CORONA
BURNER CONTROLLER
INSTRUCTION MANUAL

RCF15

EXCLUSIVE FOR FLAME ROD

Corona Corporation

- ○ This instruction manual contains important information for safe use of this device.
- ○ Keep this instruction manual near the installation place of this device and use the manual for quick reference when needed.
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- ○ The contents of this instruction manual are subject to change in the future without notice.

INTRODUCTION

Thank you for purchasing our burner controller.
This instruction manual should be read and understood before use by personnel who are in charge of design and/or maintenance of operation panels and/or equipment using RCF15.

FEATURES OF THE PRODUCT

- ○ The burner controller RCF15 is exclusively used for gas-fired combustion equipment with combustion rate of 175 kW or less.
- ○ RCF15 is exclusively used for 24-hour or less batch type combustion equipment.
- ○ The product is a combustion safety control device to control the equipment safely if any misoperation or trouble due to malfunction occurs.
- ○ The Combustion/Alarm indicator LED illuminates at combustion.
- ○ The Combustion/Alarm indicator LED blinks at ignition failure (misfire), detection of a false flame signal, or flame failure.
- ○ RCF15 does not start in case of circuit failure of the inside or outside of the burner controller, or false flame signal detection at operation start.
- ○ If system lockout occurs, it cannot be restarted until the reset button of RCF15 is pressed manually.
- ○ Do not press the reset button too hard. Otherwise the button may be damaged.

PRECAUTIONS FOR SAFETY

The following are important items for safe use.
Be sure to read them before installation and start of use.

● Symbols and meanings for safety in this instruction manual are as follows.

⚠ WARNING	Indicates that mishandling the product may result in death or serious injury to the user.
⚠ CAUTION	Indicates that mishandling the product may result in injury to the user, or physical damage.

* Items with CAUTION may also result in serious consequences depending on the situations.
All the descriptions with both symbols are important contents. Be sure to observe them.

WARNING

- Be sure to turn off all power supplies of the product and the connected devices at installation, removal, and wiring of the product. Otherwise, electric shock may
- When the safety switch for this product is operated or lockout occurs, remove the cause first, and then reset the product. Do not repeat reset many times continuously.
- Select the product and other combined devices according to the operation type of the combustion equipment (batch operation, continuous operation). Inappropriate selection or combination may lead to a serious accident of the combustion equipment.

  * Batch operation type equipment starts and stops one or more times within 24 hours. Continuous operation type equipment continues combustion for 24 hours or more.

CAUTION

- The product is equipped with very important functions to operate the combustion equipment safely.
  For proper use of the product, observe this instruction manual, instruction manuals of the combined devices, instruction manuals of the combustion equipment, etc.
- Installation, wiring, inspection, adjustment, maintenance, etc., of the product should be performed by an experienced technician who has acquired the knowledge and skills related to the combustion equipment and the product.
- Do not operate the product out of the rated specifications specified in the instruction manual of the product. Otherwise, failure or malfunction may occur.
- Avoid installing the product in the following locations. Otherwise, failure may occur.
  - ∇ Locations where there are special chemicals or corrosive gases.
  - ∇ Locations where there are water droplets or excessive humidity.
  - ∇ Locations exposed to high temperatures.
  - ∇ Locations subject to prolonged vibration.
- Perform wiring of the product correctly according to the specified standards with the cables and wiring method specified in the instruction manual. Otherwise, failure or malfunction may occur.
- Perform maintenance and inspection properly by observing the method, how to handle, replacement intervals, etc., specified in the instruction manual of the product. Otherwise, failure may occur.
- Do not disassemble the product. Otherwise failure or electric shock may occur.
- Do not press the reset button too hard. Otherwise the button may be damaged.

