

# Flame Safeguard Control

## Advanced Ultraviolet Relay with Communication Function

### AUR350C

The AUR350C is a relay with a dynamic self-checking function and communication function, and is used in combination with the AUD300C Advanced Ultraviolet Detector. This UV relay controls the built-in flame relay while checking if any malfunction has occurred in the UV detector or the UV relay by driving the shutter of the UV detector. If the detector or relay amplifier circuit fails for any reason, the relay is not automatically energized and secures the safety of the system.

This relay includes an integrated communication function (RS-485), ensuring a wide range of applications using data stored in the built-in microprocessor and in combination with a personal computer or picture display.



#### ■ Features

- When any abnormality exists at the start of operation, the start-check relay is not energized, ensuring safety by not generating a signal to the main valve or flame output.
- Operation status can be confirmed by LED displays (power, shutter, start check and flame)
- Flame signal output (0 to 5Vdc) is provided as a standard function. This is useful for burner adjustment and flame status control.
- For the event relay operation, various operations (ON at event occurrence, flame voltage high/low limits, etc.) can be selected by means of the Smart Loader Package setting.
- The communication function (RS-485 based) and microprocessor are integrated, so that the trend monitoring (flame voltage, shutter cycling time, etc.), maintenance data (operation time, event history, etc.), and playback data can be displayed with the Smart Loader Package.

#### ■ Specifications

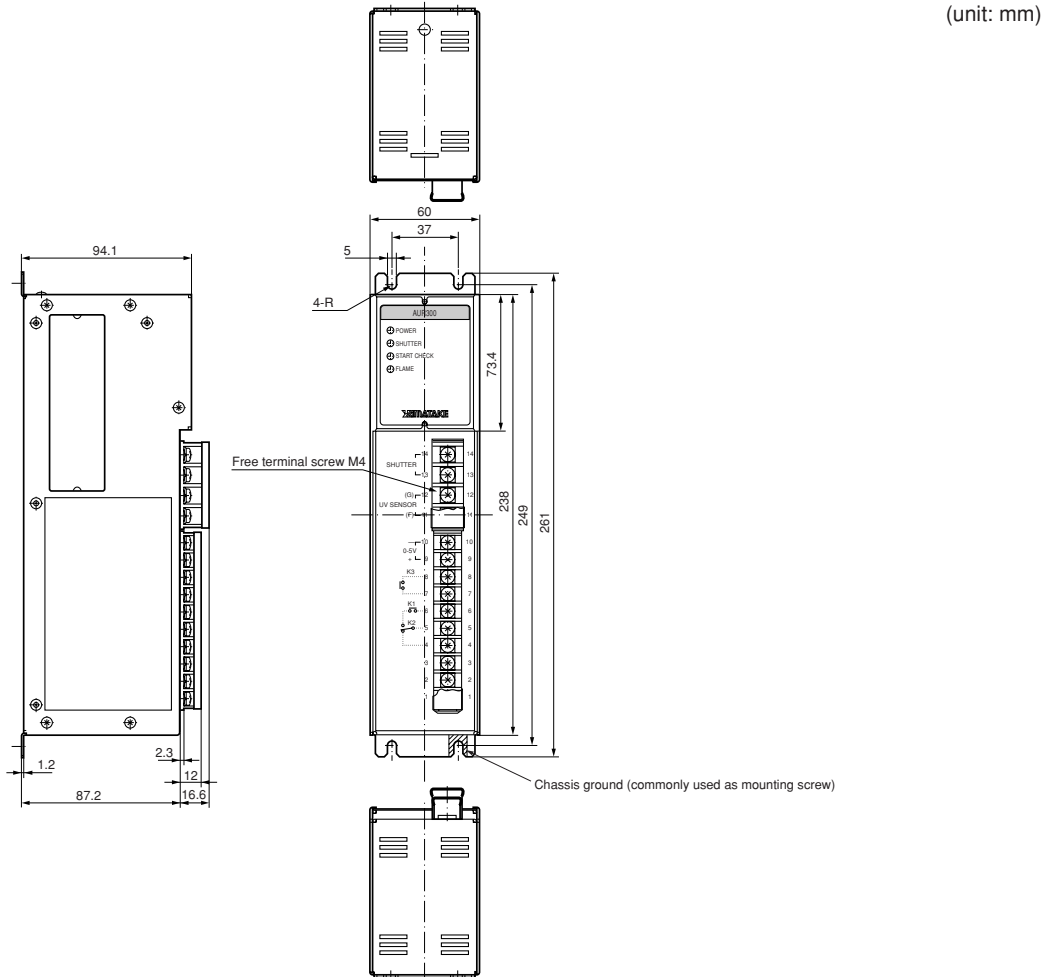
Item	Description	
Flame detector	AUD300C	
Flame response time	Nominal 1.5s, (max. 2s) at 3V flame voltage Nominal 3s, (max. 4s) at 3V flame voltage	
Flame voltage range	<ul style="list-style-type: none"> <li>· When ignited: 1.2 to 4.0Vdc at room temperature, humidity and rated voltage</li> <li>· When flame fails: 0.0 to 0.6Vdc at room temperature, humidity and rated voltage</li> </ul>	
Recommended flame voltage	1.5Vdc min. in stable state when ignited (However, in case of nominal 1.5s flame response, the voltage must be 2.0Vdc min. in a stable state.)	
Rated power supply voltage	100Vac or 200Vac at 50/60Hz	
Allowable voltage range	85 to 110% of rated power supply voltage	
Power consumption	10W max. (with AUD300C)	
Dielectric strength	1500Vac 50/60Hz 1 min or 1800Vac 50/60Hz 1s Application points: Between ground and primary terminals 1 to 8 (not 9 to 14)	
Insulation resistance	100MΩ min. by a 500Vdc megger Measurement points: Between ground and primary terminals 1 to 8 (not 9 to 14)	
Induced lightning surge	10kV, 1.2/50μs (JEC-187 : 75Ω min. surge impedance) The surge absorber listed hereunder must be connected between the power supply terminal (terminal 1) and the ground. · Recommended surge absorber: Part No. 83968019-001	
Service life	7 years or 100,000 cycles (operation cycles of each relay)	
Communication	Signal level	RS-485 based
	Transmission line connection	Multipoint (one host unit vs max. 15 slave units)
	Communication system	Half-duplex
	Synchronization	Start/stop

