

# Dynamic Self-Checking Flame Monitor

## Model AUR355

### Overview

The AUR355 dynamic self-checking flame monitor is a flame relay that supports both continuous and batch operation. This device can be used in combination with the AUD300C advanced ultraviolet flame detector, the AUD500C explosion-proof advanced ultraviolet flame detector, or a flame rod.

The AUR355 drives the shutter that is built into the AUD300C/AUD500C to continuously check both its own flame detection circuit and the ultraviolet detector in order to provide flame detection for continuous burner operation. Also, when used with a flame rod, the AUR355 continuously checks its own built-in flame detection circuit to provide flame detection for continuous burner operation.

The front connector provides a communication function and event output that are convenient for maintenance and troubleshooting. Note particularly that the PC loader can read out various kinds of data recorded in the AUR355 using the RS-485 communications protocol, including the flame voltage, ignition delay time, combustion count, combustion time, the recorded state for approximately 10 seconds before an alarm is activated (the playback function), and alarm history containing up to 16 records on operating status at alarm activation and alarm details. This data is useful for troubleshooting and preventive maintenance. Also, when the combustion time reaches 25,000 hours and the ultraviolet detector needs to be replaced, the event output turns ON to ensure timely replacement. Additionally on the front face of the unit, a 7-segment display shows the flame voltage and the current operating status. When an alarm is activated, the display indicates an operating status and an alarm code so that the details can be checked easily.

### Note:

The use of this device is strictly restricted by safety guidelines and other standards. For safety, use this device only with compatible equipment.



### Features

- Safety standard certification  
SIL 3  
Ease of instrumentation and handling  
Designed for compactness, so requires little installation space. Wires connect to the sub-base, so the unit is easy to install/remove. Flame monitor and alarm output contacts are available as independent non-voltage contacts. There is a terminal for external reset input. This device can be reset from the operation panel.
- Multifunction display  
The 7-segment display is useful for maintenance and troubleshooting, helping to identify the progress of operations, alarm codes, and event codes. In addition, flame detection and alarm activation can be checked visually with LED indicators.

### ■ Precautions for instrumentation

Facilities that use combustion safety equipment 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
  - Index of Safety Technology of Industrial Gas Combustion Equipment, by Japan Gas Association
  - Index of Safety Technology of Gas Boiler Combustion Facilities, by Japan Gas Association
- U.S.A. NFPA 86  
Combustion Safety Guidelines, by National Fire Protection Association
- Europe EN 746 (Industrial Thermoprocessing Equipment)  
93/68/EEC (CE Marking Directive) amending Appliances Burning Gaseous Fuels
- For usuct abroad, create a design with reference to the laws and standards of the relevant country.

### ● 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 system design

This device does not have ignition or purge function. They must be provided externally.

# Specifications

## ■ General specifications

Item	Description	
Application	Gas- or oil-burning combustion equipment	
Compatible flame detector	Model AUD300C/500C ultraviolet flame detector, flame rod	
Flame failure response	AUD300C/500C flame detector	Flame rod
	2 s max. or 4 s max. (select by model No.) when flame voltage is 3 V	4 s max. when flame voltage is 2 V
Flame voltage output	0–5 V DC	
Flame detection level	AUD300C/500C flame detector	Flame rod
Flame detection	Flame detection	1.5–4.0 V DC
	Flame out detection	0.0–0.6 V DC
Recommended flame voltage	Stable 2.0 V DC min.	
Rated power	100/200/220 V AC, 50/60 Hz	
Allowable voltage range	85–110 % of rated power	
Power consumption	10 W or less (incl. power supplied to AUD300/AUD500)	
Contact rating	Input specifications	Start signal 500 Ω max. / Non-voltage contact input
		Contact reset 500 Ω max. / Non-voltage contact input
	Output specifications	Flame relay N.C. output 5 A, 250 V AC
		Flame output with start check 5 A, 250 V AC
		Event output 3 A, 250 V AC
		Flame SIL output 0.2 A, 30 V DC 0.3 A, 250 V AC
	Flame voltage output	0–5 V DC
Service life	7 years or 100,000 operations (operation count of any relay)	
Ambient temperature	Mounting of single unit	–20 to +60 °C
	Gang mounting	–20 to +45 °C
	During storage	–20 to +70 °C
Mounting orientation	Mount so that the front panel is vertical, with the loader jack at the bottom and the 7-segment display at the top.	
Mounting	Separable sub-base BC-R05A100 DIN rail or direct mounting through screw holes	
Color	Black	
Weight	Approximately 600 g (incl. sub-base)	
Protection rating	IP40, if sideboards (81447515-001) are attached to the sub-base IP10: sub-base (BC-R05) only	
Dimensions	H105 × W95 × D110 mm incl. sub-base (excl. front connector)	
Standards compliance	KC Marking Functional Safety level SIL3, compliant with IEC 61508: 2010	