CONTENTS

1 Product Specifications

Model	**RCF151**	**RCF152**
Rated voltage	AC100V (85 - 110%)	AC200V (85 - 110%)
Power supply frequency	50/60Hz	
Power consumption	7VA	
Contact capacity of devices	Terminal ⑨ (Ignition transformer) : 250VA	
	Terminal ⑤ (Pilot valve) : 100VA	
	Terminal ① (Main valve) : 100VA	
	Terminal ⑧ (Alarm) : 75VA	
Allowable ambient temperature	-20 - +60℃	
Allowable ambient humidity	35 - 90%RH (Ambient temperature 40ºC)	
Withstand voltage	Between each terminal (excluding ④ and ⑥) and the ground: AC1500V 1 min or AC1800V 1s	
Insulation resistance	Between each terminal (excluding ④ and ⑥) and the ground: 50MΩ or more (with a DC500V Megger)	
Lightning surge immunity	3 kV 1.2/50μs (IEC61000-4-5)	
Mounting direction	The reset button faces upwards or sideways.	
Mass	Approx. 395 g	

Application	For gas-fired combustion equipment with combustion rate of 175 kW/h or less (limited to batch operation type)
Flame detector type	Flame rod type
Sequence timing	Prepurge : 15±1 sec
	Ignition trial : 4±1 sec
	Post-ignition : 11±1 sec
	Lock out : 15±1 sec
	Flame response : 1 sec
Flame current	Normal combustion : 2 - 6μA (between the flame rod and the terminal ④)
	Flame detection threshold : Maximum 1.0 μA
	Non-flame detection threshold : Minimum 0.2 μA

2 Installation and Wiring

* PRECAUTIONS *

1. Absolutely avoid the following installation locations.
   - ○ Locations where there are special chemicals or corrosive gases.
   - ○ Locations where there are water droplets or excessive humidity.
   - ○ Locations exposed to high temperatures.
   - ○ Locations subject to prolonged vibration.
2. Perform installation and wiring according to this instruction manual.
3. The product should be handled by only an experienced technician with sufficient knowledge.
4. Connect the power supply after completing all wiring.
   Mistakenly touching a terminal may cause electric shock or damage.
5. The load connected to each terminal should be within the rated load in the specifications.
6. Supply the same power voltage and frequency as those indicated on the product.
7. When timers or auxiliary relays are used for additional functions, select reliable ones and build a correct circuit.
8. Arrange the high-voltage cable wiring separately while the cable is kept 10 cm or more away from the burner controller.
   Do not bundle the power cable or the high-voltage cable of the ignition transformer with the flame rod cable. Also do not arrange the wiring of them closely. Otherwise, this may cause malfunction of the burner controller.
9. Connect the high-voltage cable of the ignition transformer properly to avoid contact failure.
   Contact failure may generate high-frequency radio waves which may cause malfunction.
   In addition, install the ignition transformer directly to the burner housing or to the metal part electrically connected to the burner housing.
10. After completing the wiring, be sure to check that the wiring is correct. Wrong wiring may cause damage or malfunction.

Mounting Direction

1. The product can be installed in any position other than the direction the reset button faces downward.
2. Main body and subbase
   (1) Loosen the main body securing screw shown in Fig. 1.
   (2) Hold the subbase and the cover respectively and separate them.
   At this time, be careful not to apply excessive force. (Reference: Fig. 2)
   (3) Perform installation in the reverse procedure of the above.
3. Installation method of the subbase
   (1) Make knock-out holes for subbase conduits as required, and install the wiring conduits.
   (Refer to Fig. 2 and 3.)
   (2) Secure the subbase at the specified position with screws.
   At this time, be careful not to apply excessive force to the screws. (Refer to Fig. 8.)

