Multiburner Controller
Model FRS100

Overview

The model FRS100 multiburner controller is a combustion safety controller with a safe-start circuit, for use with manually ignited combustion equipment.
To ensure safety, the FRS100 prevents ignition if anything abnormal is detected at startup, and shuts off the fuel valve if a flame failure occurs during operation.
It is used for batch-operation combustion equipment in combination with a flame rod or model AUD100 advanced ultraviolet flame detector.
This compact controller can be mounted on a DIN rail.
In addition, the LEDs on the front panel indicate the flame level.

The model FRS60A flame meter cannot be connected to the FRS100.

■ Precautions for instrumentation

Facilities that use a flame safeguard system must be designed in compliance with relevant laws, standards, safety guidelines, and the like.

Main safety policies in Japan

- Technical Policy on Safety Standards for Combustion Equipment in Industrial Furnaces, by Ministry of Health, Labor and Welfare
- Combustion Equipment in Compliance with the Safety Principles for Industrial Incinerators - JIS B 8415
- The Index of Safety Technology of Industrial Gas Combustion Equipment, by Japan Gas Association
- The Index of Safety Technology of Gas Boiler Combustion Facilities, by Japan Gas Association

- **Important points for ensuring safety**

1. Connect loads directly to this device.
2. Design the interlock so that it can directly cut off power to the load.
3. Be sure to use a safe startup circuit upon startup.
4. Do not add a bypass circuit that allows manual operation of any load.
5. Both the main valve and pilot valve must have redundant shutoff.

- **Precautions for instrumentation**

Since this device does not have purge and ignition functions, it must be provided externally.

This product has functions that are extremely important for combustion safety. When planning a flame safeguard system, please consult an Azbil Corporation sales representative for explanation of detailed specifications.

Specifications

<table>
<tr><td>Application</td><td colspan="7">Batch operation of combustion equipment with oil burners, gas burners, or multi-fuel oil and gas burners</td></tr>
<tr><td rowspan="3">Compatible flame detector</td><td>Model FRS100B</td><td colspan="6">Flame rod: C7007A, C7008A (wiring distance: approx. 30 m max.; high frequency coaxial cable: 5C2V, 7C2V)</td></tr>
<tr><td></td><td colspan="6">Ultraviolet flame detector: C7012A*3, C7012C*1 *3 (wiring distance: approx. 50 m max.; high frequency coaxial cable: 5C2V, 7C2V)</td></tr>
<tr><td>Model FRS100C</td><td colspan="6">Model AUD100 advanced ultraviolet flame detector, models C7035A*2 and C7027A*2 compact ultraviolet flame detector (wiring distance: approx. 200 m max., 2 mm² 600 V AC PVC-insulated cable (IEC 60227-3))</td></tr>
<tr><td rowspan="13">Multiburner controller
(Please put “D” in _ if the inspection report is required. Exclude _ if the inspection report is not necessary.)</td><td>Model</td><td>Model No.</td><td>Rated power</td><td>Power consumption</td><td>Flame failure response</td><td colspan="2">Compatible flame detector</td></tr>
<tr><td rowspan="4">Standard model</td><td>FRS100B100_-2</td><td>100 V AC, 50–60 Hz</td><td rowspan="4">3 W max.</td><td rowspan="2">3 ±1 s
(when flame voltage is 2 V)</td><td rowspan="4" colspan="2">Flame rod
C7007A, C7008A
Ultraviolet flame detector
C7012A,*3 C7012C*3</td></tr>
<tr><td>FRS100B200_-2</td><td>200 V AC, 50–60 Hz</td></tr>
<tr><td>FRS100B104_-2</td><td>100 V AC, 50–60 Hz</td><td rowspan="2">2 s max.
(when flame voltage is 2 V)</td></tr>
<tr><td>FRS100B204_-2</td><td>200 V AC, 50–60 Hz</td></tr>
<tr><td rowspan="4">Standard model</td><td>FRS100C100_-2</td><td>100 V AC, 50–60 Hz</td><td rowspan="4">7 W max.</td><td rowspan="2">3 ±1 s
(when flame voltage is 4.2 V)</td><td rowspan="8" colspan="2">Advanced ultraviolet flame detector
AUD100C + AUD15C
AUD110C + AUD15C