## ■ Wiring types and max. wiring length

Signal	Wiring type	Recommended length	Max. length
Startup input (START)	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	20 m max.	100 m <sup>*1</sup>
Contact reset input (RESET) <sup>*2</sup>	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	—	10 m
Flame relay N.C. output (NC, COM)	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	—	—
Flame output (with start check) (FC, COM)	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	—	—
Event output (EV-NO, EV-COM)	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	—	—
Flame output (SIL Capability) (FL1, FL2)	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	—	—
Flame voltage output signal	Copper 600 V PVC-insulated cable (IEC 60227-3), 0.75 mm <sup>2</sup>	—	10 m
AUD300C/500C (F, G, S1, S2)	Copper 600 V PVC-insulated cable (IEC 60227-3), 1.25 mm <sup>2</sup>	—	200 m
Flame rod (F, G)	RG-11U (JAN standard: U.S. DoD-compliant specification) or the equivalent, 5C2V, 7C2V (JIS standard)	20 m max.	30 m
RS-485 communications (3-wire system)	Twisted-pair shielded cable Recommended: JCS 4364 cable for low-power instruments, 4 cores (2 pairs)	100 m max.	500 m

\*1 This input signal is checked using a periodic digital signal (24 V DC, 20 mA pulse) to detect failure of the circuit. If the wiring from this device exceeds the recommended length, to avoid the effects of external electromagnetic interference, run the wiring through a conduit, separated from power lines, and check the operation of the system.

\*2 For details on the contact reset input specification, see Flame Monitor Model AUR355 User's Manual, No. CP-SP-1454E.

## Model selection

Basic model No.	Flame detector	Flame sensitivity	Flame failure response	Power	(Reserved)	(Reserved)	Additional functions <sup>*1</sup>	Description
AUR355								—
	B							Flame rod
	C							AUD300C/500C
		1						Standard
			3					4 s max. (nominal 3 s)
		<sup>*2</sup>	2					2 s max. (nominal 1.5 s)
				1				100 V AC
				2				200 V AC
				4				220 V AC
					0			—
						0		—
							0	None
							D	With inspection data

\*1 The printed circuit boards of all models are varnished, so tropicalization treatment is not offered as an additional function.

\*2 AUR355C only

## Related devices

### ■ Compatible ultraviolet flame detector (sold separately)

Model No.	Name
AUD500C11__	Explosion-proof advanced ultraviolet flame detector
AUD300C100_	Advanced ultraviolet flame detector
AUD300C110_	