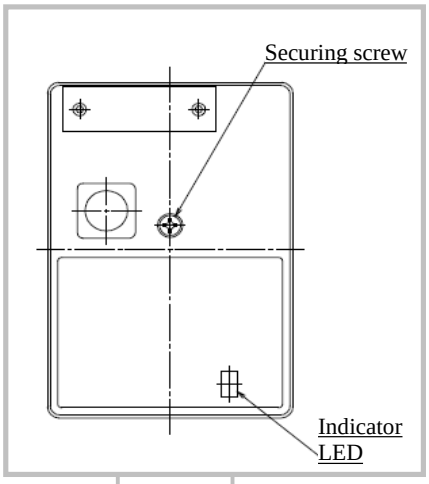


Fig. 1

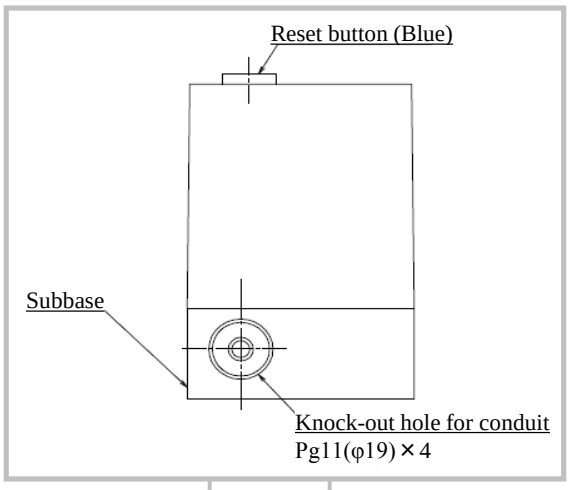
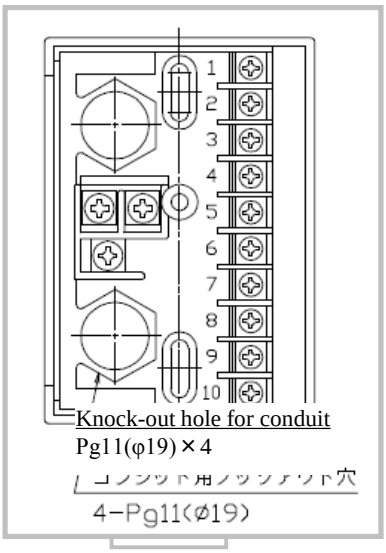


Fig. 2



4. Wiring method of the subbase

(1) Fig. 3 shows the terminal layout of the subbase. Fig. 5 shows an example of wiring connection with external devices.

(2) When the power supply has a voltage side Ⓗ and a ground side Ⓖ, connect the voltage side and the ground side to terminal ② and ⑦ respectively. Refer to Fig. 4 for wiring connection to the valve.

(3) The main body is installed by a plug-in method. Thus, carry out wiring so that the cables do not interfere with the installation of the main body.

(4) Ensure that the wiring is correct, and then plug the main body into the subbase and secure the main body with the main body securing screws.