Compact ultraviolet flame detector
C7027A*2, C7035A*2</td></tr>
<tr><td>FRS100C200_-2</td><td>200 V AC, 50–60 Hz</td></tr>
<tr><td>FRS100C104_-2</td><td>100 V AC, 50–60 Hz</td><td rowspan="2">2 s max.
(when flame voltage is 4.2 V)</td></tr>
<tr><td>FRS100C204_-2</td><td>200 V AC, 50–60 Hz</td></tr>
<tr><td rowspan="4">High-sensitivity model</td><td>FRS100C150_-2</td><td>100 V AC, 50–60 Hz</td><td rowspan="4">7 W max.</td><td rowspan="2">3 ±1 s
(when flame voltage is 3.5 V)</td></tr>
<tr><td>FRS100C250_-2</td><td>200 V AC, 50–60 Hz</td></tr>
<tr><td>FRS100C154_-2</td><td>100 V AC, 50–60 Hz</td><td rowspan="2">2 s max.
(when flame voltage is 3.5 V)</td></tr>
<tr><td>FRS100C254_-2</td><td>200 V AC, 50–60 Hz</td></tr>
<tr><td>Contact rating</td><td colspan="7">250 VA (terminals 3 & 4, 3 & 8)</td></tr>
<tr><td rowspan="3">Flame sensitivity</td><td colspan="2"></td><td colspan="2">FRS100B</td><td colspan="2">FRS100C</td></tr>
<tr><td colspan="2">Ignition detection level</td><td colspan="2">Flame voltage 1 V max.</td><td colspan="2">Flame voltage 1 V max.</td></tr>
<tr><td colspan="2">Flame-out detection level</td><td colspan="2">Flame voltage 0.2 V min.</td><td colspan="2">Flame voltage 0.4 V min.</td></tr>
<tr><td>Flame signal output</td><td colspan="7">0 to 5 V DC, wiring distance: 10 m max. (use shielded cable), output terminals: A (−) and B (+) on the controller
Input impedance of externally connected device: 100 KΩ min.</td></tr>
<tr><td>Flame voltage indication method</td><td colspan="7">LEDs</td></tr>
<tr><td rowspan="6">Indicated flame voltage levels</td><td colspan="4">Flame voltage (V)</td><td colspan="3">LEDs</td></tr>
<tr><td colspan="4">4.5 or above</td><td colspan="3">5 LEDs are lit.</td></tr>
<tr><td colspan="4">3.5 to 4.5</td><td colspan="3">4 LEDs are lit.</td></tr>
<tr><td colspan="4">2.5 to 3.5</td><td colspan="3">3 LEDs are lit.</td></tr>
<tr><td colspan="4">1.5 to 2.5</td><td colspan="3">2 LEDs are lit.</td></tr>
<tr><td colspan="4">0 to 1.5
(ignition detection level)</td><td colspan="3">All off</td></tr>
<tr><td>Ambient temperature</td><td colspan="7">−20 to + 60 °C (independent mounting), −20 to + 45 °C (when 2 or more units are gang-mounted)</td></tr>
<tr><td>Allowable ambient humidity</td><td colspan="7">90 %RH, 40 °C (without condensation)</td></tr>
<tr><td>Vibration resistance</td><td colspan="7">4.9 m/s² max., 10 to 60 Hz for 2 hours each in x, y, and z directions (when directly mounted in a panel using screws)</td></tr>
<tr><td>Insulation resistance</td><td colspan="7">50 MΩ min. with a 500 V DC megger between each terminal and the ground terminal</td></tr>
<tr><td>Dielectric strength</td><td colspan="7">No failure after applying 1500 V AC for 1 min or 1800 V AC for 1 s between each terminal and the ground terminal
(excluding flame detector input to terminals 5 and 6)</td></tr>
<tr><td>Lightning-induced surge</td><td colspan="7">10 kV, 1.2 × 50 μs (JEC-187, surge impedance: 75 Ω min.)
when the surge absorber below is mounted between terminal 2 (power supply) and the ground terminal
• Recommended surge absorber: 83968019-001</td></tr>
<tr><td>Service life</td><td colspan="7">100,000 operations (at normal temperature and humidity, rated voltage)</td></tr>
<tr><td>Body color</td><td colspan="7">Gray</td></tr>
<tr><td>Installation method</td><td colspan="7">DIN rail mounting, or direct panel mounting using screws</td></tr>
<tr><td>Mass</td><td colspan="7">FRS100B: approx. 270 g, FRS100C: approx. 270 g, subbase (FRS50A): approx. 70 g</td></tr>
<tr><td rowspan="5">Accessories (sold separately)</td><td colspan="3">Model No.</td><td colspan="4">Name</td></tr>
<tr><td colspan="3">FRS50A100</td><td colspan="4">Subbase</td></tr>
<tr><td colspan="3">FSP300C100</td><td colspan="4">Flame simulator for the AUD100, C7035A,*2 C7027A*2</td></tr>
<tr><td colspan="3">123514A</td><td colspan="4">Flame simulator for flame rod</td></tr>
<tr><td colspan="3">83968019-001</td><td colspan="4">Lightning-induced surge absorber</td></tr>
</table>