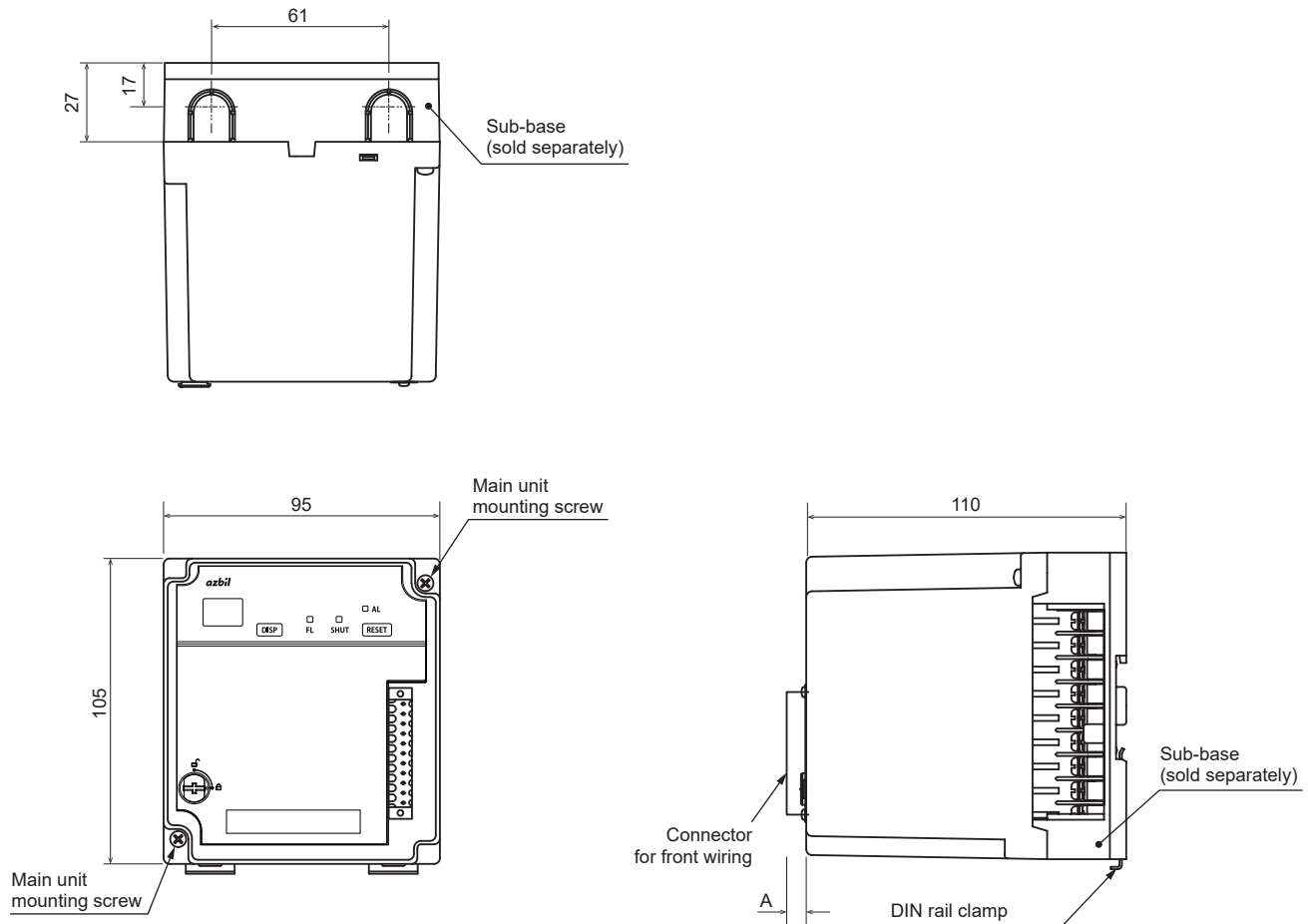
\_ : 0 = standard product    D = with inspection report (with data)    T = tropicalization    Y = traceability certificate  
DT = tropicalization + inspection report    YT = traceability certificate + tropicalization

### ■ Optional parts (sold separately)

Model No.	Name
BC-R05A100	Dedicated sub-base (a requirement for AUR355)
81447514-001	Connector for front wiring    Weidmueller BL3.5/11F    Compatible wire: 0.2–1.5 mm <sup>2</sup> (28-14 AWG)
81447514-002	Connector for front wiring (for right side wiring)    Weidmueller BL3.5/11/270F    Compatible wire: 0.2–1.5 mm <sup>2</sup> (28-14 AWG)
81447515-001	Side supports (2)
SLP-A55J91	Smart Loader Package (no cable)
81441177-001	USB loader cable
FSP136A100	Analog flame meter
81447519-001	Jack cover (1)
83968019-001	Surge suppressor