● Wiring Connection to Valve

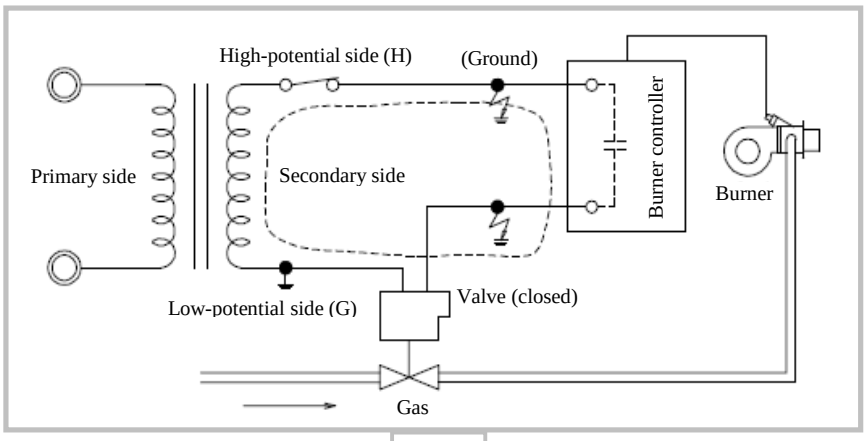


Fig. 4

● Example of Wiring Connection to External Devices

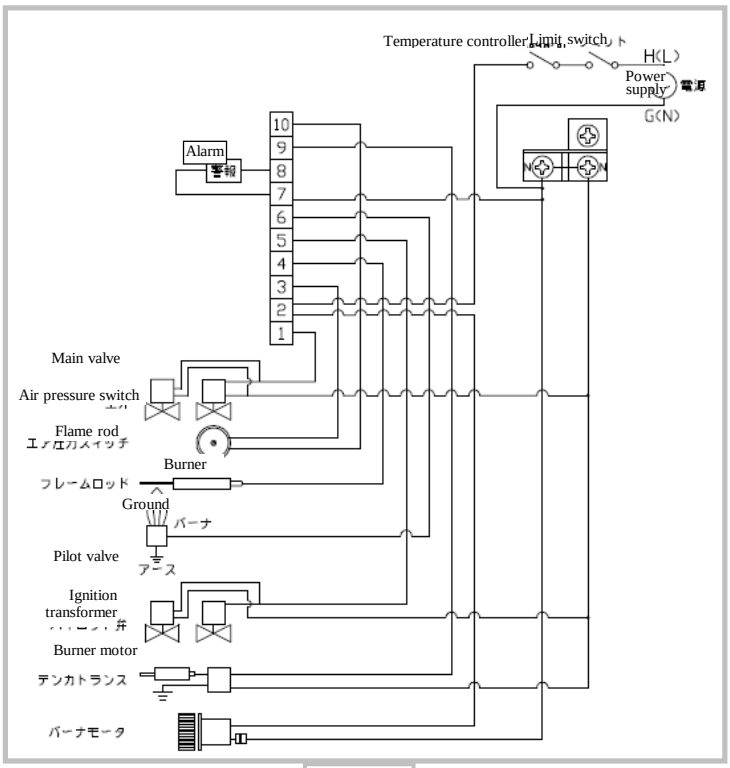


Fig. 5

3 Operation

1. RCF15 Operation in Circuit

	Operation in Circuit	Equipment State
(1)	The power supply voltage is applied between the terminals ②, ⑩, ③ and ⑦. (Voltage is applied to the terminal ③ when the air pressure switch is turned on.)	Burner motor starts. Air pressure switch ON
(2)	The prepurge trial circuit starts.	
(3)	When the prepurge is complete, the power supply voltage is applied between the terminals ⑤, ⑨, and ⑦.	Ignition transformer operation starts. Pilot valve ON
(4)	When the flame detector (flame rod) detects flame during the ignition trial (within 4 seconds), the state becomes post-ignition.	Combustion/Alarm indicator LED illuminates.
(5)	When the post-ignition is complete, the power supply voltage is applied between the terminas ⑤, ①, and ⑦.	The ignition transformer stops operation. Main valve ON
(6)	When the power switch is turned off or the temperature controller is turned off, all the circuits return to the initial state to be ready for the next ON signal.	Burner motor stops. Pilot valve OFF, Main valve OFF Combustion/Alarm indicator LED is turned off.

● Internal Block Circuit

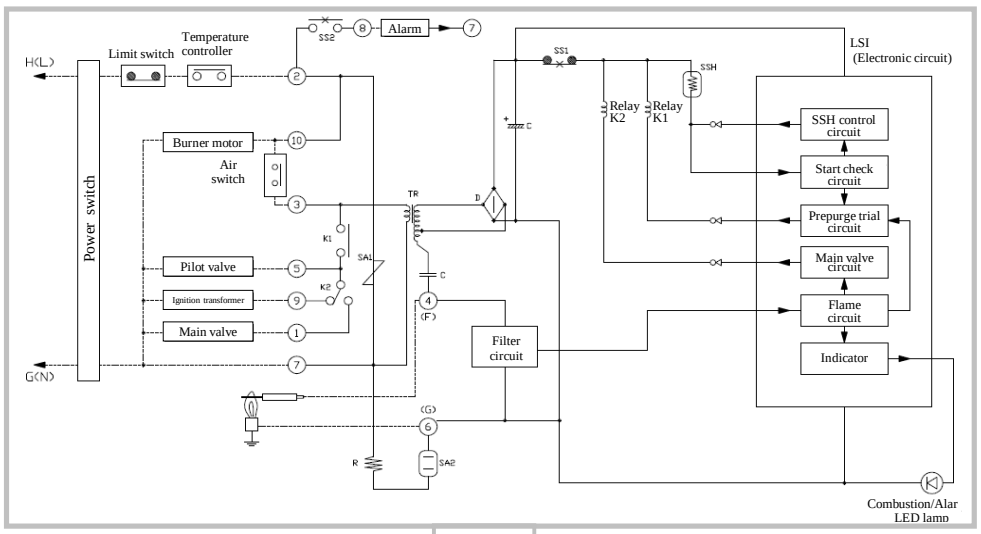


Fig. 6

⚠ CAUTION

Keep the operation time for at least 1 minute between start/stop and stop/start of the burner controller.
If the instruction is not observed, the controller will be reset when the power switch or the temperature controller is turned off during lockout. Then the lockout will become unavailable, which causes abnormal operation.