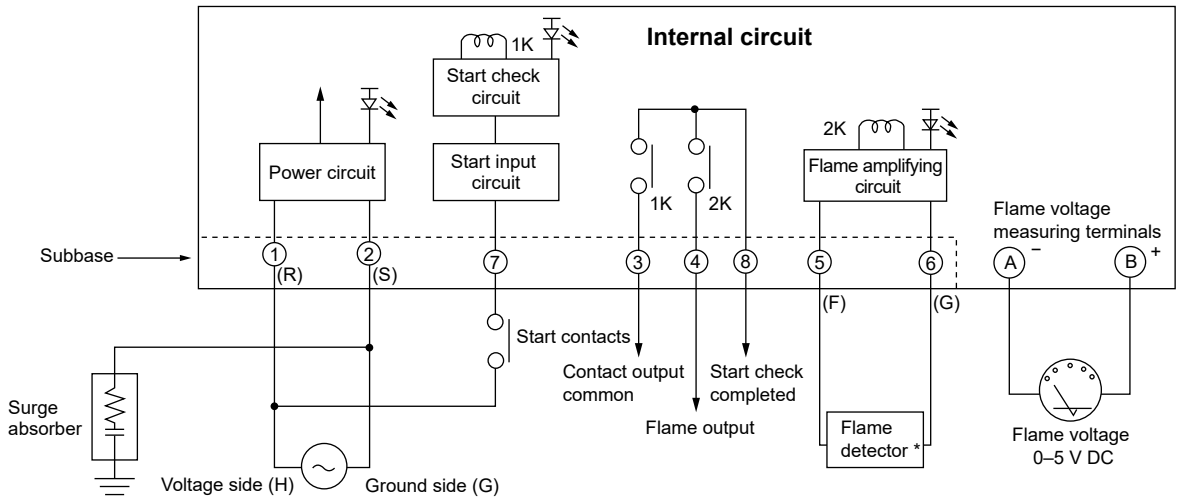
*1. The only high-frequency coaxial cable that can be used with the C7012C is 7C2V.

*2. Discontinued in December 2011.

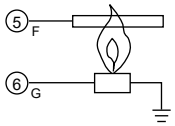
*3. Discontinued in March 2012.

