INFRA-RED GAS HEATER

VAL6 GP5 Ⅱ

Service Manual

Shizuoka Seiki Co.,Ltd.

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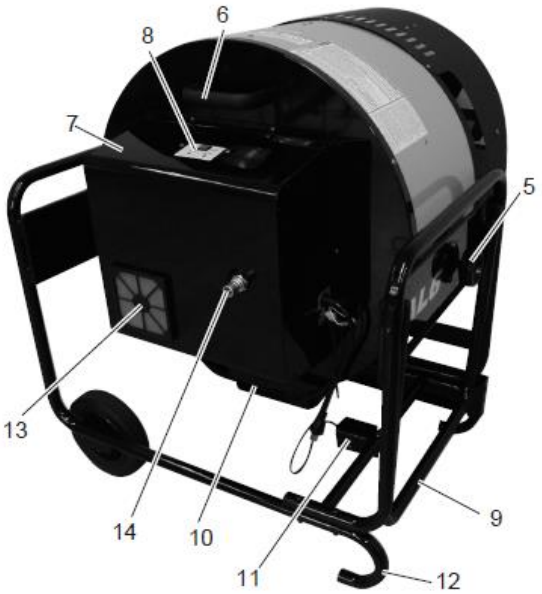
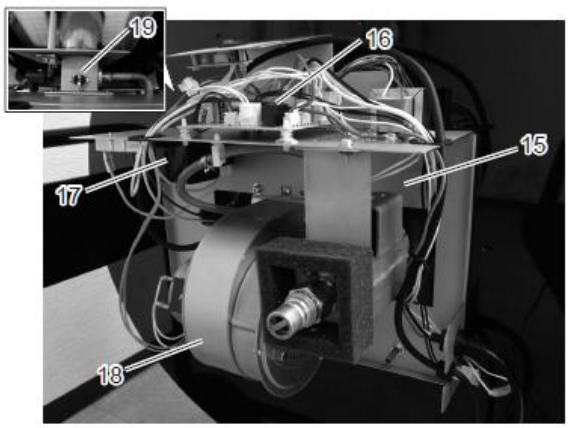
Main Components

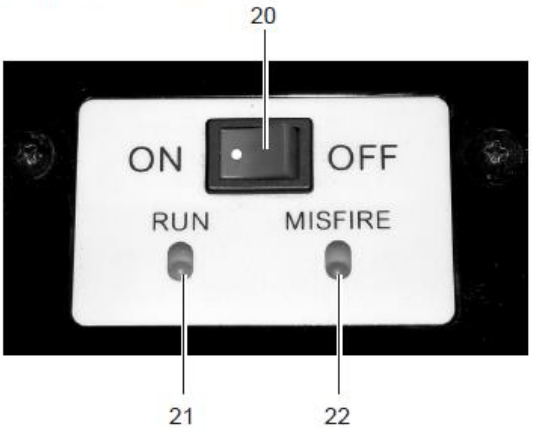


1 Radiation disk
2 Protector
3 Wheel
4 Casing overheat sensor
5 Knob bolt
6 Burner grip
7 Burner cover
8 Switch section
9 Handle
10 Blower
11 Tip-over switch
12 Legs
13 Filter
14 Nipple

Burner Section



Switch Section



15 Gas/Air Ratio control Gas Valve
16 Fuse
17 Ignition transformer
18 Combustion fan
19 Mixer overheat sensor
20 Operating switch
21 Operating lamp
22 Misfire lamp