2. Normal Operation

(1) When the temperature controller is turned on after the power switch is turned on, the burner motor starts.

(2) The burner motor starts, the air pressure switch is turned on, and the prepurge trial circuit starts.

(3) When the prepurge is complete, the ignition transformer and the pilot valve are set to ON simultaneously, and the Combustion/Alarm indicator LED illuminates.

(4) The state becomes post-ignition when a flame is detected during the ignition trial (within 4 seconds).

(5) When the post-ignition is complete, the ignition transformer operation stops and the main valve is set to ON simultaneously.

Normal Operation

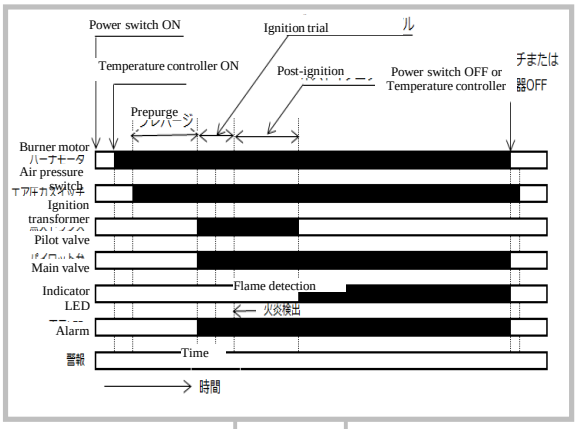


Fig. A

3. Ignition Failure (Misfire)

If the flame detector does not detect any flame during the ignition trial (within 4 seconds), the ignition operation stops and the pilot valve is set to OFF. Simultaneously, the Combustion/Alarm indicator LED blinks. Then lockout occurs after the lockout timing. When lockout occurs, an alarm is issued.
In this case, blinking of the indicator LED and the alarm continue until the system is reset.
For restarting the system, press the reset button to reset the system.

Ignition Failure

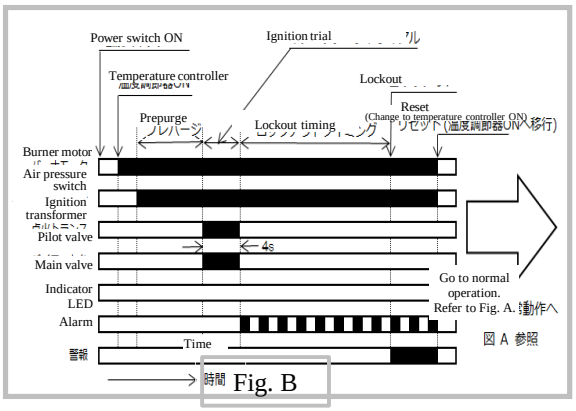


Fig. B

4. Flame Failure during Combustion

If a flame failure occurs during normal combustion, the pilot valve and the main valve will be set to OFF when the flame response time has expired. Simultaneously, the Combustion/Alarm indicator LED blinks. Then lockout occurs after the lockout timing.
The subsequent operation is as explained in Ignition Failure in the above Item 3.

