azbil Specification

AUR890
Burner Controller

Overview
AUR890 burner controllers were developed to replace the RA890, and are designed for batch operation of combustion equipment (at least one start and stop in a 24-hour period). In combination with an AUD100 series Advanced Ultraviolet Flame Detector or a flame rod, the AUR890 automatically executes ignition, flame monitoring, and fuel shutoff for ON/OFF-controlled gas burners or oil burners.

Features
- 7-segment LED display shows the step in the combustion sequence, alarm codes, and flame voltage.
- The presence/absence of a flame signal or lockout is shown by LED indicators.
- If lockout occurs due to ignition failure or flame failure, combustion cannot restart without a manual reset.
- If there is a false flame signal during startup, the controller will be locked out.
- Conducts self-diagnosis of the internal control relay circuit.
- A base unit, Q890A100, is available for use when replacing the RA890.
  To use this Q890A base unit when replacing the RA890, install the Q890A base unit under the sub-base (Q270A1024) of the RA890F/G in the same mounting holes. Then, attach the cables that were connected to the Q270A1024 sub-base to the new base unit. The terminals have the same numbers.

■ Precautions on equipment instrumentation

(1) Facilities that use combustion safety equipment must be designed in compliance with relevant laws, standards, safety guidelines, and the like. If this device is used outside Japan, please observe the local laws and standards.
(2) This device monitors for failures of the relay contacts connected to combustion-related loads (IG, PV, MV). Error E09 is output if, due to a ground fault or incorrect wiring, voltage is generated at the terminals connected to the loads even though this device is not outputting a load. If E09 occurs after this device is installed, recheck the wiring and eliminate the cause of the error.

Specifications

<table>
<tr><th colspan="2">Item</th><th colspan="4">Description</th></tr>
<tr><td colspan="2">Application</td><td colspan="4">Batch-operated combustion systems burning gas, oil, or gas/oil mixture</td></tr>
<tr><td colspan="2">Compatible flame detector</td><td colspan="4">AUD100 / 110 / 120 series UV sensor, flame rod</td></tr>
<tr><td rowspan="9">Sequence</td><td>Ignition wait time from start check</td><td colspan="4">3 ±0.3 s</td></tr>
<tr><td>Lock-out timing</td><td colspan="4">13.5 ±1.5 s</td></tr>
<tr><td>Main burner combustion wait time</td><td colspan="4">0.4 s</td></tr>
<tr><td rowspan="2">Flame response *1</td><td colspan="2">AUD100/110/120 series UV sensor</td><td colspan="2">Flame rod</td></tr>
<tr><td colspan="2">3 ±1 s max (when flame voltage is 3 V)</td><td colspan="2">1 s max, 3 ±1 s (when flame voltage is 2 V)</td></tr>
<tr><td>Reset timing</td><td colspan="4">1 s or longer (main unit RESET switch or contact reset input) *2</td></tr>
<tr><td>False flame detection time</td><td colspan="4">15 s</td></tr>
<tr><td>Operation at ignition failure</td><td colspan="4">Lockout</td></tr>
<tr><td>Operation at flame failure</td><td colspan="4">Lockout</td></tr>
<tr><td rowspan="8">Electrical specifications</td><td>Rated power supply</td><td colspan="4">100 V AC, 200 V AC, 220VAC (depending on the model), 50 Hz or 60 Hz</td></tr>
<tr><td>Allowable power supply voltage</td><td colspan="4">85 to 110 % of rated power supply</td></tr>
<tr><td>Power consumption</td><td colspan="4">10 W or less</td></tr>
<tr><td>Dielectric strength</td><td colspan="4">1500 V AC for 1 min, or 1800 V AC for 1 s
Between each terminal and ground (the DIN rail clamp), except for flame detector connection terminals (terminals 14, 15)</td></tr>
<tr><td rowspan="2">Contact rating</td><td>Ignition transformer</td><td>Pilot valve</td><td>Main valve</td><td>Alarm</td></tr>
<tr><td>300 VA</td><td>200 VA</td><td>200 VA</td><td>75 VA</td></tr>
<tr><td>Insulation resistance</td><td colspan="4">At least 50 MΩ, 500 V DC megger
Between each terminal and ground (the DIN rail clamp), except for flame detector connection terminals (terminals 14, 15)</td></tr>
<tr><td rowspan="2">Flame detection level</td><td colspan="2">AUD100 / 110 / 120 series UV sensor</td><td colspan="2">Flame rod</td></tr>
<tr><td colspan="2">Flame establishment: 1.5 to 4.5 V DC
Flame-out detection: 0.2 to 0.6 V DC</td><td colspan="2">Flame establishment: 1.5 to 4.5 V DC
Flame-out detection: 0.0 to 0.1 V DC</td></tr>
<tr><td>Flame voltage output</td><td colspan="2">Recommended flame voltage: Must be stable at 2 V DC or above
Flame voltage output range: 0.2 to 4.5 V DC</td><td colspan="2">Recommended flame voltage: Must be stable at 2 V DC or above
Flame voltage output range: 0.0 to 4.5 V DC</td></tr>
<tr><td>Input</td><td colspan="4">Each input is a non-voltage contact input, with allowable contact resistance up to 500 Ω
Low voltage temp. controller, contact reset</td></tr>
<tr><td>Service life</td><td colspan="4">10 years when used for eight hours per day, or 100,000 start/stop cycles (at 25 °C, constant temperature, rated voltage)</td></tr>
<tr><td rowspan="5">Transportation and storage conditions</td><td>Ambient temperature</td><td colspan="4">-20 to +70 °C</td></tr>
<tr><td>Ambient humidity</td><td colspan="4">5 to 95 % RH (without condensation)</td></tr>
<tr><td>Vibration</td><td colspan="4">0 to 9.8 m/s^2 (10 to 150 Hz, 1 octave/minute, 10 cycles, in each of XYZ directions)</td></tr>
<tr><td>Shock</td><td colspan="4">0 to 300 m/s^2</td></tr>
<tr><td>Packaged drop test</td><td colspan="4">60 cm drop height (free drop onto 1 corner, 3 edges, 6 sides)</td></tr>
<tr><td rowspan="6">Operating conditions</td><td>Ambient temperature</td><td colspan="4">-20 to +60 °C</td></tr>
<tr><td>Ambient humidity</td><td colspan="4">10 to 90 % RH (without condensation)</td></tr>
<tr><td>Vibration</td><td colspan="4">0 to 3.2 m/s^2 (10 to 150 Hz, 1 octave/minute, 10 cycles, in each of XYZ directions)</td></tr>
<tr><td>Shock</td><td colspan="4">0 to 9.8 m/s^2</td></tr>
<tr><td>Mounting angle</td><td colspan="4">Reference plane ±10°</td></tr>
<tr><td>Dust</td><td colspan="4">0.3 mg/m^3 or less</td></tr>
<tr><td rowspan="9">General specifications</td><td>Protective structure</td><td colspan="4">IP40 (with a sideboard (81447515-001) attached to the sub-base (BC-R05))
IP10 • When only the replacement base unit (Q890A100) is used
• sub-base (BC-R05) only</td></tr>
<tr><td>Overvoltage category</td><td colspan="4">II</td></tr>
<tr><td>Pollution degree</td><td colspan="4">PD2</td></tr>
<tr><td>Case color</td><td colspan="4">Black</td></tr>
<tr><td>Case material</td><td colspan="4">Denatured PPE resin (UL94-V0 PTI materials group IIIa)</td></tr>
<tr><td>Structure</td><td colspan="4">Sub-base and a main unit</td></tr>
<tr><td>Mounting orientation</td><td colspan="4">Vertical or horizontal
However, in horizontal mounting the 7-segment display must face directly upward
(DIN rail mounting or direct mounting through base screw holes)</td></tr>
<tr><td>Dimensions</td><td colspan="4">When used in combination with the replacement base unit (Q890A100) : W126 × H136 × D147 mm
When used in combination with the sub-base (BC-R05A100) : W95 × H105 × D110 mm</td></tr>
<tr><td>Certification</td><td colspan="4">JIS C 9730-2-5, UL 60730-2-5 (pending) ※120 V model only, FM 7610 (pending) ※120 V model only</td></tr>
<tr><td>Weight</td><td colspan="4">Approximately 1200g (When used in combination with the replacement base unit), Approximately 600 g (incl. sub-base)</td></tr>
<tr><td colspan="2">Wiring types and max. wiring length</td><td colspan="4">- Low voltage temp. controller
Copper IV wire with 600 V vinyl insulation, 1.25 mm^2, recommended condition: 20 m or less, maximum wiring length: 100 m
- Contact reset
Copper IV wire with 600 V vinyl insulation, 1.25 mm^2, maximum wiring length: 10 m
- AUD100 Series (F, G)
Copper IV wire with 600 V vinyl insulation, 1.25 mm^2, maximum wiring length: 100 m, 2 mm^2, maximum wiring length: 200 m
- Flame rod (F, G)
RG-11U (JAN standard: US DoD compliant specification) or equivalent, 5C2V, 7C2V (JIS standard)
Recommended condition: 20 m or less, maximum wiring length: 30 m
- Signal line for flame voltage output
IV wire, 0.75 mm^2 or larger, max. wiring length 10 m</td></tr>
</table>

*1 Depending on the model.
*2 Also, reset input is not accepted if no alarm has occurred.

