sure the power cable is connected, or replace it
		Loose connection of power source connector	Plug in power source connector (CN1) again, and then turn on	If it works normally, power source connector fails in contact	Plug in connector (CN1) firmly
		Loose connection of transformer connector	Plug in transformer connector (CN24) again, and then turn on	If it works normally, transformer connector fails in contact	Plug in connector (CN24) firmly
		Failure of transformer	Measure voltage at output side of transformer connector (CN24) Standard (purple-purple): about AC12V	If multimeter reads normal voltage at input side, and reads 0V at output side, transformer fails	Replace transformer
		Loose connection of operating switch connector	Plug in operation switch connector (CN2) again, and then turn on	If it works normally, operation switch connector fails in contact	Plug in connector (CN2) firmly
		Failure of operating switch	Take operating switch connector (CN2) out, and then check lead with multimeter Standard: Conducting (0Ω) when turned on	If it doesn't conduct when turned on, operating switch fails	Replace operating switch
		Failure of burner controller	Measure voltage at input side of transformer connector (CN24) Standard (white-red): AC120V	If power source is normal and multimeter reads 0V at input side, burner controller fails	Replace burner controller
	Run lamp is lit	Loose connection between thermostat connector	Attach the thermostat connector	If it works normally, the thermostat fails in contact.	Attach the connector firmly
	Misfire lamp is lit.	Failure of overheat protection	After cooling,take overheat protection connector (CN3) out,and then check lead with multimeter.Standard:Conducting(0Ω)	If it doesn't conduct , overheat protection fails	Replace overheat protection
		Failure of tip-over sensor	Take tip-over switch connector (CN3) out,and then check lead with multimeter.Standard:Conducting(0Ω)	If it doesn't conduct when turned on, tip-over switch fails	Replace tip-over switch
		Failure of burner controller		It doesn't start to operate	Replace burner controller

2. The heater does not ignite.

Solenoid Valve does not operate at all.

Loose connection of solenoid valve connector	Plug in solenoid valve connector (CN8) again, and then turn on	If it works normally, solenoid valve connector fails in contact	Plug in connector (CN8) firmly
Failure of solenoid valve	Measure voltage at output side of solenoid valve connector on burner controller	If voltage is normal, solenoid valve fails	Replace solenoid valve
Failure of burner controller	Standard (white-white) (CN8) AC120V	If multimeter reads 0V, burner controller fails	Replace burner controller
Failure of air switch(A or B or C)	Check conduction during cooling operation as a connector(CN19) for air switch is connecting to circuit board.	If no conduction, air switch(A or B or C) fails.	Replace air switch (A or B or C)
Operation of air switch A (C4065F578:2)		If no conduction, air pressure from combustion fan motor is not being detected. 1. Additionally check whether the combustion fan motor is normal. 2. Check if there is no clog in pressure pathway from mixing box	1. Replace combustion fan motor. 2. Clean pressure pathway from mixing box to air switches.
Operation of air switch B (6065F126:2)		If no conduction, air switch(B) is operating due to clogged burner head(Metal-knit).	Clean burner head(Metal-knit)
Operation of air switch C (NS2-1440-01)		If no conduction, air switch(C) is operating due to clogged filter.	Replace filter
No fuel or a little fuel gas is supplied.	Fuel line is clogged	Disconnect each fuel line, and then clean up each of them	Clean fuel lines
	Nozzle is clogged	Clean nozzle	Clean nozzle
	Loose joint in fuel lines	Check looseness of each joint	Fasten joints more tightly
	Solenoid valve is clogged, or failure	Measure the manifold pressure with pressure gauge. Standard ⇒ GN5:1.8 / GP5:1.5 in.w.c.	Replace solenoid valve.
	Manifold pressure has shifted.	If manifold pressure has shifted, adjust regulator to correct pressure.	Adjust regulator
	Inlet pressure has shifted.	Measure the inlet pressure with pressure gauge. Standard ⇒ GN5:5~7 / GP5:10~11 in.w.c.	Adjust inlet pressure.

		Failure of burner controller	Measure voltage at solenoid valve connector on burner standard (white-white) (CN8) AC120V	If multimeter doesn't read power supply voltage, burner controller fails	Replace burner controller
		Incorrect nozzle	Check maker's imprint of the nozzle if it is correct.	GN5 ϕ 3.0mm x 9 holes GP5 ϕ 2.4mm x 9 holes	Replace incorrect nozzle for correct one
		Type of fuel is not correct	Check if type of fuel is matched with specification label on the unit.	If not matched, using wrong fuel.	Use proper fuel
	Igniter does not spark. [Igniter does not operate.]	Loose connection of igniter connector		If it works normally, loose connection of igniter connector	Plug in connector (CN7) firmly
		Failure of igniter	Measure voltage at igniter connector (CN7) on burner controller	If voltage is normal, igniter fails	Replace igniter
		Failure of burner controller	Standard (black-black):AC120V	If multimeter reads 0V, burner control fails	Replace burner controller
	Sequence of operation is normal, but it doesn't ignite	Alignment of electrode is out of standard	Measure the alignment of electrode	If any part is out of standard position, out of alignment is cause	Replace electrode (adjust the position)
		Improper quantity of combustion air	Check gate opening of fan motor	If gate opening is unusual, quantity of combustion air is improper	Adjust gate opening. Normal scale: GN5/GP5 - 1.0
3. Misfire within 4 seconds after ignition.	Misfire lamp is lit.	Loose flame rod cord	Open burner cover, and check if the flame rod cord is in	If flame rod cord comes off, it doesn't work	Put in flame rod cord firmly
		Shortage of light sensed from flame	Take flame rod cord out, and then measure voltage at flame rod cord connector(CN23) standard(white-yellow/green):AC120V	If multimeter reads 0V, burner control fails	Replace burner controller
			Check extent of combustion air inlet opening	If opening is too extensive, flame is unstable because combustion air is too much	Decrease opening to reduce combustion air. Normal scale: GN5/GP5 - 1.0
		Loose connection of flame rod	Plug flame rod connector (CN 23) again, and then turn on	If it works normally, flame rod connector fails on contact	Plug connector (CN 23) firmly
		Nozzle clogged	Replace nozzle	If it ignited, nozzle is clogged	Replace nozzle
4. Combustion stops during	Misfire lamp is lit.	Loose connection of flame rod	Plug flame rod connector (CN 23) again, and then turn on	If it works normally, flame rod connector fails on contact	Plug connector (CN 23) firmly
		Out of fuel (when using propane gas)	Check remaining amount of propane gas	Out of fuel if cylinder is empty	Replace a cylinder
		Freezing propane gas cylinder	Check the surface of cylinder	If surface of cylinder is frosting, cylinder is freezing	Use bigger cylinder