Flame Failure

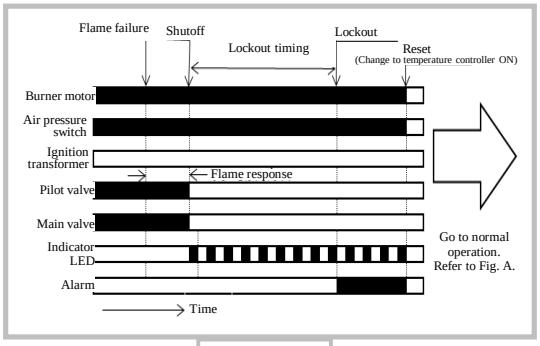


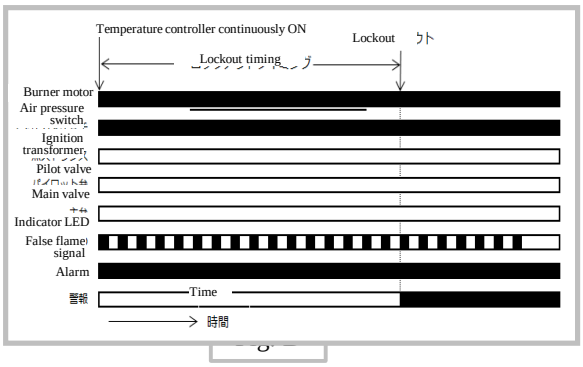
Fig C

5. Operation When a False Flame Signal Is Issued

(1) When a false flame signal continues from the startup time

The Combustion/Alarm indicator LED blinks. In addition, when the false flame signal continues beyond the lockout timing, lockout occurs.
The subsequent operation is as explained in

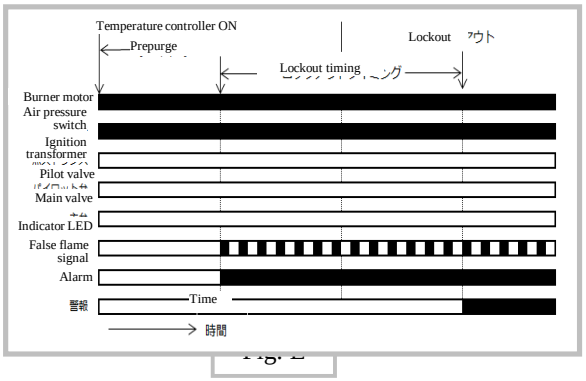
When a false flame signal continues from the startup time



(2) When a false flame signal is issued during the prepurge and the signal continues beyond the prepurge timing

The Combustion/Alarm indicator LED blinks as soon as a false flame signal is issued. Then lockout occurs after the lockout timing.
The subsequent operation is as explained in Ignition Failure in the above Item 3.

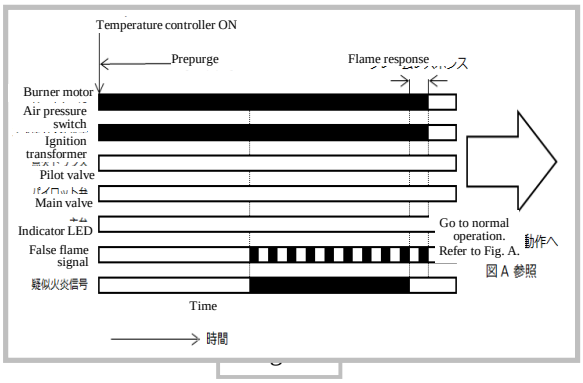
When a false flame signal continues even after the prepurge timing



(3) When a false flame signal is issued during the prepurge and stops within the prepurge timing

The Combustion/Alarm indicator LED blinks only while a false flame signal is being issued during the prepurge. However, when the false flame signal stops, the normal sequence starts. (Prepurge timing is counted from the start.)

When a false flame signal is issued during prepurge and stops within the prepurge timing



If lockout occurs, failure of any part of the related system is assumed. Perform inspection thoroughly and remove the cause.

* CAUTION * Pressing the reset button too hard causes failure or damage.