Model selection guide

(Note: The dedicated sub-base and sideboard are not provided with the AUR890 series controller. Order them separately.)

Model number	Power supply	Lock-out timing	Flame response	Compatible flame detector
AUR890F11_-1	100 V AC	13.5 ±1.5 s	1 s max. *1	Flame rod (Ionization)
AUR890F13_-1	100 V AC	13.5 ±1.5 s	3 ±1 s *1	Flame rod (Ionization)
AUR890F21_-1	200 V AC	13.5 ±1.5 s	1 s max. *1	Flame rod (Ionization)
AUR890F23_-1	200 V AC	13.5 ±1.5 s	3 ±1 s *1	Flame rod (Ionization)
AUR890F_-1	220VAC	13.5 ±1.5 s	1 s max. *1	Flame rod (Ionization)
AUR890F63_-1	220VAC	13.5 ±1.5 s	3 ±1 s *1	Flame rod (Ionization)
AUR890G13_	100 V AC	13.5 ±1.5 s	3 ±1 s *2	UV sensor (AUD100/110/120)
AUR890G23_	200 V AC	13.5 ±1.5 s	3 ±1 s *2	UV sensor (AUD100/110/120)
AUR890G63_	200 V AC	13.5 ±1.5 s	3 ±1 s *2	UV sensor (AUD100/110/120)

*1 At flame voltage 2 V DC _: 0: standard product, D: with inspection record (with data)

*2 At flame voltage 3 VDC

Compatible flame detector (sold separately)

● UV sensor

Model number	Name	Notes
AUD15C1000	Advanced UV sensor tube unit	Use a dedicated socket for the AUD100C/110C/120C
AUD100C100_	Dedicated socket for the AUD15 Lead wire type	AUD15C1000, sold separately
AUD100C1000-A15		AUD15C1000 in package
AUD110C100_	Dedicated socket for the AUD15 Terminal board type	AUD15C1000, sold separately
AUD110C1000-A15		AUD15C1000 in package
AUD120C120_	Dedicated socket for the AUD15 1/2-inch mounting type	Without G1/2 adapter, AUD15C1000, sold separately
AUD120C121_		With G1/2 adapter, AUD15C1000, sold separately

_: 0: standard product, D: with inspection record (with data), T: tropicalization treatment (AUD110C only), B: with inspection record (with data) + tropicalization treatment (AUD110C only)

● Flame rod

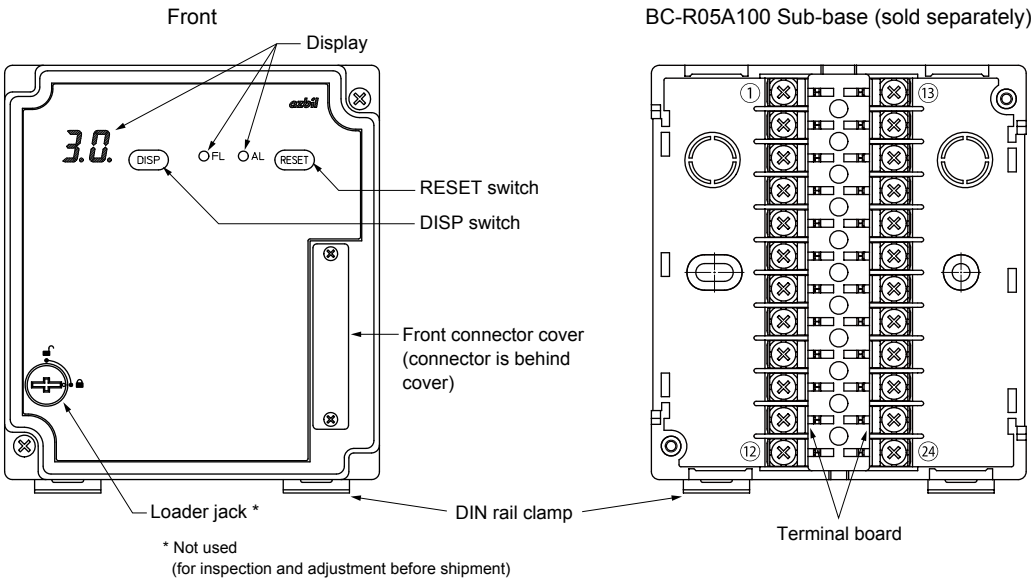
Model number	Name	Notes
C7007A	Flame rod holder	Discontinued
C7008A	Flame rod assembly	Discontinued

Options (sold separately)

Model number	Product name	Notes
BC-R05A100	Dedicated sub-base for BC-R	Required for AUR890
81447514-001	Connector for front wiring *	Contains one. Weidmueller model number : BL3.5/11F, compatible wire: 0.2-1.5 mm^2 (AWG28-14)
81447514-002	Connector for front wiring * (For right-side wiring)	Contains one. Weidmueller model number : BL3.5/11/270F, compatible wire: 0.2-1.5 mm^2 (AWG28-14)
81447515-001	Sideboards	Contains two. Not included in the sub-base.
Q890A100	Q890A base unit (when replacing the RA890)	The mounting holes and terminal numbers are the same as those of the sub-base (Q270A1024) for the RA890.
FSP136A100	Analog flame meter	
81447519-001	Jack and jack cover	(Included with the controller.)
81447531-001	Front connector cover	Packaged with mounting screws (Included with the controller.)

* Used for flame voltage measurement.

Terminal numbers, front panel item names



Terminal numbers

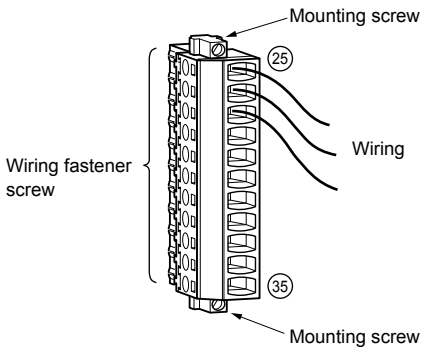
Front connector terminals

No.	Function	No.	Function
25	Flame voltage output (+)	31	NC
26	Flame voltage output (-)	32	NC
27	NC	33	NC
28	NC	34	NC
29	NC	35	NC
30	NC	-	-

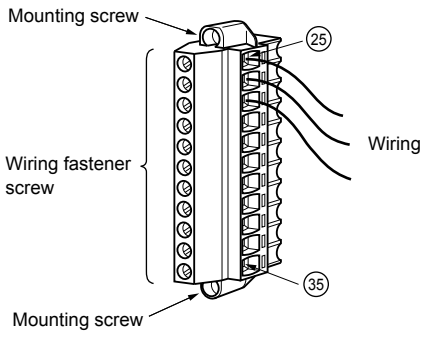
BC-R05A100 Sub-base terminals

No.	Function	No.	Function
1	Line voltage temp. controller	14	Flame detector (F)
2	AC power supply (L1)	15	Flame detector (G)
3	AC power supply (L2 (N))	16	NC
4	NC	17	Input common
5	NC	18	NC
6	Ignition transformer output	19	NC
7	Pilot valve output	20	Low voltage temp. control-ler Non-voltage contacts (betw. 17 and 20)
8	Main valve output		
9	NC		
10	Alarm output COM	21	NC
11	Alarm output NO	22	NC
12	Alarm output NC	23	NC
13	NC	24	Contact reset

- **Connector for front wiring (81447514-001) terminal layout**

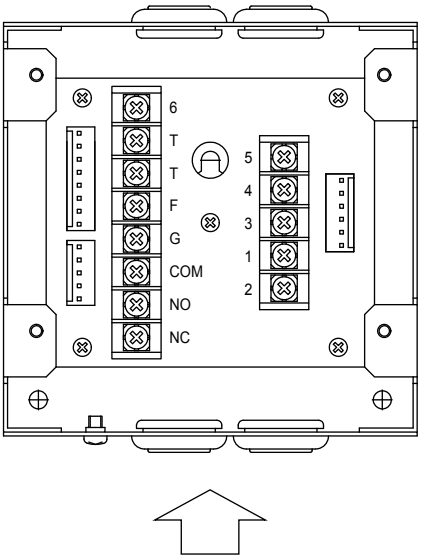


- **Connector for front wiring (for right side wiring) (81447514-002) terminal layout**



External connection terminals of the RA890 replacement base unit (Q890A100)