Specifications

Heater Specifications

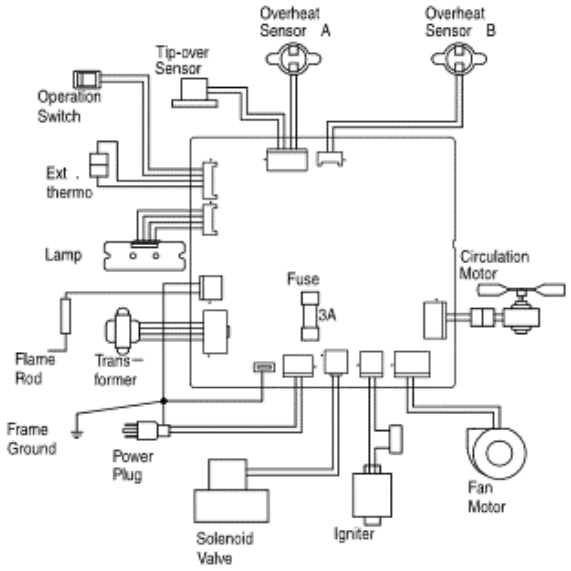
	VAL6 GP5II
Type	Radiated direct flame
Ignition System	High intensity discharge
Fuel	Propane gas
Fuel Consumption	50.5 CFH / 6.0 lbs/h
Heat Output	122,000 BTU/h / 35.8 kW
Dimensions (H×D×W)	35.3 x 31.7 x 30.3 inch / 896 x 804 x 770 mm
Dry Weight	110.2 lbs / 50 kg
Power Supply	120 V 60 Hz
Power Consumption	When igniting: 97 W When burning: 81 W
Fuse Type	3.0 A
Noise Level	60 dB (A)
Safety Systems	Flame monitor (Flame-rod) Overheat protection × 2 Tip-over switch
Accessory	Hose

Gas Requirement

	GP5II (Propane gas)
Inlet pressure	Max. 11.0 IN. WC. Min. 10.0 IN. WC.
Manifold pressure	0.68 IN. WC.