Burner Flame Monitoring

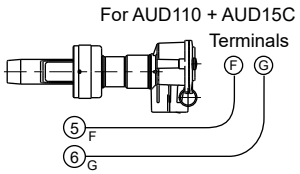
Terminal connections



* ● For flame rod

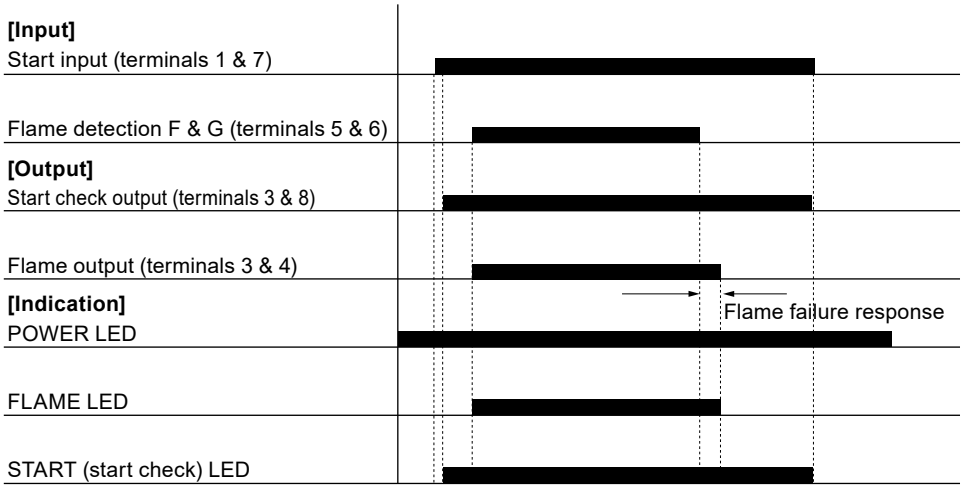


● For the AUD100 advanced ultraviolet flame detector

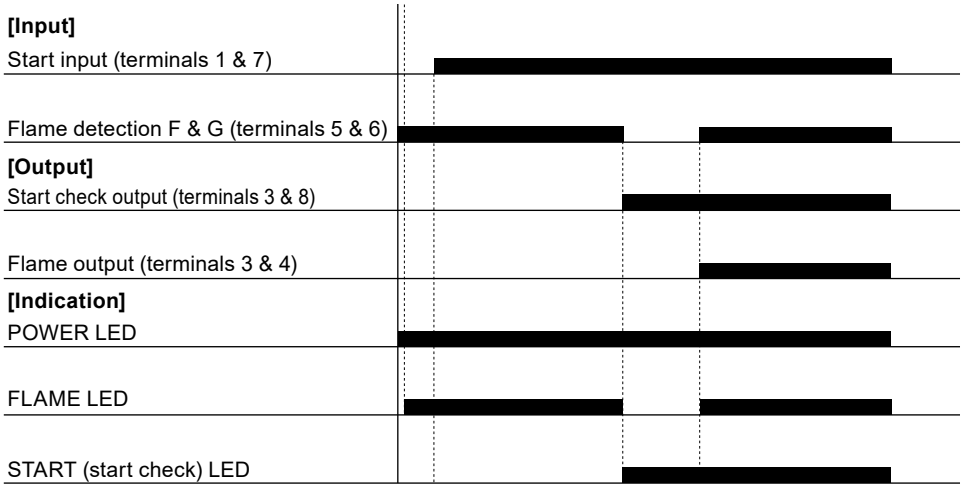


Operation chart

• Normal operation

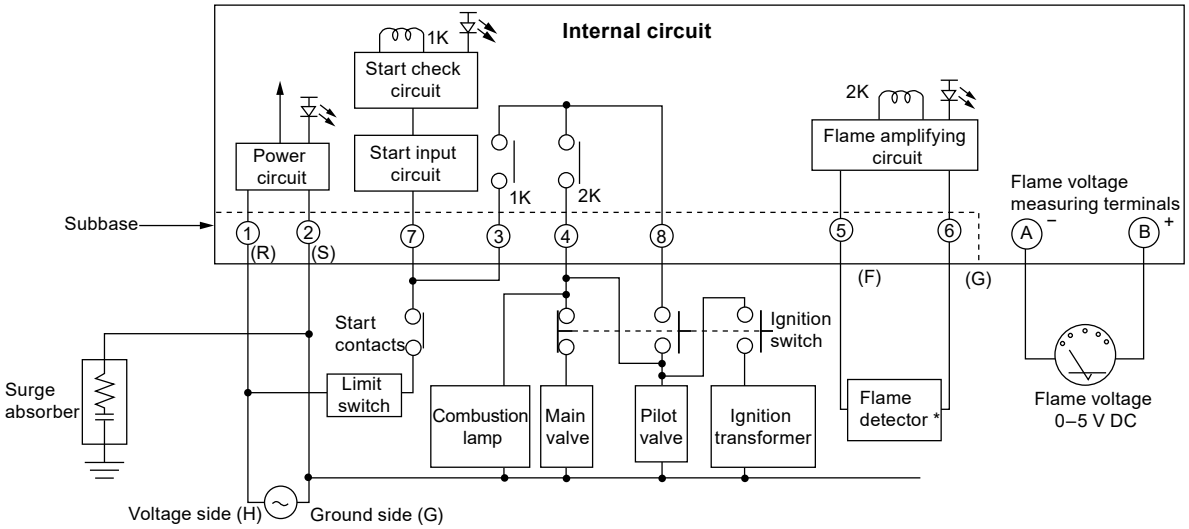


• When false flame is detected

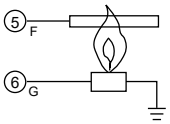


Manual Ignition (Intermittent Pilot)