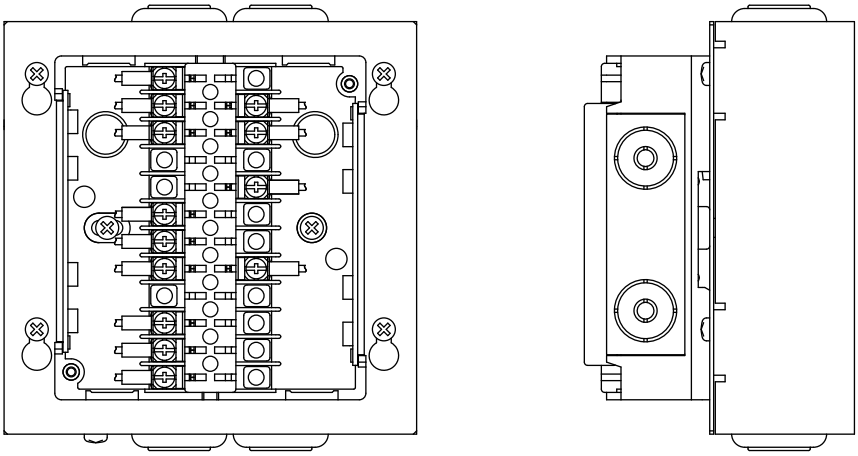
External connection terminals of Q890A100



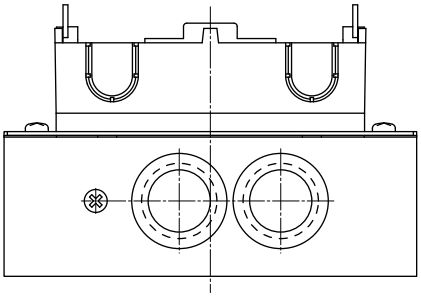
Q590A100 external-connection terminal Nos.

No.	Function
1	AC power supply (L1)
2	AC power supply (L2 (N))
3	Pilot valve output
4	Ignition transformer output
5	Main valve output
6	Line voltage temp. controller
T	External controller (for low voltage) (Non-voltage contacts)
T	
F	Flame detector
G	
COM	Alarm output
NO	
NC	

When the upper part of the replacement base unit is removed, the external connection terminals can be viewed.



Q890A100

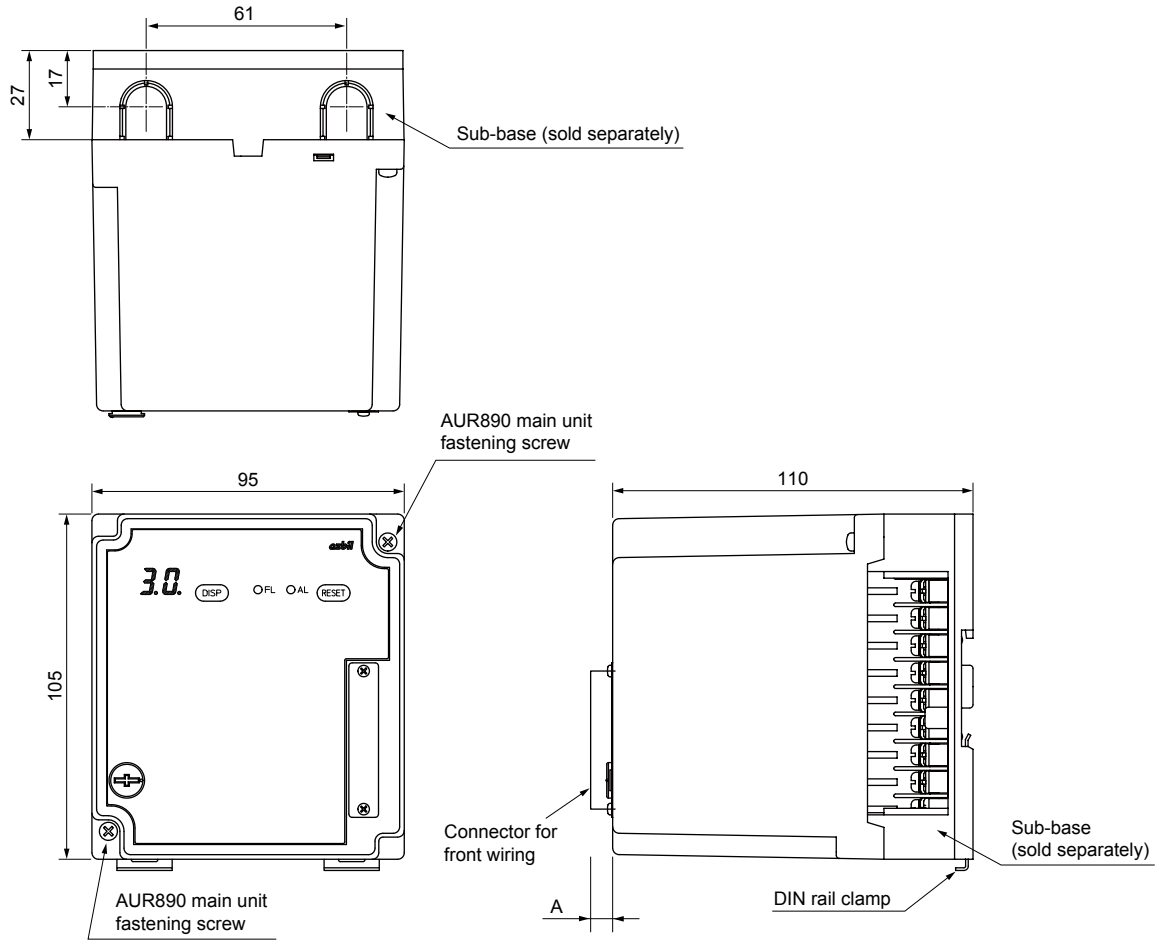


External dimensions

■ AUR890 with the BC-R05A100 sub-base

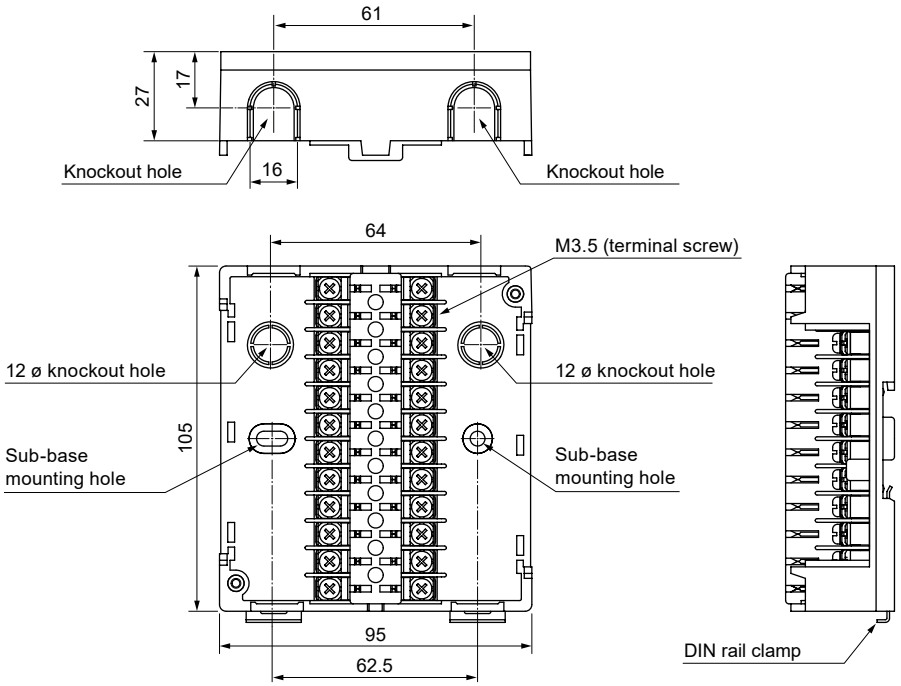
(Unit: mm)

● **AUR890 Burner Controller**



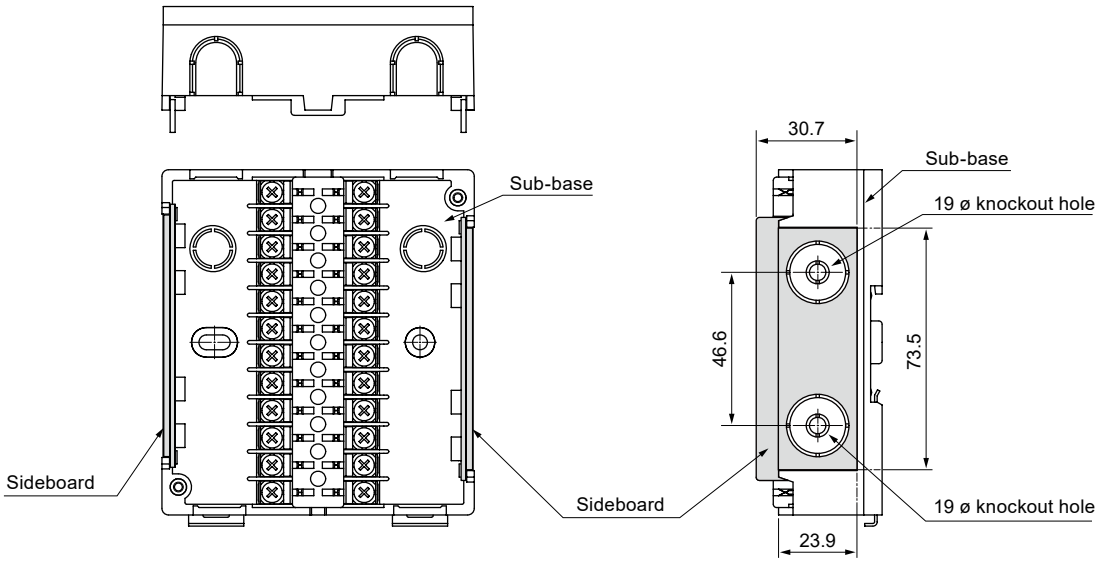
Model number	A
81447514-001	10.6
81447514-002	14.6