<b>Communication</b>	Transmission control	Polling/selecting method (CPL communication format)
	Max. transmission line length	500m max.
	Number of communication lines	3-wire system
	Communication speed error	0.16% max.
	Terminating resistor	150Ω
	Transmission speed	2400, 4800, 9600, 19200bps
	Data length	8 bits
	Stop bit length	1 bit
	Parity bit	Even parity or none
<b>Ambient temperature</b>	-20 to +60°C	
<b>Storage temperature</b>	-20 to +70°C	
<b>Ambient humidity</b>	90% RH at 40°C max. (no condensation allowed)	
<b>Vibration resistance</b>	4.9m/s <sup>2</sup> max., 10 to 55Hz for 2 hours each in X, Y and Z directions	
<b>Mounting direction</b>	Wall mounting (vertical or horizontal mounting)	
<b>Color</b>	White	
<b>Weight</b>	Approx. 1.2kg	

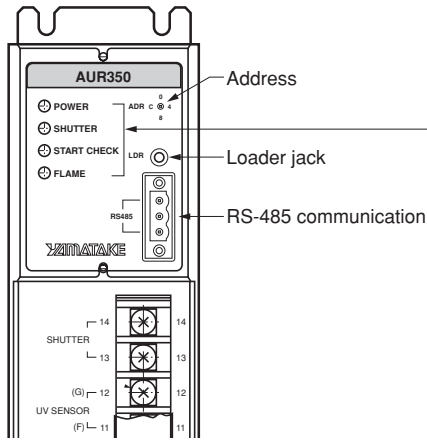
## ■ Model No.