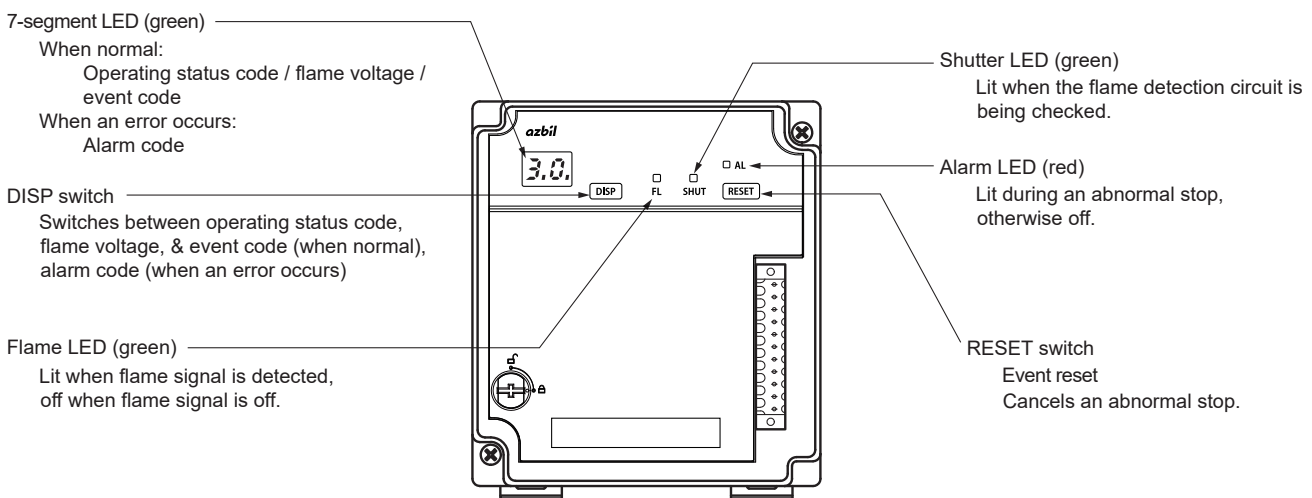
## External dimensions

Unit: mm



Model No. of connector for front wiring	A
81447514-001	10.6
81447514-002	14.6

## Names and functions of parts



## ■ 7-segment LED: operating status code

Display	Status
PF	Flame is being monitored.
PE	False flame is detected.
--	Controlled shutdown
E9/ __	Abnormal stop

Note For details, please refer to Flame Monitor Model AUR355 User's Manual, No. CP-SP-1454E.

## ■ Alarm

Display	Name	Description
E9 + sub-code (2 digits)* <sup>2</sup>	Device error	Communication errors between CPUs, CPU memory malfunction detected, internal circuit malfunction detected, etc.

\* For details, please refer to Flame Monitor Model AUR355 User's Manual, No. CP-SP-1454E.

## ■ Event code

Event code	Name	Condition for event
A1	UV flame detector check (combustion time)*	When the combustion time exceeds the set value
A2	Product service life check (total operating time)	When the total operating time exceeds the set value
A3	Product service life check (total combustion count)	When the total combustion count exceeds the set value
A4	False flame	When false flame detection status (PE) continues for approximately five seconds
A5	Flame relay OFF	When a flame failure occurs (the flame relay is turned OFF) during flame monitoring
A6	Flame relay OFF (shutter closed)	AUR355C: when approximately five seconds pass with the shutter closed AUR355B: This event does not occur. A failure of the shutter, the tube unit, or this device's flame detection circuit may be the cause.

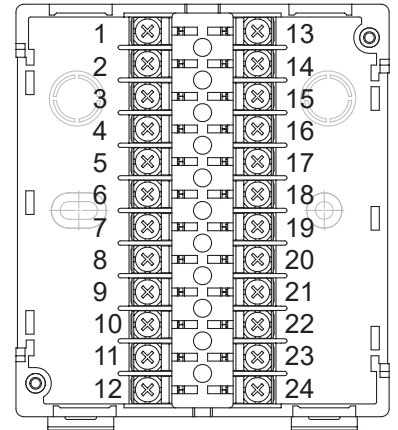
\* If a flame rod is used, use this as the flame rod inspection cycle.

## Terminals and characteristics

### ■ Terminal layout

#### ● Sub-base

No.	Code	Function	No.	Code	Function
1	—	Not used	13	—	Not used
2	AC-H	Power (H)	14	F	Flame sensor (F)
3	AC-G	Power (G)	15	G	Flame sensor (G)
4	—	Not used	16	S1	Shutter output 1 (for AUR355C)
5	NC	Flame relay N.C. output	17	S2	Shutter output 2 (for AUR355C)
6	COM	Contact output common	18	—	Not used
7	FC	Flame output (with start check)	19	COM1	Input common 1
8	—	Not used	20	COM2	Input common 2
9	EV-NO	Event output	21	START	Start input
10	EV-COM	Event output	22	—	Not used
11	FL-NO	Flame output (SIL Capability)	23	—	Not used
12	FL-COM	Flame output (SIL Capability)	24	RESET	Contact reset input