● **Sub-base BC-R05A100 (sold separately)**



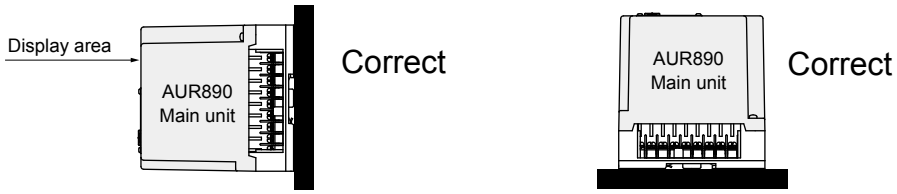
(Unit: mm)

- **Sideboard 81447515-001 (sold separately)**

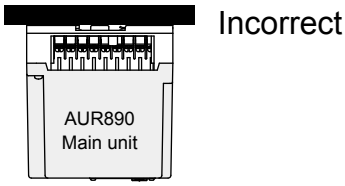


Installation orientation

Install the device in the orientation shown below.



Do not install it in the orientations illustrated below.

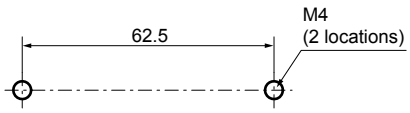


Mounting in a panel

(Unit: mm)

[1] Drill two M4 screw holes into the panel.

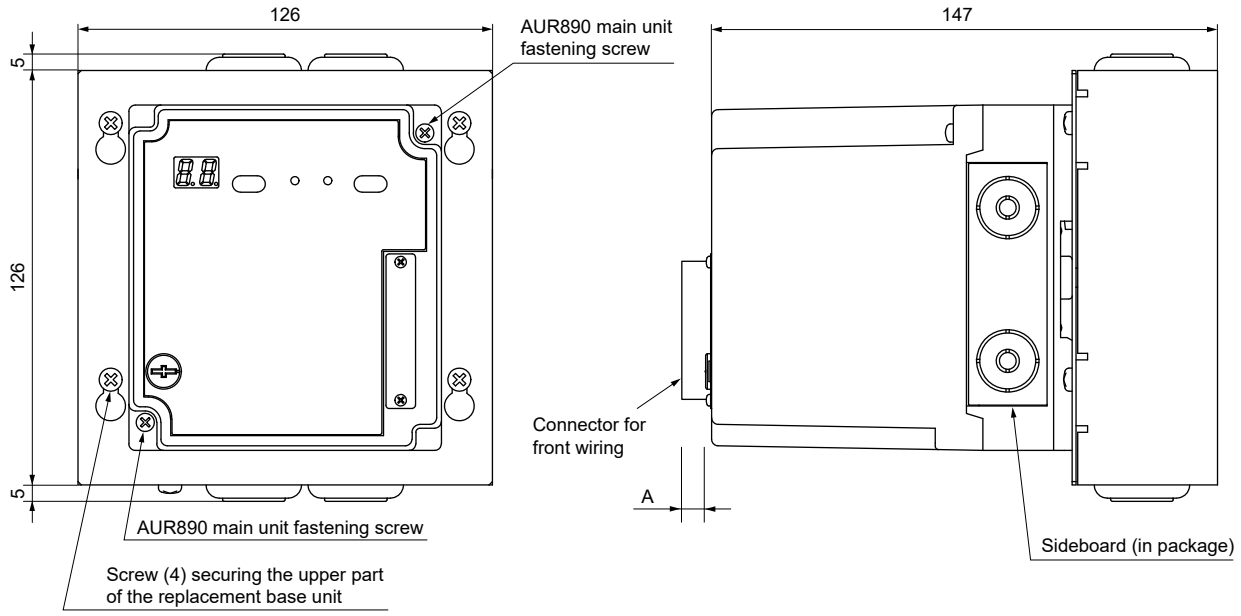
[2] Use screws to mount the sub-base on the panel.
(Maximum tightening torque: 1.2 N·m)



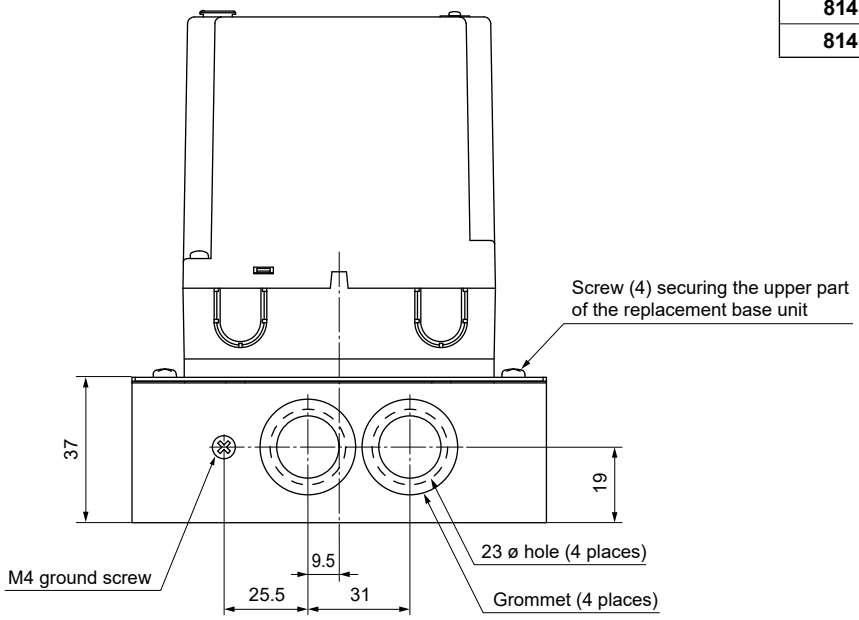
■ Q890A100 base unit for RA890-AUR890 replacement

(Unit: mm)