4 Dimensional Outline Drawing

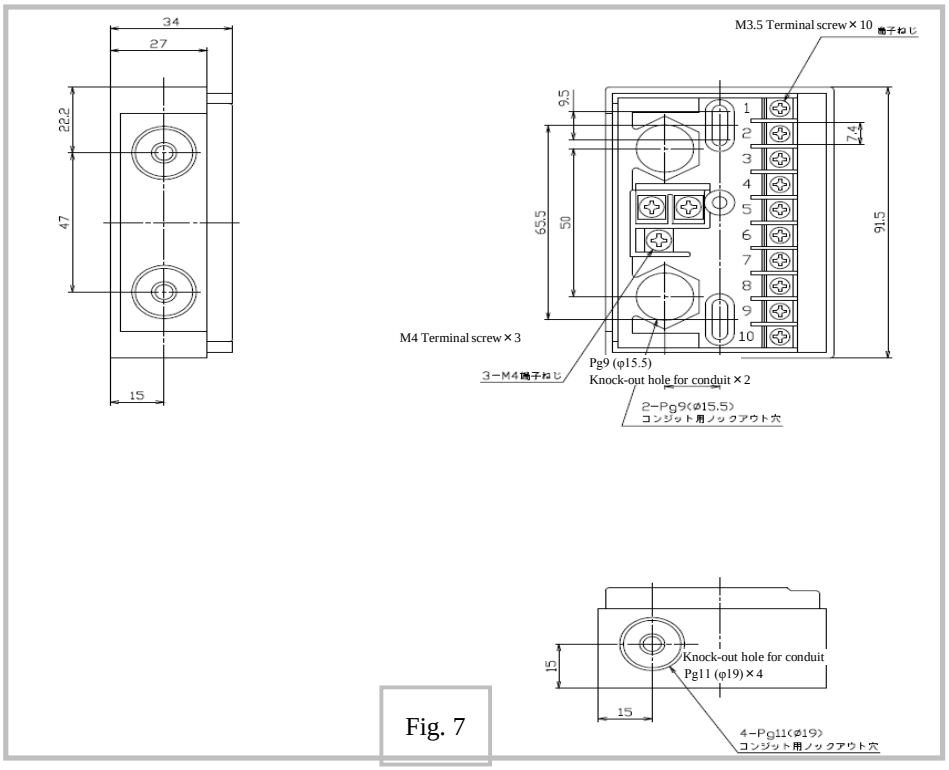


Fig. 7

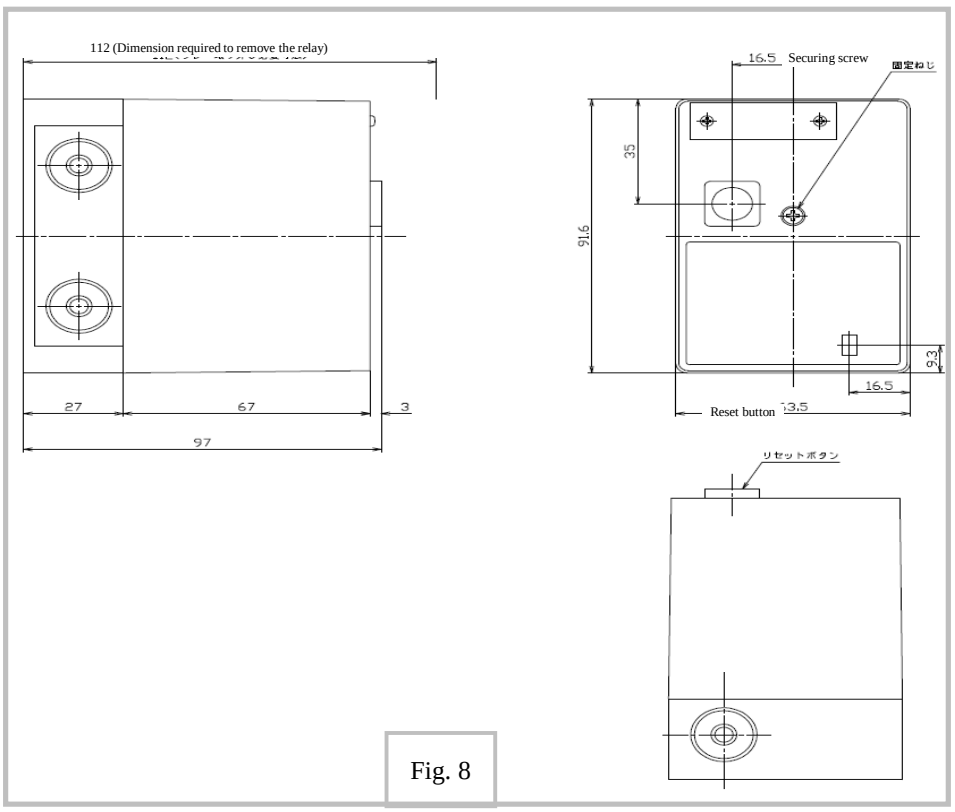


Fig. 8

5 Maintenance and Inspection

1. General maintenance and inspection

   (1) When replacing RCF15, perform all inspections and adjustments specified in this instruction manual.
   (2) Never lubricate any part of RCF15.
   (3) Remove combustion products from the flame rod, the burner, etc.