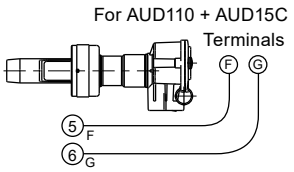
Terminal connections



* ● For flame rod

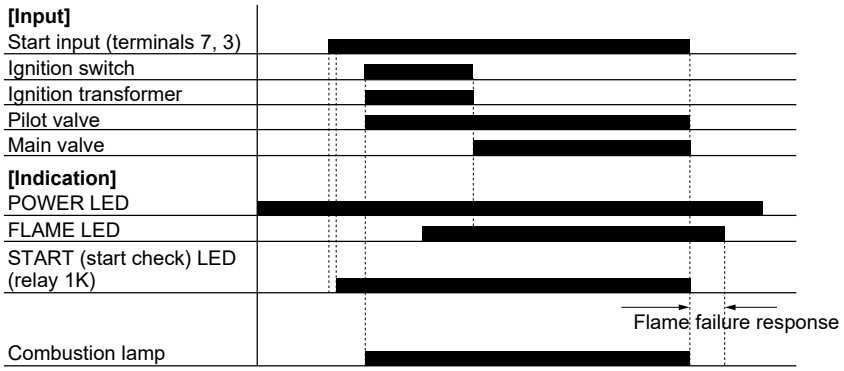


●For the AUD100 advanced ultraviolet flame detector

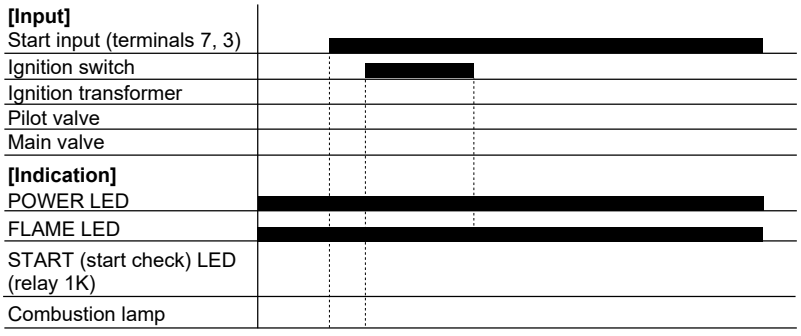


Operation chart

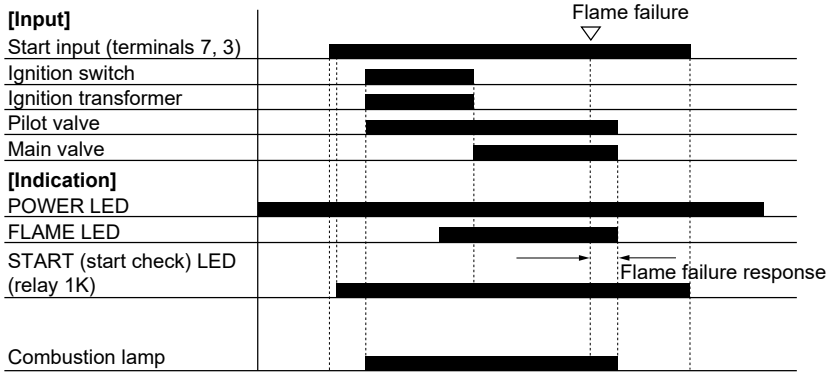
• Normal operation



• When false flame is detected

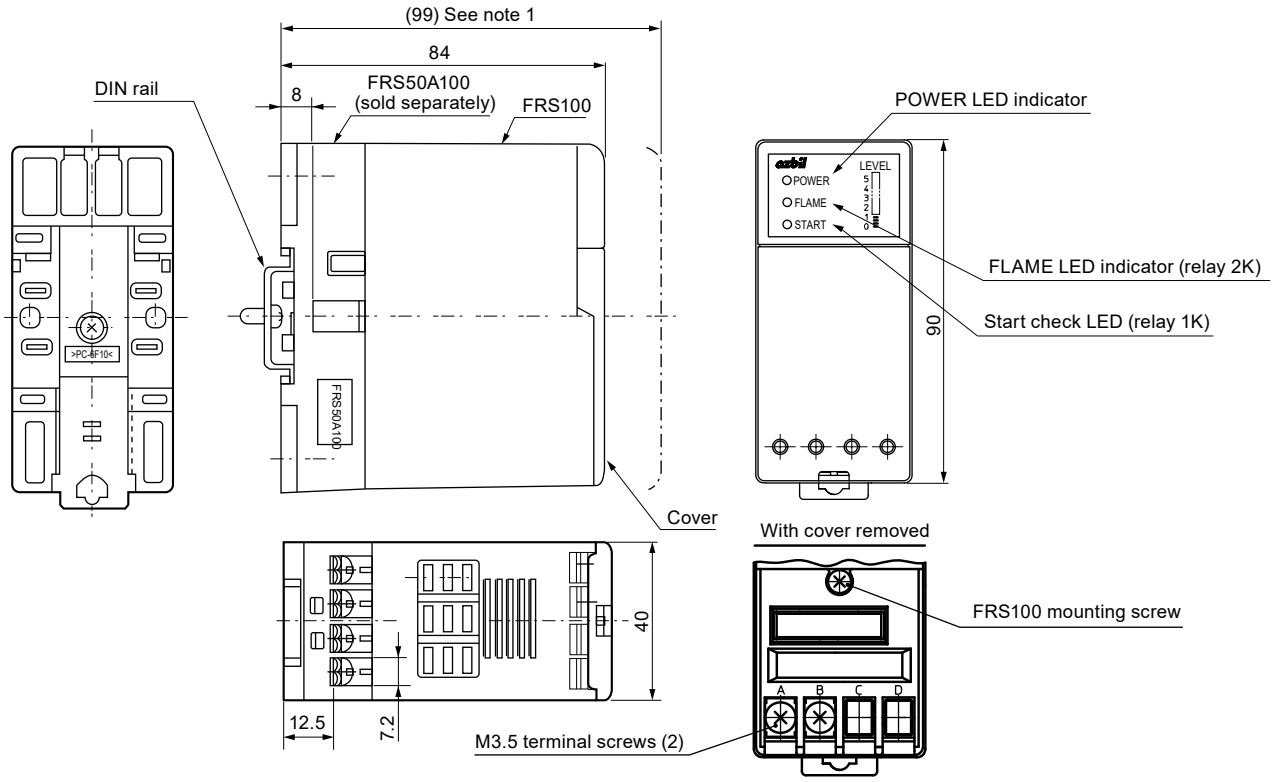


• When flame failure occurs



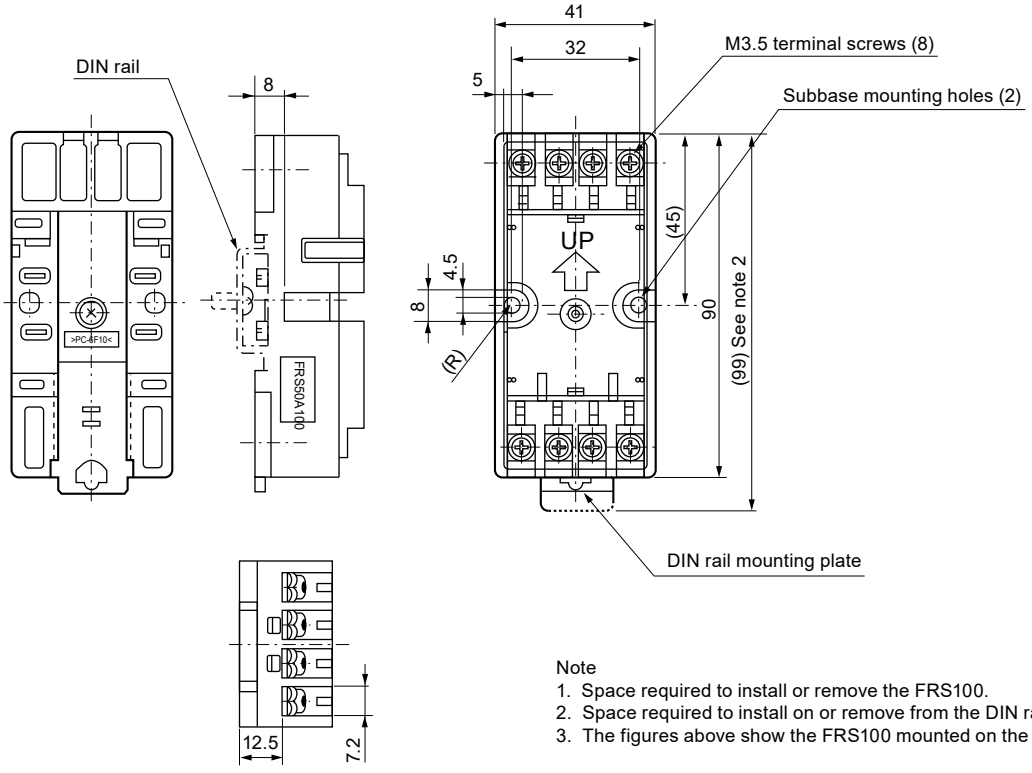
Dimensions

(Unit: mm)



Subbase (sold separately)

Model No.: FRS50A100



Note
1. Space required to install or remove the FRS100.
2. Space required to install on or remove from the DIN rail.
3. The figures above show the FRS100 mounted on the FRS50A100 subbase.

Troubleshooting

The following can be diagnosed by checking the status of the LEDs.

○ LED OFF
● LED ON

	POWER	START (start check)	FLAME	Status	Corrective action (check items)
Before startup	○	○	○	The power is off.	Panel power switch, wiring
After startup	●	●	●	Flame is detected (normal operation).	-
	●	●	○	Flame is not detected.	Flame detector, burner, valve, ignition transformer, flame relay
	●	○	●	False flame	Burner flame, flame detector, flame relay
	●	○	○	Relay 1K does not turn on.	Power to the start input terminal 7, flame relay

Handling Precautions

(1) Before wiring, be sure to turn the power off Accidentally touching the wrong terminal may cause electric shock or malfunction.