● AUR890 Burner Controller

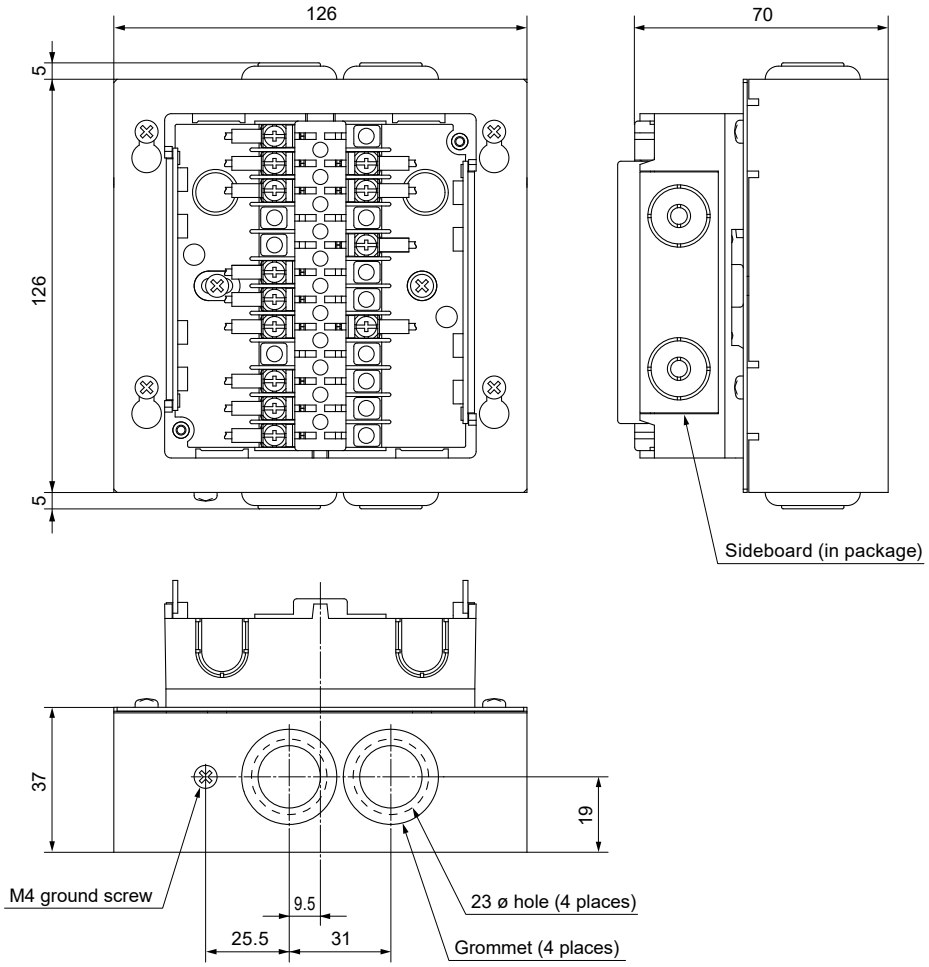


Model number	A
81447514-001	10.6
81447514-002	14.6



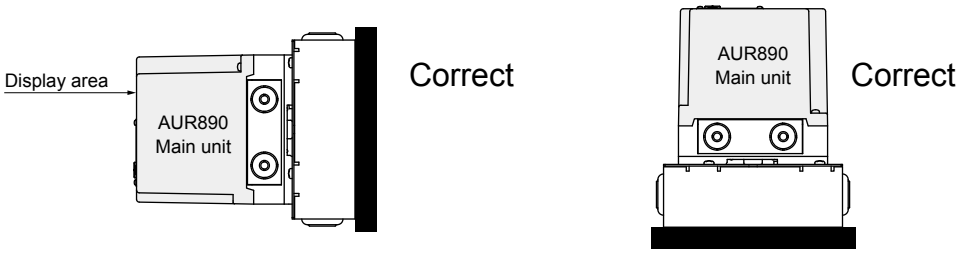
(Unit: mm)

- **Q890A100 base unit for RA890-AUR890 replacement (sold separately)**

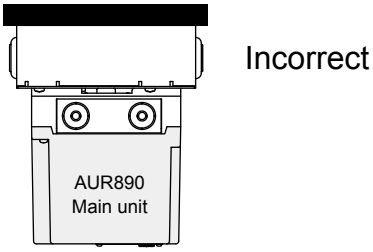


Installation orientation

Install the device in the orientation shown below.



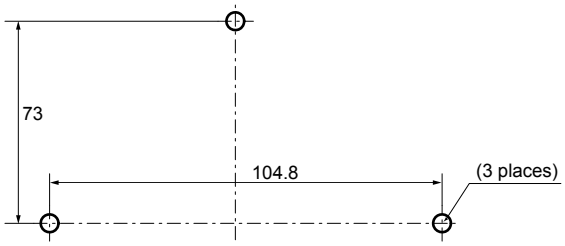
Do not install it in the orientations illustrated below.



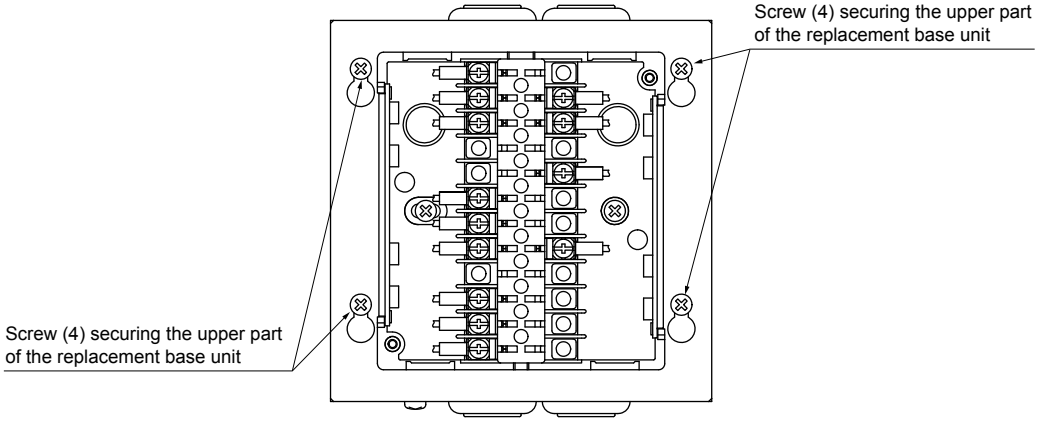
Mounting in a panel

(Unit: mm)

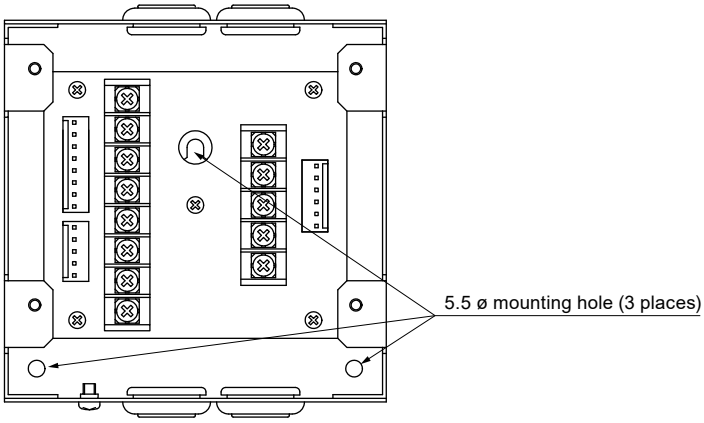
[1] Drill three 5 ϕ screw holes into the panel.



[2] Loosen the four retaining screws to remove the upper part of the replacement base unit.



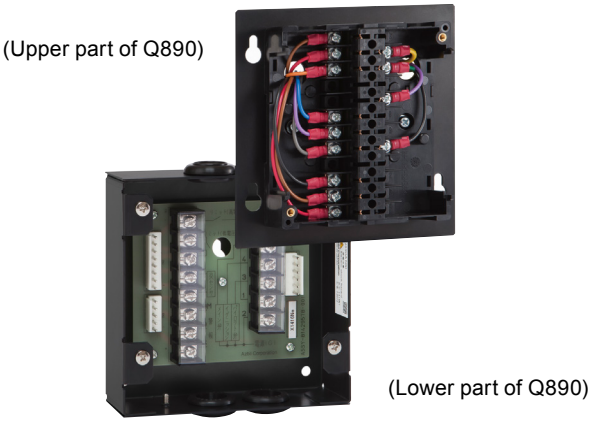
[3] Insert screws into the three mounting holes on the lower part of the base unit, and tighten the screws.



[4] Wire the external connections to the terminal block on the lower part of the replacement base unit, and then connect the cable connectors of the upper part of the base unit to the connectors on the lower part.

[5] After connecting the connectors, secure the upper part to the lower part using the four retaining screws. (maximum tightening torque: 1.2 N·m)

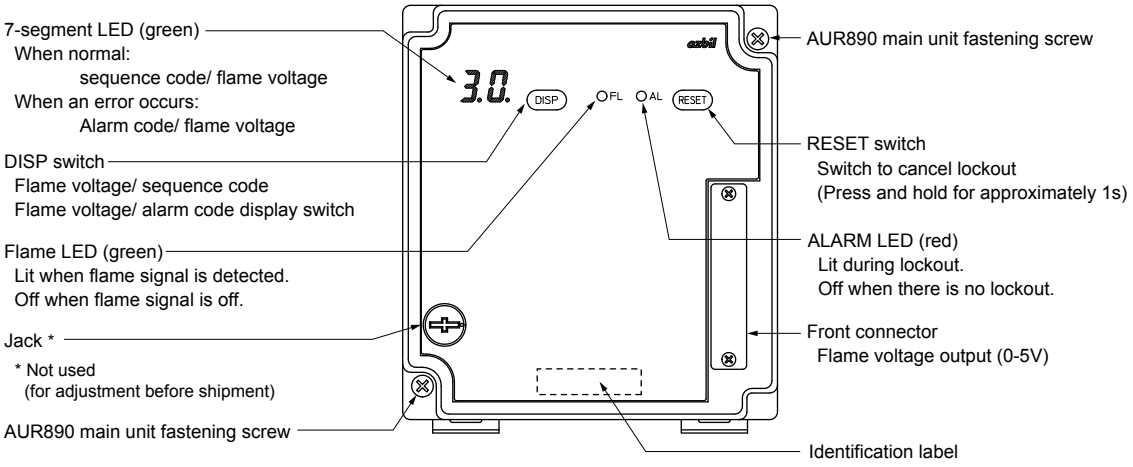
Structure of the replacement base unit (Q890A100)



7-segment display, LED display, switches

If this device detects a flame failure etc., it isolates the load and applies a lockout. During lockout, the relevant diagnostic function code is displayed on the 7-segment display.