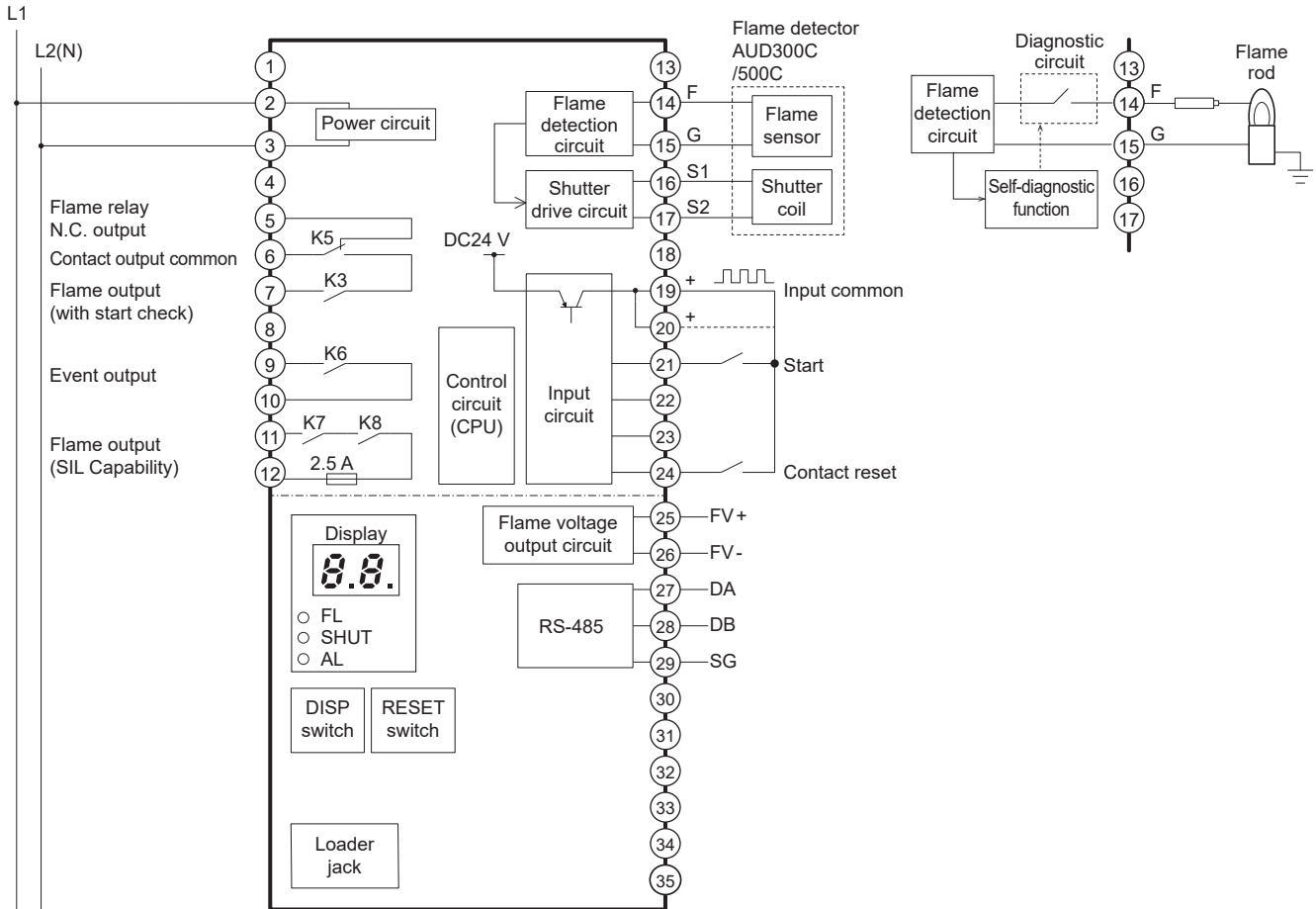


#### ● Front connector terminals

No.	Function	
25	FV+	Flame voltage output (+)
26	FV-	Flame voltage output (-)
27	DA	RS-485 (DA)
28	DB	RS-485 (DB)
29	SG	RS-485 (SG)
30	—	Not used
31	—	Not used
32	—	Not used
33	—	Not used
34	—	Not used
35	—	Not used