(2) Be sure to check that the wiring is correct before use. Incorrect wiring may cause damage or faulty operation.

(3) Securely connect the high voltage cables of the ignition transformer to prevent poor contact.
Poor contact may cause high frequency noise, which may cause malfunction.

(4) Keep the power cable and the high-voltage cable of the ignition transformer separate from the flame detector lead wires. Do not put them in the same conduit. In particular, run the high-voltage cable of the ignition transformer separately and keep it at least 10 cm away from this device.

(5) Do not install this product in a place with any of the following characteristics.
- Certain chemicals or fumes (ammonia, sulfur, chlorine, ethylene compounds, acid, etc.)
- Splashing water
- High temperatures
- Prolonged vibration

(6) Wire the power terminals (100/200 V and 0 V) so that power is applied to them all the time from the moment the power switch is turned ON. This is necessary to ensure operation of the self-check circuits at startup.

(7) Connect terminals F and G of the AUD110C advanced ultraviolet flame detector to terminals 5 and 6 of the controller, respectively. In the case of the AUD100C, connect the blue signal wire to terminal F, and the white one to terminal G. If incorrectly connected, the AUD15C tube unit may be damaged when the power is turned on.

(8) Do not transport this device while it is mounted on a DIN rail. Before transporting, remove it from the subbase and put it in its original shipping box. If this device is transported while it is mounted on a DIN rail, it may fall and be damaged.

(9) This device does not have the prepurge timer and sequence functions required for burner ignition. Use this device as part of a system whose design gives careful consideration to the prepurge timer and ignition sequence timing.

(10) Do not connect a solenoid valve to the voltage side of the circuit. If a ground fault occurs, current can leak to the solenoid valve and open it, allowing fuel to flow out, regardless of the status of this burner controller.

(11) When using a high-sensitivity model, the flame voltage should be no more than 4.5 V.

(12) If the flame voltage level LEDs are lit in red, adjust the burner so that the flame voltage is appropriate.

(13) The flame voltage level LEDs are not lit when the burner is not operating, even if the power is on.

Please read “Terms and Conditions” from the following URL before ordering and use.

https://www.azbil.com/products/factory/order.html

Specifications are subject to change without notice.

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