Part name



Alarm codes

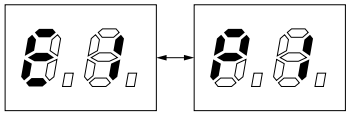
Alarm codes	Sub-code	Description
E1	None	False flame
E6		Ignition failure
E7		Flame failure
E9	02	Switch input
E9	03	Internal relay feedback (K1)
E9	05	Terminal 7 voltage discrepancy (PV)
E9	06	Terminal 8 voltage discrepancy (MV)
E9	07	Terminal 6 voltage discrepancy (IG)
E9	08	Alarm activation at power ON
E9	50 or more	Device error

Sequence codes

Display	Status content
P1	Start check
P3	Ignition standby
P4	Lock-out timing
P5	Main burner combustion standby
P8	RUN
--	Stop

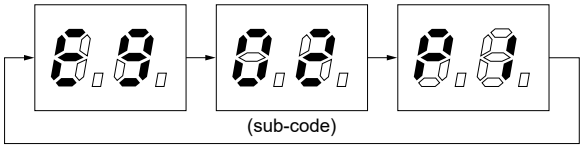
Examples of sequence codes and alarm codes

- Alarm code: E1 to E7



Switches every 0.8 s

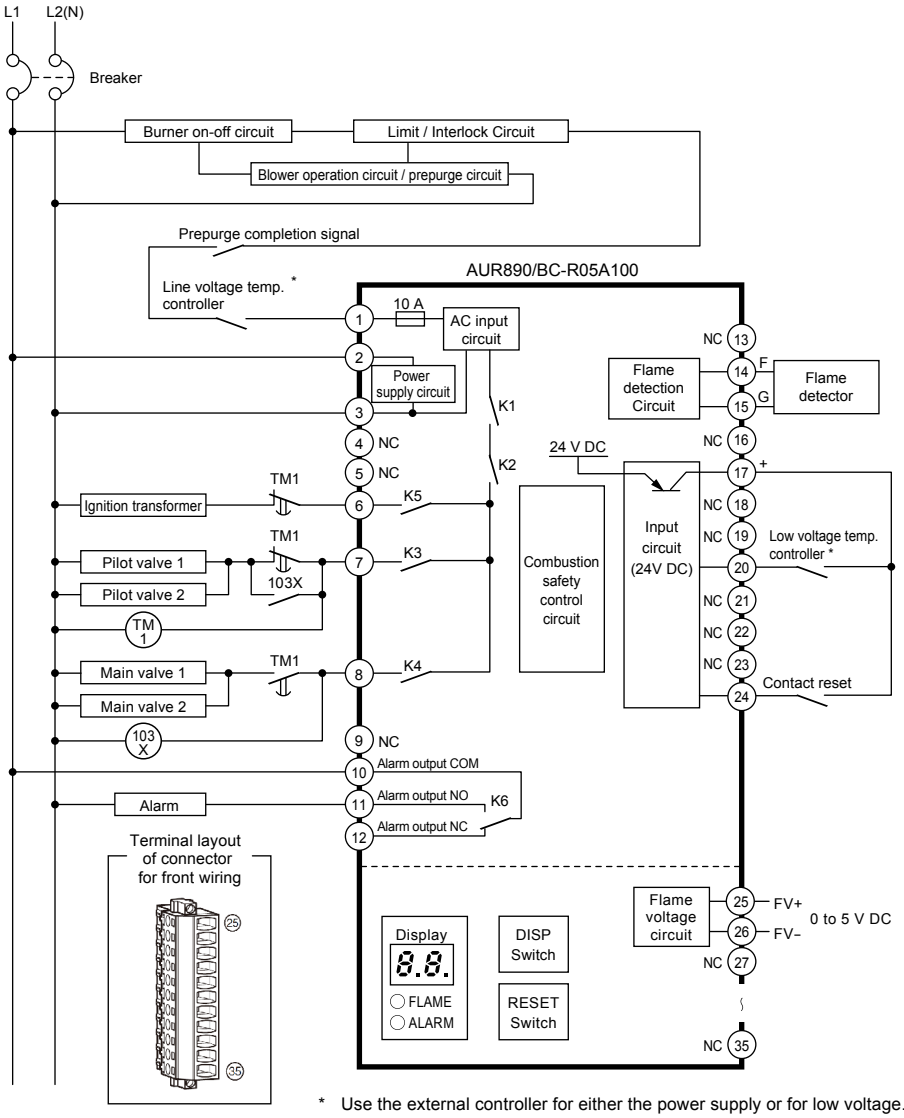
- Alarm code: E9 + sub-code (2 digits)



Switches every 0.8 s

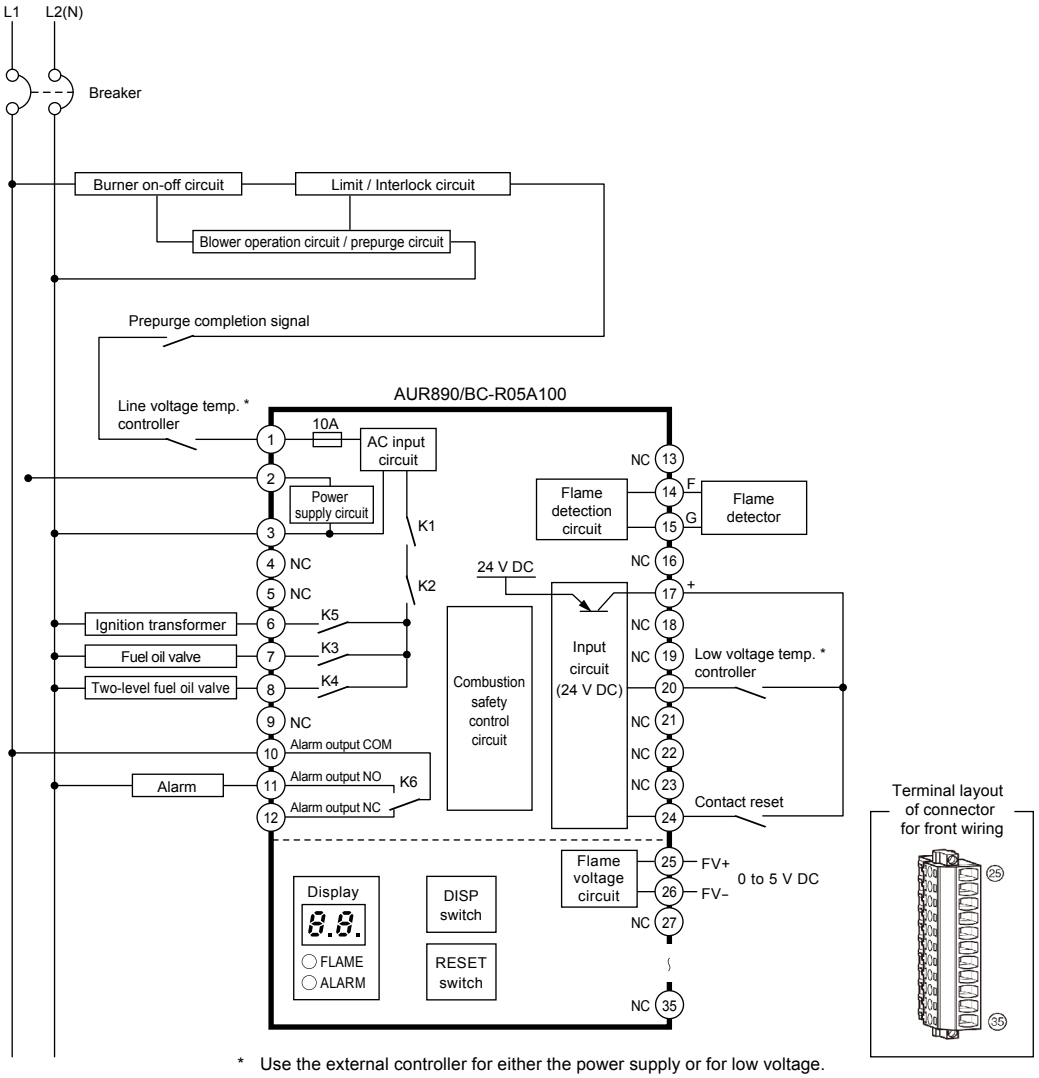
Internal block circuit, external connection terminals

- **With the sub-base BC-R05A100 (1-24 on sub-base, 25-35 on front connector)**
  - Non-recycling gas-fired combustion



* Use the external controller for either the power supply or for low voltage.
If the line voltage controller is used to start burner controller operation, connect terminal 17 to terminal 20.