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

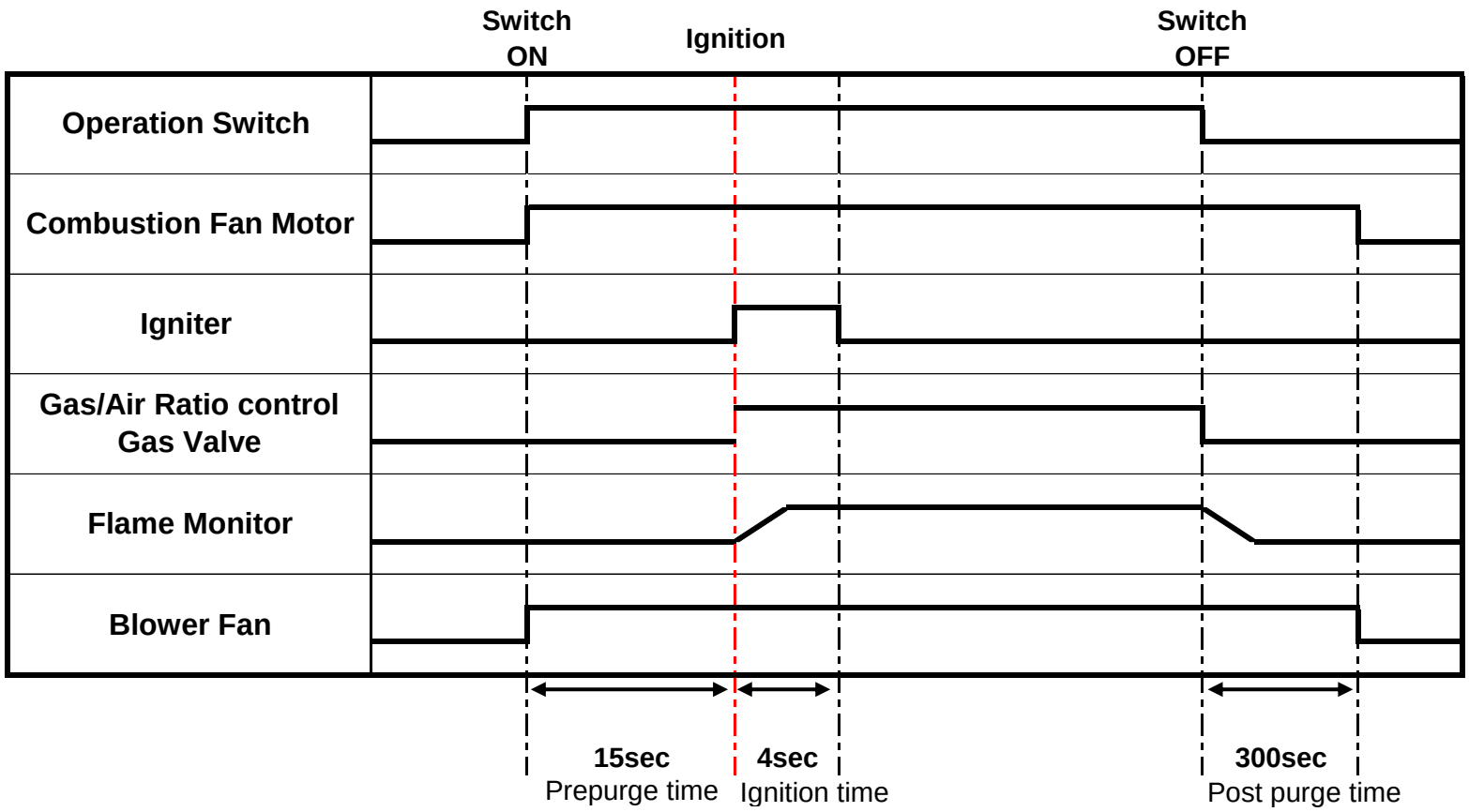
Wiring Diagram



Safety Devices

Description of Safety Devices	
Casing 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.
Mixer 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.

Sequence Time Chart



Standard resistance & Standard Voltage

Standard resistance of functional parts

Parts	Connector NO		Lead	Condition	Resistance	Memo
					GP5Ⅱ	
Operating Switch	CN2		Red-Red	On	0Ω	
				Off	∞Ω	
Tip-over Switch	CN3	1-2PIN	Black-Black	On	0Ω	Operation angle：50 - 80 °
				Off	∞Ω	
Overheat Protection		3-4PIN	White-White	On	0Ω	
				Off	∞Ω	
Transformer	CN24	1-5PIN	White-Red	Input	about 260Ω	
		3-7PIN	Green-Green	Output	about 375Ω	
		4-8PIN	Purple-Purple		about 4Ω	
Ignition transformer	CN7		White-White	Input	-	
				Output	about 1.2kΩ	
Gas/Air Ratio control Gas Valve	CN8		White-White	-	about 705kΩ	
Combustion fan motor	CN5		Gray-Gray	-	about 175Ω	Mark on the damper scale (Individual setting during manufacturing)
Blower fan motor	CN20		White-Black	-	about 16Ω	

Standard resistance & Standard Voltage

Input & Output of Burner Control

Parts	Connector NO	Lead	Condition	Voltage	Memo
				GP5II	
Power Cable	CN1	Black-White	-	AC 120V(±10%)	
Transformer	CN24	White-Red	Input	AC 120V(±10%)	
		Green-Green	Output	AC120V(±10%)	
		Purple-Purple		AC12V(±10%)	
Ignition toransformer	CN7	Black-Black	Input	AC 120V(±10%)	
Gas/Air Ratio control Gas Valve	CN8	White-White	-	AC 120V(±10%)	
Flame Rod	CN23	White-Yellow/Green	-	AC 120V(±10%)	
Combustion fan	CN5	Gray-Gray	-	AC 120V(±10%)	Mark on the damper scale (Individual setting during manufacturing)
Blower	CN20	Black-White	-	AC 120V(±10%)	

