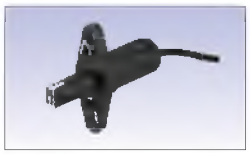
Azbil

Технические характеристики

Модули контроля пламени серии RX

Introduction to Flame Safeguard System

Flame Detector Types and Features

Detectors	Model/appearance	Flame property	Applicable combustion	Main uses
Ultraviolet phototubes (UV sensors)	AUD300C1000 Series 	Ultraviolet light 185–245 nm	Gas Oil	Batch operation or continuous operation Pilot burner monitoring Main burner monitoring Industrial furnaces Plants Boilers
	AUD500C11000 Series 			
	C7076A 	Ultraviolet light 185–270 nm		[Reference] ● Continuous operation equipment means: Combustion continues for at least 24 hours ● Batch operation equipment means: Combustion starts and stops at least once every 24 hours Note: Flame detectors designed for continuous operation can also be used for batch operation.
	C7076D 			
	AUD100+AUD15 	Ultraviolet light 185–245 nm		For batch operation Pilot burner monitoring Main burner monitoring Industrial furnaces Boilers
	AUD110+AUD15 			
Photo diodes (Visible light flame detectors)	AFD100 	Light 400–800 nm	Oil	For batch operation Small oil-fired boilers
	AFD110 			

Introduction to Flame Safeguard System

Safety Shutoff Valves

Safety technology related to safety shutoff valves

Source: Japan Gas Association, "Safety Technology Indices for Industrial Gas Combustion Equipment," January 2009

The basis of gas combustion equipment safety is the ability to shut off the gas supply immediately when an abnormal or dangerous state occurs. The safety shutoff valve is the key safety device for immediate shutoff of the gas supply to the overall equipment or to an independent zone when a hazardous state arises, such as a combustion issue like ignition failure or flame failure, or an abnormal rise in the temperature of the heating unit, or when the gas or air pressure falls outside the preset range. As a rule, two safety shutoff valves are installed in series in the event that one valve is not able to completely shut off the gas due some problem with the valve.

Conditions requiring installation

Safety shutoff valves must be installed where they can immediately shut off the gas supply to the overall equipment or to an independent combustion zone when a hazardous state arises, with the exception of cases where the operator is able to continuously monitor the heating unit situation and immediately shut off the gas in the event of danger, such as when workmen are using hand-held acetylene torches near the gas pipeline.

Safety shutoff valve

Safety shutoff valves must be able to shut completely and automatically within 1 second after the supply of electricity or air pressure stops, must be able to sufficiently withstand the usage pressure, and also must comply with the relevant standards.
Specifically, JIS B 8415 (General Safety Code for Industrial Combustion Furnaces) states that it is preferable for a fuel switch valve for a regenerative burner, such as a high-performance industrial furnace, that is being used as a shutoff valve to be given a minimum of two million operation test cycles as a durability test using the method prescribed in ISO 23550.

・Leakage Standards for Safety Shutoff Valves: List of Safety Shutoff Valve Leakage Standards

Standard	External leakage	Test methods	Internal leakage	Test methods
EN161 Europe	Standard bore DN < 10 20 cm^3/h or less 10 ≤ DN ≤ 25 40 cm^3/h or less 25 < DN ≤ 80 60 cm^3/h or less 80 < DN ≤ 150 60 cm^3/h or less 150 < DN 60 cm^3/h or less	Measure at the burette or water column gauge after applying 60 mm of H_2O and a pressure of 1.5 times the maximum usage pressure from the inlet and outlet.	Standard bore DN < 10 20 cm^3/h or less 10 ≤ DN ≤ 25 40 cm^3/h or less 25 < DN ≤ 80 60 cm^3/h or less 80 < DN ≤ 150 100 cm^3/h or less 150 < DN 150 cm^3/h or less	Measure at the burette or water column gauge after applying 60 mm of H_2O and a pressure of 1.5 times the maximum usage pressure from the inlet and outlet.
UL429 USA	200 cm^3/h or less	1.5 times the maximum usage pressure for those with 350 mm of H_2O or greater.	235 cm^3/h or less (when the internal diameter is greater than 11/2 B, add an extra 235 cm^3/h for each B)	• Test at 175 mm of H_2O and again at 1.5 times the maximum usage pressure (but at least 350 mm of H_2O). • Measure • Measure the pressure difference at a pressure gauge upstream from the valve.
JIS B 2151 Japan *1	30 cm^3/h or less	Measure with the leakage detector at 4.2 kPa as well as 0.5 kPa of air pressure from the inlet.	• 30 cm^3/h or less (for appliance valves) • 300 cm^3/h or less (for non-appliance valves)	Measure at the leakage detector at 4.2 kPa as well as 0.5 kPa air pressure from the inlet.
ISO 23551	Standard bore DN < 10 20 cm^3/h or less 10 ≤ DN ≤ 25 40 cm^3/h or less 25 < DN ≤ 80 60 cm^3/h or less 80 < DN ≤ 150 60 cm^3/h or less 150 < DN ≤ 250 60 cm^3/h or less	After carrying out an internal leakage test at 0.6 kPa, repeat the test using pressures of either 1.5 times the maximum usage pressure or 15 kPa, whichever is higher. However, those using gas at 11.2 kPa or 14.8 kPa should be tested at a minimum of 22 kPa.	Standard bore DN < 10 20 cm^3/h or less 10 ≤ DN ≤ 25 40 cm^3/h or less 25 < DN ≤ 80 60 cm^3/h or less 80 < DN ≤ 150 100 cm^3/h or less 150 < DN ≤ 250 150 cm^3/h or less	After carrying out an internal leakage test at 0.6 kPa, repeat the test using pressures of either 1.5 times the maximum usage pressure or 15 kPa, whichever is higher. However, those using gas at 11.2 kPa or 14.8 kPa should be tested at a minimum of 22 kPa.