5. Smell of fuel comes out.		Gas leakage	Check all connection of pipe line	If smell strongly at connection, fuel leakage	Refasten the connection of pipe line
		Incorrect nozzle	Check makers imprint of the nozzle if it is correct.	GN5 ϕ 3.0mm x 9 holes GP5 ϕ 2.4mm x 9 holes	Replace incorrect nozzle for correct one
		Type of fuel is not correct	Check if type of fuel is matched with specification label on the unit.	If not matched, using wrong fuel.	Use proper fuel
6. Smoke comes out.		Using at high altitude area (Low oxygen concentration)	Know if using at lower than the altitude of 1000m(3000ft)	If altitude is over 1,000m(3,000ft), heater cannot be used due to low oxygen concentration	Never use the heater over 1,000m(3,000 ft)
		Incorrect nozzle	Check makers imprint of the nozzle if it is correct.	GN5 ϕ 3.0mm x 9 holes GP5 ϕ 2.4mm x 9 holes	Replace incorrect nozzle for correct one
		Loose joints in fuel line	Check looseness of each joint	If any joints are loose, air is absorbed into fuel lines from loose joint	Fasten joints more tightly
7. Combustion is not stable.		Loose joints in fuel line	Check looseness of each joint	If any joint is loose, fuel is leaking	Fasten joints more tightly
		Improper quantity of combustion air	Check gate opening of fan motor	If gate opening is unusual, quantity of combustion air is improper	Adjust gate opening. Normal scale: GN5/GP5 - 1.0
		Inlet pressure has shifted.	Measure the inlet pressure with pressure gauge. Standard $\Rightarrow$ GN5:5~7 / GP5:10~11 in.w.c.	If inlet pressure has shifted, adjust inlet pressure to correct pressure.	Adjust inlet pressure.
		Manifold pressure has shifted.	Measure the manifold pressure with pressure gauge. Standard $\Rightarrow$ GN5:1.8 / GP5:1.5 in.w.c.	If manifold pressure has shifted, adjust regulator to correct pressure.	Adjust regulator

8. Fuse blows out	When the plug is put into the outlet.	Short circuit of transformer coil	Unplug transformer connector (CN24) from burner controller, then measure coil resistance values of two leads Standard: GN5/GP5 (white-red) - about 260Ω (green-green) - about 365Ω (purple-purple) - 4Ω	If either of the values is 0Ω, transformer is short-circuited	Replace a transformer
			▪ Without tester		
		Short circuit of surge absorber (SA1)	Unplug transformer connector (CN24) from burner controller, then put plug into AC outlet	If fuse doesn't blow out, transformer is short-circuited	
	When the switch is turned	Short circuit of fan motor coil	Gauge resistance at surge absorber (SA1)	If resistance value is 0Ω, surge absorber is short-circuited	Replace burner controller
		Short circuit of fan motor coil	Unplug fan connector (CN5) from burner controller, then measure resistance between	If resistance value is 0Ω, fan coil is short-circuited	
			▪ Without tester		
			Unplug fan connector (CN5), and then start operation	If fuse doesn't blow out, fan coil is short-circuited	
	About 15 seconds after turning on	Short circuit of blower motor coil	Unplug fan connector (CN20) from burner controller, then measure resistance between	If resistance value is 0Ω, fan coil is short-circuited	Replace blower motor
			▪ Without tester		
			Unplug fan connector (CN20), and then start operation	If fuse doesn't blow out, fan coil is short-circuited	
	About 15 seconds after turning on	Short circuit of igniter	Unplug igniter connector(CN7) from burner controller, then measure resistance between terminals	If resistance value is 0Ω, primary side of igniter is short-circuited	Replace igniter
			▪ Without tester		
			Unplug igniter connector (CN7), and then start operation	If fuse doesn't blow out, igniter is short-circuited	
	About 15 seconds after turning on	Short circuit of solenoid valve coil	Unplug solenoid valve connector (CN8) from burner controller, then measure resistance between terminals	If resistance value is 0Ω, pump coil is short-circuited	Replace solenoid valve.
			▪ Without tester		
			Unplug solenoid valve connector (CN8), then turn on	If fuse doesn't blow out, pump coil is short-circuited	