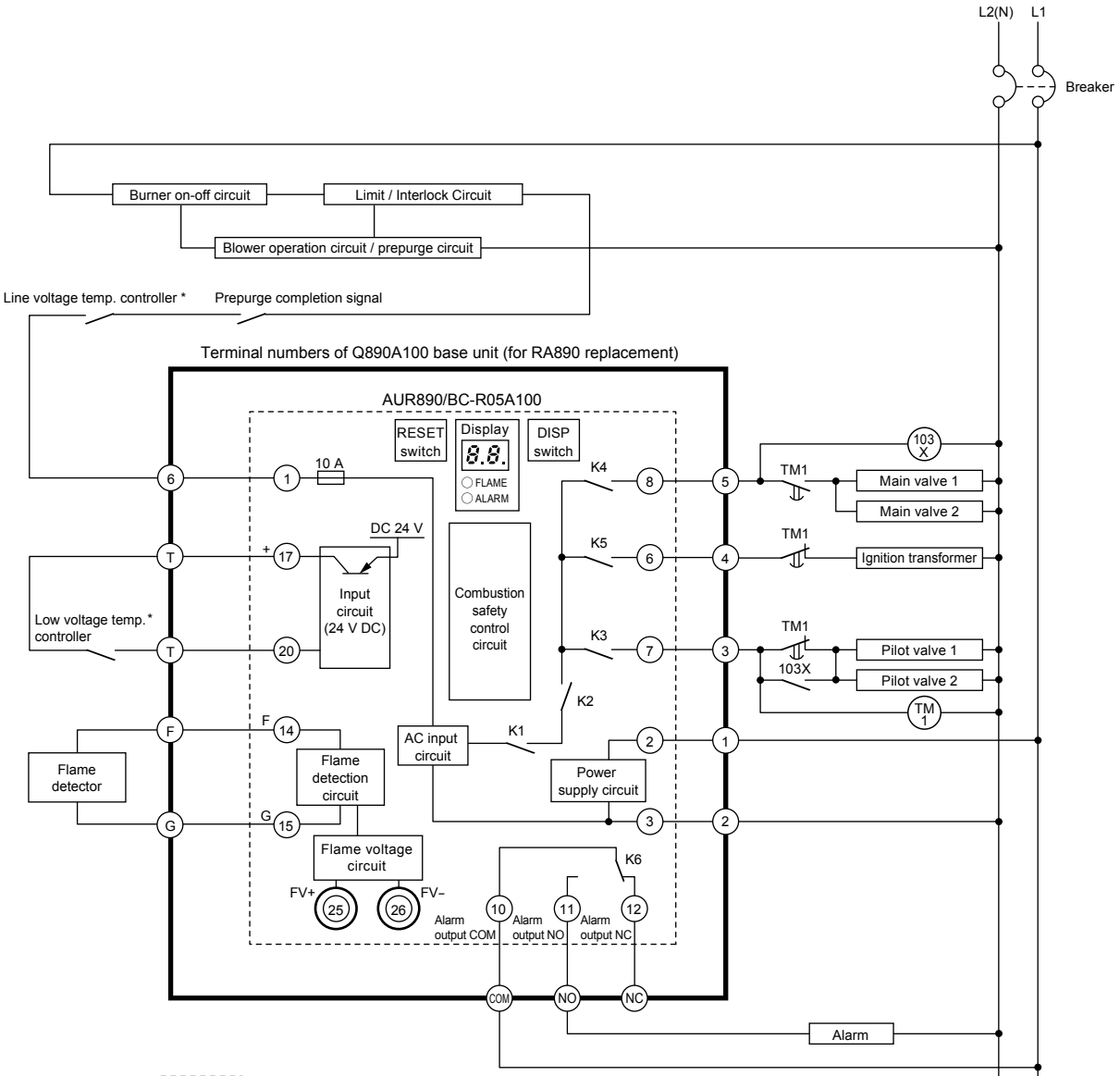
• Non-recycling oil-fired combustion (2-level combustion)



* Use the external controller for either the power supply or for low voltage.
If the line voltage controller is used to start burner controller operation, connect terminal 17 to terminal 20.

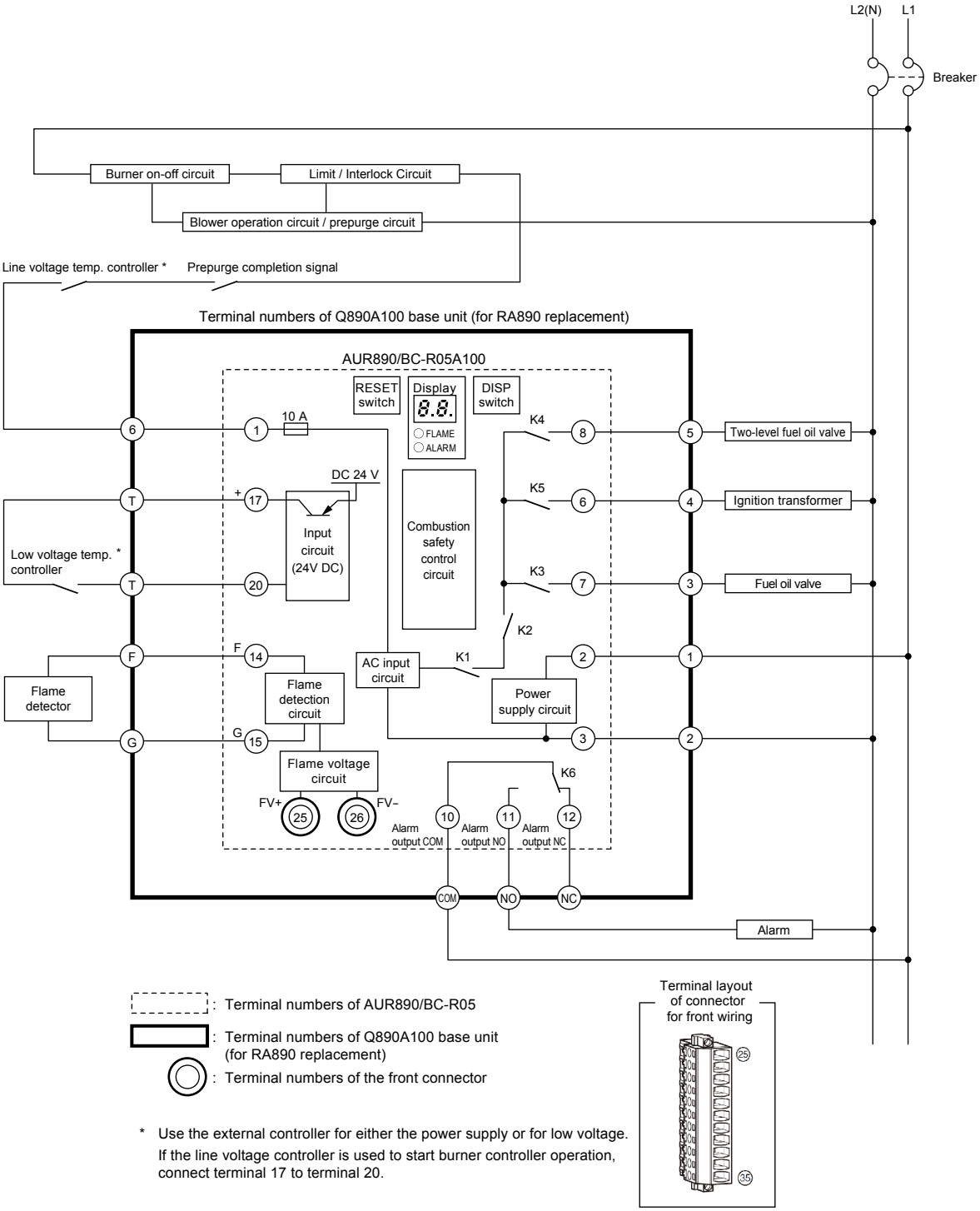
● Q890A100 base unit for RA890-AUR890 replacement

• Non-recycling gas-fired combustion



* Use the external controller for either the power supply or for low voltage.
If the line voltage controller is used to start burner controller operation, connect terminal 17 to terminal 20.

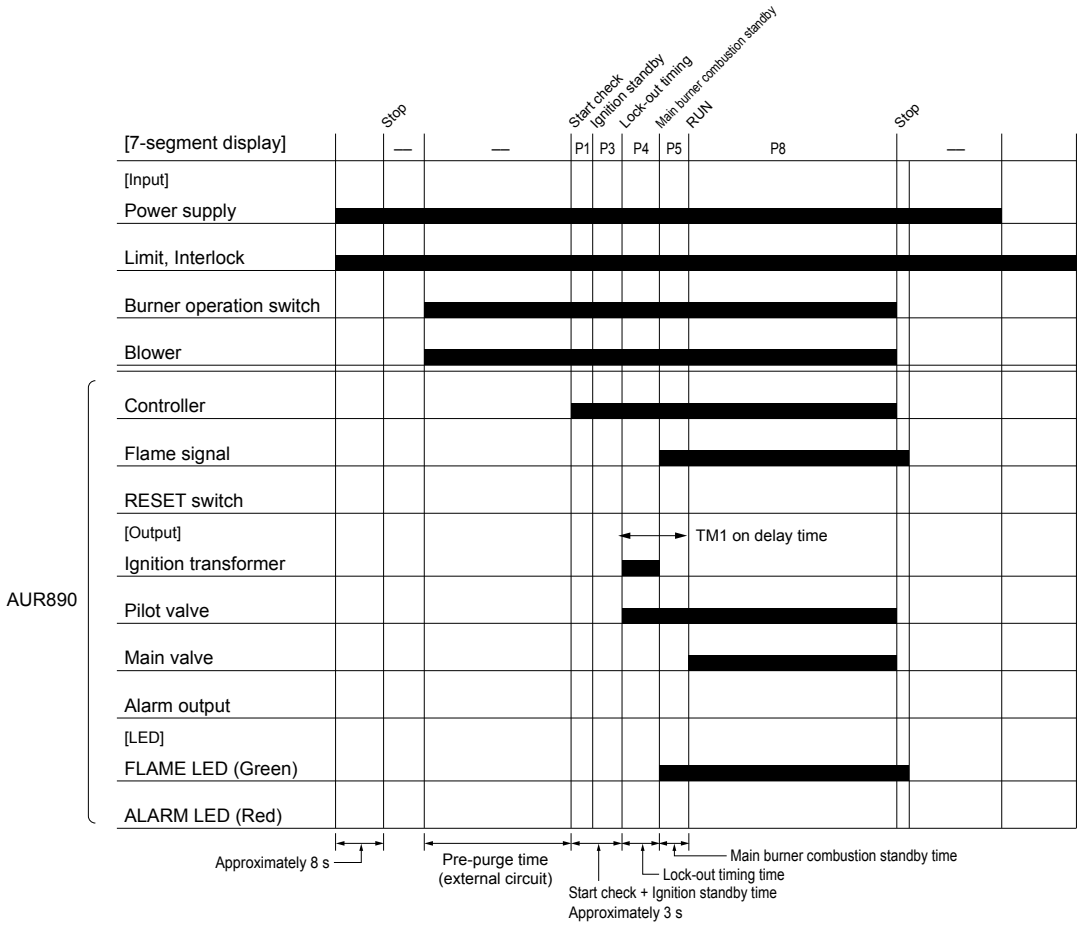
• Non-recycling oil-fired combustion (2-level combustion)