	Phenomenon		page
1	The heater does not start	The lamp does not light on	
		Run lamp is lit	
		Misfire lamp is lit	
2	The heater does not ignite (though the heater is working)	Gas/Air Ratio Control Gas Valve does not operate at all does not operate at all	
		No fuel or a little fuel is supplied	
		Igniter does not spark [Igniter does not operate]	
		Sequence of operation is normal, but it doesn't ignit	
3	Misfire within 4 seconds after ignition	Misfire lamp is lit	
4	Combustion stop during the operation	Misfire lamp is lit	
5	Smell of fuel comes out.		
6	Smoke comes out		
7	Combustion is not stable		
8	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 multimeter indicates 0V, power source is disconnected	Connect power source
		Fuse blow out	Take fuse out from fuse box, and then check each lead with multimeter	If multimeter indicates ∞Ω, 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): 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.	**"Gas/Air Ratio Control Gas Valve" does not operate at all.**	Loose connection of the connector of Gas/Air Ratio Control Gas Valve	Plug in the connector of Gas/Air Ratio Control Gas Valve (CN8) again, and then turn on	If it works normally, the connector of Gas/Air Ratio Control Gas Valve fails in contact	Plug in connector (CN8) firmly
		Failure of Gas/Air Ratio Control Gas Valve	Measure voltage at output side of the connector of Gas/Air Ratio Control Gas Valve on burner	If voltage is normal, solenoid valve fails	Replace Gas/Air Ratio Control Gas Valve
		Failure of burner controller	Standard (white-white) (CN8) AC120V	If multimeter reads 0V, burner controller fails	Replace burner controller
	No fuel or a little fuel gas is supplied.	Fuel line is clogged	Disconnect each fuel line, and then clean up each of them	If it ignites after cleaning, fuel flow decreases because of clogged in fuel lines	Clean fuel lines
		Nozzle is clogged	Clean nozzle	If it ignites, nozzle is clogged	Clean nozzle
		Loose joint in fuel lines	Check looseness of each joint	If heater ignites by joints fastened more tightly, gas leaked with the fuel line at loosed joints	Fasten joints more tightly
		Hoses of manifold (flexble hoses between combustion fan motor and Gas/Air Ratio Control Gas Valve) are clogged or loose	Disconnect flexible hoses between combustion fan motor and Gas/Air Ratio Control Gas Valve, and then clean up of them, and then reconnect them	If it works normally, hoses of manifold are clogged or loose	Clean hoses of manifold and connect them firmly
		Pressure of combustion fan has shifted.	Measure the pressure between combustion fan motor and Gas/Air Ratio Control Gas Valve with differential pressure gauge Ajust damper opening to standard pressure Standard: 0.64 - 0.80 in w.c.	If the pressure isn't correct, combustion fan is clogged, incorrect damper opening or failure	Clean combustion fan, adjust damper opening or replace combustion fan
		Gas/Air Ratio Control Gas Valve is clogged or failure	Measure the pressure of Gas/Air Ratio Control Gas Valve(small port for checking pressure of outlet) with differential pressure gauge Standard: 0.72 - 0.88 in w.c.	If the pressure isn't correct, Gas/Air Ratio Control Gas Valve is clogged or failure	Replace Gas/Air Ratio Control Gas Valve
		Inlet pressure has shifted.	Measure the inlet pressure with pressure gauge. Standard: 10 - 11 in w.c.	If inlet pressure has shifted,ajust inlet pressure to correct pressure.	Adjust inlet pressure.