Model No.	Description		
	Power supply	Flame response time (nominal)	Inspection certificate
<b>AUR350C13100</b>	100Vac 50/60Hz	3s	—
<b>AUR350C13200</b>	200Vac 50/60Hz	3s	—
<b>AUR350C131D0</b>	100Vac 50/60Hz	3s	With
<b>AUR350C132D0</b>	200Vac 50/60Hz	3s	With
<b>AUR350C12100</b>	100Vac 50/60Hz	1.5s	—
<b>AUR350C12200</b>	200Vac 50/60Hz	1.5s	—
<b>AUR350C121D0</b>	100Vac 50/60Hz	1.5s	With
<b>AUR350C122D0</b>	200Vac 50/60Hz	1.5s	With

## ■ Dimensions



## ■ LED indicators



Name	Color	Description
<b>POWER</b>	Green	Lit when power supply is ON
<b>SHUTTER</b>	Green	Lit when shutter is closed
<b>START CHECK</b>	Green/red	Set by Smart Loader Package (See Table 1)
<b>FLAME</b>	Green/red	Set by Smart Loader Package (See Table 2)

(Table 1)

Selection	Name	Operation sequence	Color	Function
1	Synchronized with K1	At start/stop	Green	ON/OFF synchronized with K1 ON
2	Event occurrence	At start/stop	Red	Blinks when event occurs. ON/OFF (1s cycle)
3	Inspection frequency ①	At stop	Red	Blinks at inspection frequency ①. Blinks upon stop (K1, K2 are both OFF).
4	Inspection frequency ②	At stop	Red	Blinks at inspection frequency ②. Blinks upon stop (K1, K2 are both OFF).

- Note:
- Initial settings are 1, 2.
  - Operation sequence: During operation: K1 and K2 are ON.  
During stop: K1 and K2 are OFF
  - When an abnormality and inspection frequency both occur at the same time, the event occurrence has priority.
  - When the event occurs at K1 ON (at green ON), (red blinks) green ↔ orange blinks.

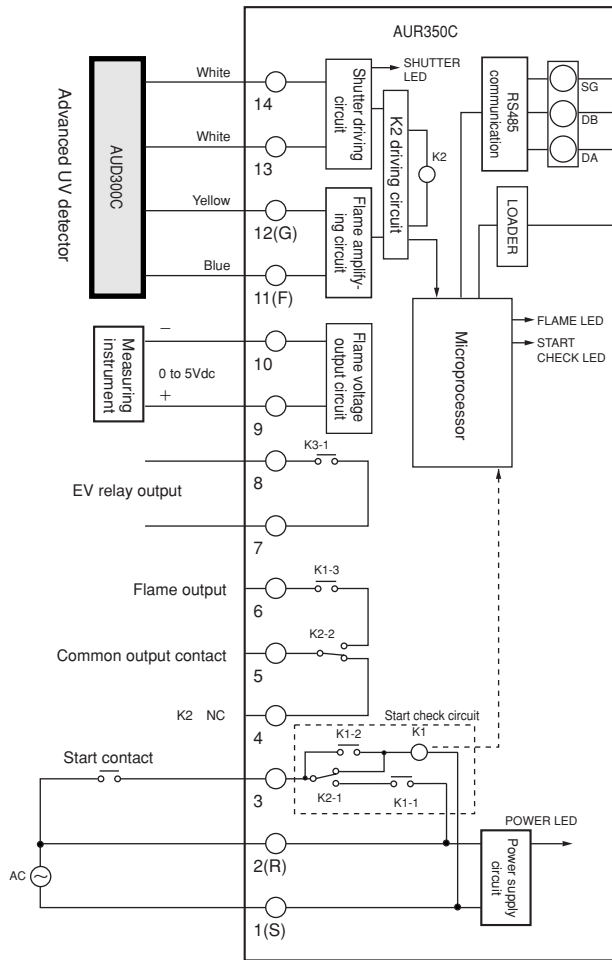
(Table 2)