* Use the external controller for either the power supply or for low voltage.
If the line voltage controller is used to start burner controller operation, connect terminal 17 to terminal 20.

Operation sequence

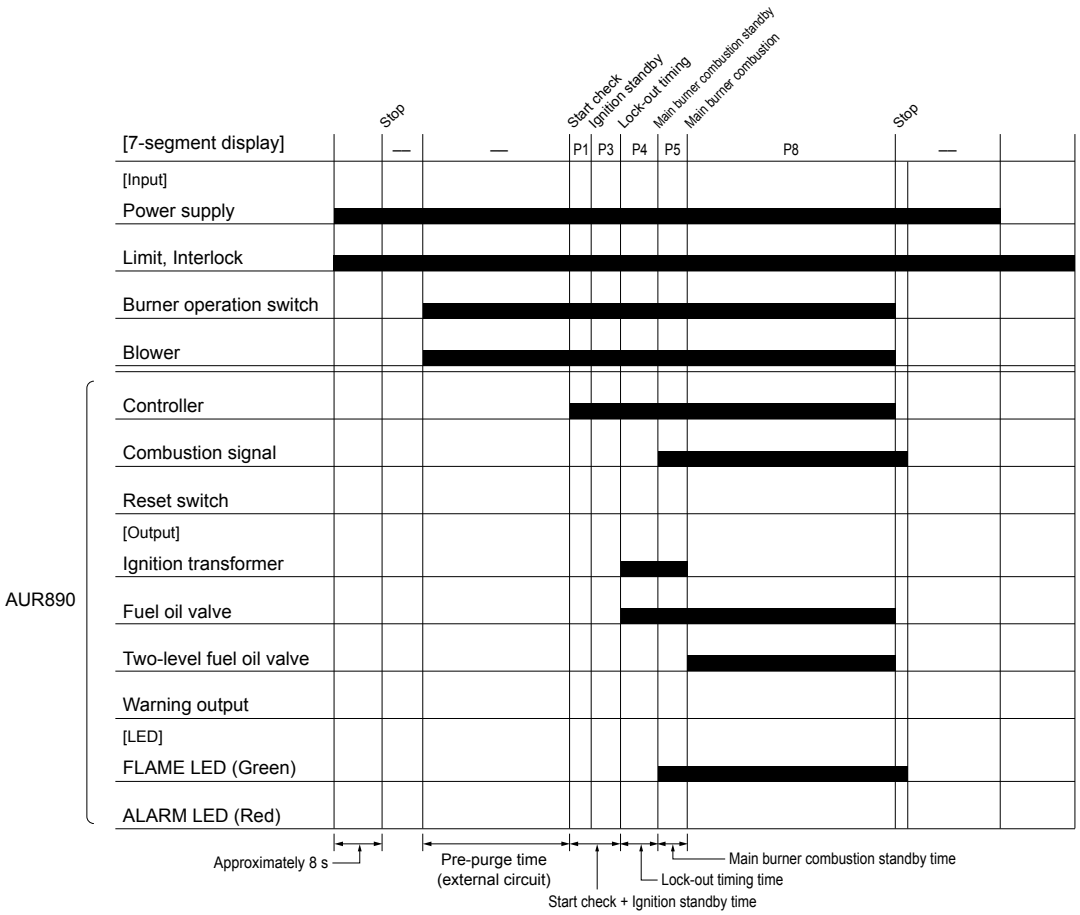
● Normal operation (Non-recycling gas-fired combustion)



Input	AUR890 operation	Sequence codes	Operation of external devices
Power-ON	When eight seconds have passed after the power has been turned on, the 7-segment LED display on the front panel of the AUR890 shows the sequence code [– –].	– –	
Burner operation switch ON		– –	When the burner operation switch is turned on, the blower starts operation, and a prepurge is done if the limit and interlock conditions are normal. When the prepurge is complete, the prepurge completion signal is turned ON. Blower: ON
Controller: ON	If the prepurge completion signal is ON and the controller is ON, the internal circuits are checked during the start check.	P1	
	Afterward a false flame check is conducted during the ignition wait time.	P3	
	If the status is normal, lockout time begins, relays K1, K2, K3, and K5 turn ON, the ignition transformer starts, the pilot valve begins to open, and external timer TM1 turns ON.	P4	Ignition transformer : start Pilot valve : open (TM1 starts)
	When the flame detector detects the pilot burner flame, relay K5 turns OFF to stop the ignition transformer.	P5	Ignition transformer : continues operation Pilot valve : remains open
	Relay 4K and external relay 103X turn ON. When the time set for TM1 operation has passed and TM1's contacts have turned on, the main valves open to begin normal combustion. FLAME LED (green) on the front panel of the AUR890 turns on.	P8	Ignition transformer : stop Main valve : open (103X : ON) (TM1's contacts : ON)
Burner operation switch OFF	When the burner operation switch turns OFF, relays K1, K2, K3, and K4 turn OFF, and the pilot and main valves begin to close. FLAME LED (green) on the front panel of the AUR890 turns off.	– –	Fuel oil combustion valve : closed Main valve : closed Blower : stop
Power-OFF	When the power is turned OFF, the 7-segment LED display on the front panel of the AUR890 stops showing the sequence code [– –].		

* The AUR890 turns the main valve ON after the standby process for normal combustion. This feature does not allow the main valve to be turned on immediately after ignition in order to prevent the flame from being blown out. During the standby process for normal combustion, if the time set for external timer TM1 is complete and the contacts are reversed, the supply of power to the pilot valve and main valve may be interrupted for a moment.
Whenever a flame is detected just before completion of the time set for external timer TM1, ignition is delayed. Adjust the burner so that it ignites reliably at least one second before the time set for external timer TM1 passes.

● Normal operation (Non-recycling oil-fired combustion (2-level combustion))



Input	AUR890 operation	Sequence codes	Operation of external devices
Power-ON	When eight seconds have passed after the power has been turned on, the 7-segment LED display on the front panel of the AUR890 shows the sequence code [– –].	– –	
Burner operation switch ON		– –	When the burner operation switch is turned on, the blower starts operation, and a prepurge is done if the limit and interlock conditions are normal. When the prepurge is complete, the prepurge completion signal is turned ON. Blower: ON
External controller: ON	If the prepurge completion signal is ON and the external controller is ON, the internal circuits are checked during the start check.	P1	
	Afterward a false flame check is conducted during the ignition wait time.	P3	
	In normal operation, safety lockout timing begins, relays K1, K2, K3, and K5 turn ON, the ignition transformer starts, and the fuel oil valve opens.	P4	Ignition transformer : start Fuel oil valve : open
	After the lockout time has passed, if a flame signal is detected, the ignition transformer output is maintained until the main burner combustion standby time has passed.	P5	Ignition transformer : continues operation Fuel oil valve : remains open
	When the flame sensor detects the flame from the fuel oil valve, relay K5 turns OFF, the ignition transformer stops, relay K4 turns ON, and the two-level fuel oil valve opens, starting main burner combustion. FLAME LED (green) on the front panel of the AUR890 turns on.	P8	Ignition transformer : stop Two-level fuel oil valve : open
Burner operation switch OFF	When the burner operation switch is turned OFF, relays K1, K2, K3, and K4 turn OFF, and the fuel oil valve and two-level fuel oil valve close. FLAME LED (green) on the front panel of the AUR890 turns off.	– –	Fuel oil valve : closed Two-level fuel oil valve : closed Blower : stop
Power-OFF	When the power is turned OFF, the 7-segment LED display on the front panel of the AUR890 stops showing the sequence code [– –].		

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