		Failure of burner controller	Measure voltage at connector of Gas/Air Ratio Control Gas Valve on burner Standard (white-white) (CN8): AC120V	If multimeter doesn't read power supply voltage , burner controller fails	Replace burner controller
		Type of fuel is not correct	Check type of fuel Standard: propane gas	If not propane gas, using wrong fuel.	Use propane gas
	Igniter does not spark. [Igniter does not operate.]	Loose connection of igniter connector	Plug in transformer connector (CN7) again, and then turn on	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 Standard (black-black): AC120V	If voltage is normal, igniter fails	Replace igniter
		Failure of burner controller		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 Standard: Distance between electrodes⇒ 0.20inch (5mm) Distance between electrode and burner head⇒ 0.20inch (5mm)	If any part is out of standard position, out of alignment is cause	Replace electrode (or adjust the position)
		Improper quantity of combustion air	Check the damper opening of combustion fan motor Standard: Mark on the damper scale	If damper opening is unusual, quantity of combustion air is improper	Adjust damper opennig Mark on the damper scale (Individual setting during manufacturing)
3. Misfire within 4 seconds after ignition.	**Misfire lamp is lit.**	Loose flame rod cord	Plug flame rod cord on the burner head again, and then turn on	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 the damper opening of combustion air inlet	If damper opening is too large, flame is unstable because combustion air is too much If damper opening is too small, flame is unstable because propane gas is too little	Adjust damper opening Mark on the damper scale (Individual setting during manufacturing)
		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 operation.	**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	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
		Type of fuel is not correct	Check type of fuel Standard: propane gas	If not propane gas, using wrong fuel.	Use propane gas
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)
		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 the damper opening of combustion fan motor Standard: Mark on the damper scale	If damper opening is unusual, quantity of combustion air is improper	Adjust damper opening Mark on the damper scale (Individual setting during manufacturing)
		Hoses of manifold (flexble hoses between combustion fan motor and Gas/Air Ratio Control Gas Valve) are clogged or loose	Disconnect flexible hoses between combustion fan motor and Gas/Air Ratio Control Gas Valve, and then clean up of them, and then reconnect them	If it works normally, hoses of manifold are clogged or loose	Clean hoses of manifold and connect them firmly
		Pressure of combustion fan has shifted.	Measure the pressure between combustion fan motor and Gas/Air Ratio Control Gas Valve with differential pressure gauge Ajust damper opening to standard pressure Standard: 0.64 - 0.80 in w.c.	If the pressure isn't correct, combustion fan is clogged, incorrect damper opening or failure	Clean combustion fan, adjust damper opening or replace combustion fan
		Gas/Air Ratio Control Gas Valve is clogged or failure	Measure the pressure of Gas/Air Ratio Control Gas Valve(small port for checking pressure of outlet) with differential pressure gauge Standard: 0.72 - 0.88 in w.c.	If the pressure isn't correct, Gas/Air Ratio Control Gas Valve is clogged or failure	Replace Gas/Air Ratio Control Gas Valve
		Inlet pressure has shifted.	Measure the inlet pressure with pressure gauge. Standard: 10 - 11 in w.c.	If inlet pressure has shifted,ajust inlet pressure to correct pressure.	Adjust inlet pressure.

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: (white-red) - about 260Ω (green-green) - about 375Ω , (purple-purple) - 4 Ω ・Without tester Unplug transformer connector (CN24) from burner controller, then put plug into AC outlet	If either of the values is 0Ω, transformer is short-circuited If fuse doesn't blow out, transformer is short-circuited	Replace a transformer
		Short circuit of surge absorber (SA1)	Gauge resistance at surge absorber (SA1)	If resistance value is 0Ω, surge absorber is short-circuited	Replace burner controller
	When the switch is turned on.	Short circuit of combustion fan motor coil	Unplug combustion fan connector (CN5) from burner controller, then measure resistance between terminals Standard: about 175 Ω ・Without tester Unplug combustion fan connector (CN5), and then start operation	If resistance value is 0Ω, fan coil is short-circuited If fuse doesn't blow out, fan coil is short-circuited	Replace combustion fan motor
		Short circuit of blower motor coil	Unplug blower fan connector (CN20) from burner controller, then measure resistance between terminals ・Without tester Unplug blower fan connector (CN20), and then start operation	If resistance value is 0Ω, fan coil is short-circuited If fuse doesn't blow out, fan coil is short-circuited	Replace blower fan motor
	About 15 seconds after turning on	Short circuit of igniter	Unplug igniter connector(CN7) from burner controller, then measure resistance between terminals ・Without tester Unplug igniter connector (CN7), and then start operation	If resistance value is 0Ω, primary side of igniter is short-circuited If fuse doesn't blow out, igniter is short-circuited	Replace igniter

		Short circuit of Gas/Air Ratio Control gas valve coil	Unplug connector of Gas/Air Ratio Control gas valve (CN8) from burner controller, then measure resistance between terminals Standard: about 705kΩ	If resistance value is 0Ω, Gas/Air Ratio Control gas valve coil is short-circuited	Replace Gas/Air Ratio Control gas valve
			・Without tester Unplug solenoid valve connector (CN8), then turn on	If fuse doesn't blow out, Gas/Air Ratio Control gas valve coil is short-circuited	