Selection	Name	Operation sequence	Color	Function
1	Synchronized with K2	At false flame/operation	Green	ON/OFF synchronized with K2 ON. If the flame current level setup is not made, the green blinks ON and OFF.
2	Flame voltage level	At K2 ON (At false flame/operation)	Green Orange Red	Color of light changes according to flame voltage level. Green: 2.5V min. Orange: 1.5 to 2.5V Red: 1.5V max. K2 goes out when K2 is OFF.
3	Inspection frequency ③	At stop	Red	Blinks at inspection frequency ③. Blinks upon stop (K1, K2 are both OFF).
4	Inspection frequency ④	At stop	Red	Blinks at inspection frequency ④. Blinks upon stop (K1, K2 are both OFF).

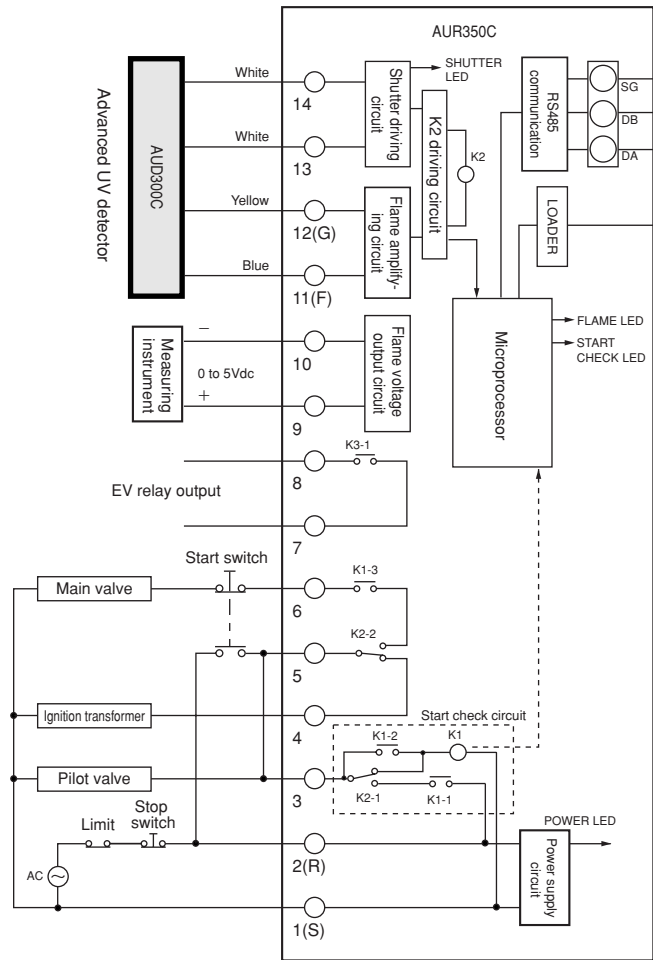
- Note: Initial settings are 1, 2.

## ■ Wiring

### ● Burner flame monitoring



### ● Manual ignition type (intermittent pilot)



Terminal No.	Description	Electrical rating	
1	Power supply (S) ground side	100/200Vac 50/60Hz	
2	Power supply (R) high voltage side		
3	Start input	—	
4	K2 relay NC (Flame relay NC)	5A 250V (cos $\phi = 1$ )	
5	Common output contact	—	
6	Flame output (K1, K2)	5A 250V (cos $\phi = 1$ )	
7	EV relay output (K3) *1	3A 250V (cos $\phi = 1$ )	*2
8	EV relay output (K3) *1		
9	Flame voltage output (+)	0 to 5Vdc	*3
10	Flame voltage output (-)		
11	Flame detector F-terminal (blue)	24Vdc 150mA	*4
12	Flame detector G-terminal (yellow)		
13	Flame detector Shutter (white)		
14	Flame detector Shutter (white)		

\*1: For the EV relay output, the output at occurrence of various events can be selected using Smart Loader Package settings.

\*2: Operation is the same as for the K2 relay. (However, since a start-checking function is not provided, do not use for combustion control, but only for combustion monitoring.)