2. Maintenance and inspection intervals

   Determine the maintenance and inspection intervals in consideration of factors such as the type of equipment, ambient conditions of the installed area, frequency of use.
   Rough guidelines are as follows.

   (1) Clean the flame rod and the burner at least once a year.
   (2) Check the flame cutoff action of the burner at least once a month.
   (3) Check the flame current at least once a month.

3. Inspection in case of trouble

   When trouble occurs, investigate the cause with the following procedure.

   (1) Turn the power switch off.
   (2) Press the reset button of the burner controller to reset the system.
   (3) Turn the power switch on. Check if the applied voltage between the terminals ②, ⑩, and ⑦ is within the specified value when the temperature controller is ON.
   (4) If the voltage is zero, check the temperature controller contact, fuse, power switch, power supply, etc.
   (5) Perform setting so that the temperature controller is turned on. When the controller is turned on, a voltage is applied between the terminals ⑩ and ⑦, and the burner motor starts.
   Next, go to step (7).
   (6) If the burner motor does not start, check if a voltage is applied between the terminals ⑩ and ⑦.
      1) If the voltage is applied, check the burner motor and the wiring between the burner motor and the terminals ⑩, ⑦.
      2) If the voltage is not applied, check the temperature controller.
   (7) Check if the air pressure switch operates normally.
      1) If the switch operates normally, the ignition action will start after the prepurge.
      2) If the switch does not operate, adjust the switch to turn it on.
      If the switch is not turned on, it is defective. Please replace it.
   (8) If the pilot burner does not ignite, check if a voltage is applied between the terminals ⑤ and ⑦, and between the terminals ⑨ and ⑦.
      1) If the voltage is applied, check the wiring between the pilot valve and the terminals ⑤, ⑦, and the wiring between the ignition transformer and the terminals ⑨, ⑦.
      2) If the voltage is not applied, the RCF15 main body is defective. Please replace it.
   (9) Flame detector function test
   When the pilot burner ignites, check that the flame current is 2μA or more.
   (10) Check of sequence operation
   When the pilot burner ignites, check the main valve operation. If the main valve does not become ON, check if a voltage is applied between the terminals ① and ⑦.
      1) If the voltage is applied, check the wiring between the main valve and the terminals ①, ⑦.
      2) If the voltage is not applied, the RCF15 main body is defective. Please replace it.
   (11) When the pilot burner ignites, check if the ignition action of the ignition transformer stops.
   If it does not stop, check the wiring between the ignition transformer and the terminals ⑨, ⑦.
   If the wiring is correct but the ignition action does not stop, the RCF15 main body is defective. Please replace it.
   (12) When a false flame signal is issued at the startup time
   When the temperature controller is turned on, the burner motor starts and the Combustion/Alarm indicator LED blinks. After approx. 15 seconds, lockout occurs and an alarm is issued.
   In this case, identify the cause of the false flame, and be sure to remove the cause. If there is no trace of the false flame,
      1) Check the flame rod. If the flame rod is normal, the RCF15 main body is defective. Please replace it.
      2) If the flame rod is defective, replace it with a non-defective one.

Terms

○ Ignition trial

Operation to ignite the burner.

○ Flame detector

Device to detect a flame and issue an signal.

○ False flame (Signal)

A signal of flame detected by the flame detector in the duration where flame generation is not allowed at burner start.

○ Batch operation

Operation that combustion equipment starts/stops once or more times within 24 hours.

○ Flame response

Time from the occurrence of a signal that a flame goes out is issued to the occurrence of a signal that the safety shutoff valve to supply gas fuel is closed is issued.

○ Prepurge

Purge to be performed between a startup signal and start of the ignition device.

○ Post-ignition

Operation where ignition sparks are not stopped immediately but kept for a fixed period of time to make flames stable when the pilot burner ignites.

○ Lockout

A safety shutoff state of the system where the system cannot be restarted unless the system is reset manually.

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[Note]

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