# Wiring and internal block diagrams

## ■ Burner flame monitoring



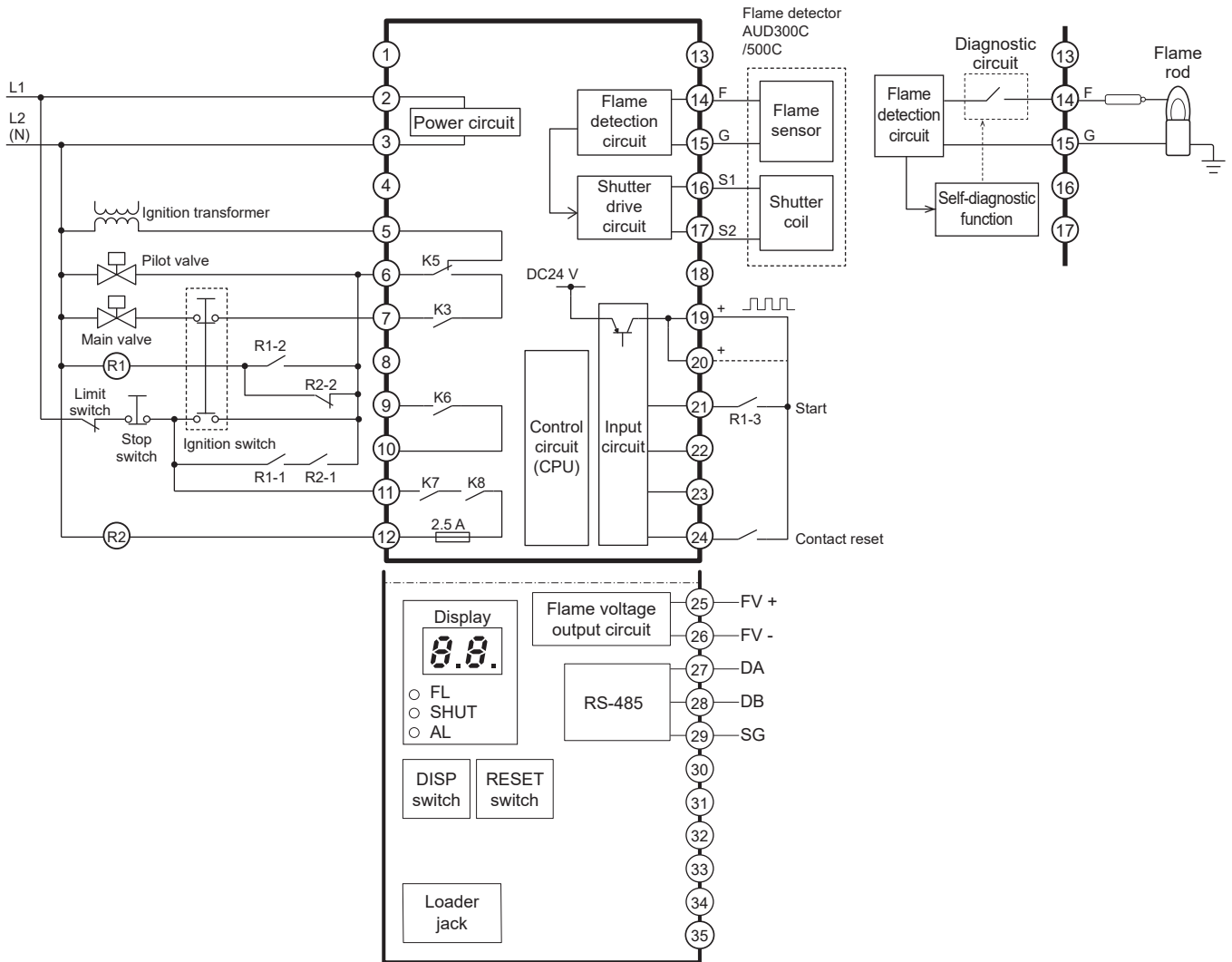
- K3: Start check relay
- K5, K7, K8: Flame relay
- K6: Event relay

Do not share the input common (terminals 19, 20) with other AUR355 devices.

■ Manual ignition (intermittent pilot)

● Manual ignition wiring example

Instrumentation is implemented in combination with external relays.



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