\*3: Use a measuring instrument with an input impedance of 100k $\Omega$  min. To connect this device, use IV lead wires of 0.75mm<sup>2</sup> no longer than 10m.

\*4: Shutter does not have polarity.

## ■ EV relay output (K3) setting

Selection	Name	K3 relay operation
1	Synchronized with K1	Operates in the same way as K1 relay.
2	Synchronized with K2	Operates in the same way as K2 relay.
3	At event occurrence	ON upon event occurrence.
4	Flame voltage upper limit	Becomes ON when exceeding the flame voltage upper limit value. Flame voltage value > "selected upper limit." The flame voltage upper limit value is set using the loader.
5	Flame voltage lower limit	ON when under the flame voltage lower limit value. Flame voltage value < "selected lower limit." The flame voltage lower limit value is set using the loader.
6	Inspection frequency ①	ON with inspection frequency ①.
7	Inspection frequency ②	ON with inspection frequency ②.
8	Inspection frequency ③	ON with inspection frequency ③.
9	Inspection frequency ④	ON with inspection frequency ④.
10	Communication command	ON when writing the communication address (3900w) through RS-485.

The initial setting is "3: At event occurrence" for event occurrence when flame relay K2 is OFF (when shutter is closed).

Various event occurrences may be selected: false flame, false discharge, F-G short-circuit, flame voltage drop, etc.

The operation can be automatically reset upon event occurrence by means of the built-in switch, Smart Loader and RS-485 communication.

However, the false flame and F-G short-circuit are automatically reset.

## Cautions

- (1) Do not install the flame relay in the following locations:
  - Near the following chemicals or where their vapors are present: ammonia, sulfur, chlorine, ethylene compounds, acid, or any other corrosive gases.
  - Locations subject to water drops or damp atmosphere.
  - Locations subject to high temperature.
  - Locations subject to continuous vibration.
- (2) Before wiring, be sure to turn the power off. Touching terminals by mistake while the power is on may damage the device or result in malfunction, or electric shock.
- (3) After completing wiring, be sure to check all wiring connections. Incorrect wiring may damage the device or result in malfunction. In particular, as the flame detector (11(F)-12(G) terminals) has polarity, a reversed connection of F and G will result in the malfunction of the detector tube unit.
- (4) Use a dedicated packing case when transporting or storing this detector.
- (5) Do not bundle the power leads together with the flame detector signal lead wires, nor place them in the same conduit. Use independent cables.
- (6) Do not short-circuit the start input (terminals 2 and 3) to operate the device by turning the power supply on or off. This interferes with the device's start-checking function.
- (7) This device must be grounded with a resistance less than 100Ω according to the technical standards for electrical facilities. Be sure to ground the device.
- (8) Make sure that the ignition transformer high-voltage cables are properly connected in order to prevent faulty contacts. If there is a poor contact, radio frequency waves may be generated, resulting in errors from radio interference. Install the ignition transformer directly onto a metal part electrically connected to the burner.
- (9) Protection against induced lightning surge is not provided in this device. When adding surge protection, connect the protection device between No.1 and the ground. Recommended surge absorber: Part No.83968019-001.
- (10) Turning the power supply on and off quickly may result in malfunction. Wait at interval of approx. 3s before turning the device on or off again.
- (11) Electricity may remain in No.11 (F) terminal even after the power supply is turned off. Touching the terminal within 1 min after the power has been turned off might result in electric shock. Do not touch the No.11 (F) terminal soon after the power has been turned off.
- (12) As the EV relay output does not perform the start-checking, do not use this device for combustion control.



### RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in the applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

*Specifications are subject to change without notice.*

**YAMATAKE**

## Yamatake Corporation Advanced Automation Company

Totate International Building  
2-12-19 Shibuya Shibuya-ku  
Tokyo 150-8316 Japan

URL:<http://www.yamatake.com>

*This has been printed on recycled paper.* (03)

Printed in Japan. (H)  
1st Edition: Issued in Nov., 2004

*No part of this publication may be reproduced or duplicated without the prior written permission of Yamatake Corporation.*