*1. For cases of connection to a gas pipe with an outer diameter of 35 mm or less, for gas burning appliance automatic valves used in combustion equipment that uses city gas or liquefied petroleum gas at a gas pressure of 3.3 kPa or less.

・European Safety Shutoff Valve Standard (EN161 Group 2): Excerpted summary by Azbil Corp.

Item	Performance	Test methods
Leakage	Size / External leakage / Internal leakage DN < 10 / 20 cm^3/h or less / 20 cm^3/h or less 10 ≤ DN ≤ 25 / 40 cm^3/h or less / 40 cm^3/h or less 25 < DN ≤ 80 / 60 cm^3/h or less / 60 cm^3/h or less 80 < DN ≤ 150 / 60 cm^3/h or less / 100 cm^3/h or less 150 < DN / 60 cm^3/h or less / 150 cm^3/h or less	Measure internal leakage after applying pressure from the inlet, and external leakage from the inlet and outlet, using 60 mm of H_2O and a pressure of 1.5 times the maximum usage pressure.
Valve closure ability	Must meet the above internal leakage standards when pressure is applied from the outlet.	Applied pressure Class A: 1500 mm — H_2O Class B: 500 mm — H_2O Class C: 100 mm — H_2O
Durability	Size / -15 °C / 20 °C / 60 °C / Total 1 or less / 25,000 cycles / 125,000 cycles / 50,000 cycles / 200,000 cycles 1¼–3 / 25,000 cycles / 50,000 cycles / 25,000 cycles / 100,000 cycles Must meet the operation, leakage, and valve closure pressures in the above test.	Done with the pressure at the maximum allowable pressure, the flow rate at 10 % or less of the rating, the voltage at 85 % at –15 °C, 85 % and 110 % (half each) at 20 °C, and 110 % at 60 °C.
Flow	Must be within 95 % of specification.	Converted to 15 °C atmospheric pressure
Resistance to gas	With n-pentane must be within ±15 % of the volume change ratio.	Measure at 40 °C after steeping in 23 °C n-pentane for 72 hours and then air-drying for 72 hours.
Open time (slow open)	Must be ±20 % of manufacturer's specification.	Measure the time taken to reach 80 % of the specification flow rate at 110 % of rated voltage at 60 °C and 85 % of rated voltage at -15 °C.
Strength (torque: kgf·cm)	Size / ¾ / ½ / ¾ / 1 / 1¼ / 1½ / 2 / 2½ / 3 Bending torque / 7 / 10.5 / 22.5 / 34 / 47.5 / 61 / 110 / 160 / 240 Twisting torque / 3.5 / 5 / 8.5 / 12.5 / 16 / 20 / 25 / 32.5 / 40	For each, apply torque for 10 seconds and check for internal and external leakage.

Group division
Group 1: Shipped in the bracket, no force applied during piping work.
Group 2: Installed inside or outside the bracket, supported only by the pipe.

・Usage by class (following EN 746-2)

Combustion capacity	When monitored by operator	When not monitored by operator
Less than 120 kW (100,000 kcal/h)	Class A: 1 valve	Class B: 2 valves
Less than 120–600 kW (100,000–500,000 kcal/h)	Class A: 1 valve	Class A: 2 valves
Less than 600–1,200 kW (500,000–1,000,000 kcal/h)	Class B: 2 valves	Class A: 2 valves
1,200 kW (1,000,000 kcal/h) or above	Class A: 2 valves	Class A: 2 valves

● Closed position indicator switch

In ISO 23551-1 (Safety and control for gas burner and gas burning appliances – Particular requirements – Part 1: Automatic valves), the closed position indicator switch is defined as the switch attached to the valve that indicates that the closing part is in the closed position. The following are specifically required.

Structure

・Must not interfere with normal valve operation
・The adjustment mechanism must seal it so that it can be seen that no adjustments have been made that the manufacturer did not intend.
・No amount of drift in the adjustment switches or driving mechanism may interfere with normal valve operation.

Performance

The switch is required to indicate the closed position in both of the following situations.

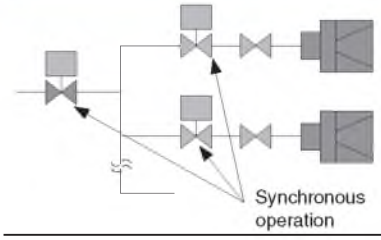
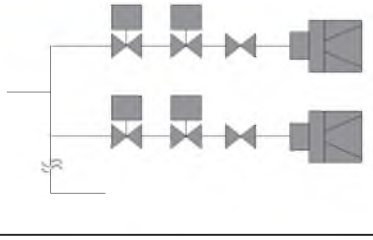
・When the flow is 10 % or less of the fully open flow at the same differential pressure.
・When the closing part is positioned within 1 mm of the closed position.

Position during automatic ignition

Normally two safety shutoff valves should be installed separately in series on the fuel supply pipes for the pilot burner and the main burner.

During synchronous ignition or extinguishing, as shown below, the safety shutoff valves for each burner form one layer, and by adding another safety shutoff valve in the zone, it is possible to have a double valve structure. However, this does not allow ignition or extinction of one burner only.

・Pipe Layout for Double Shutoff Valves

Synchronous ignition (extinction)	Non-synchronous ignition (extinction)
	

In addition, for non-synchronous ignition and extinction, two safety shutoff valves need to be installed for each burner, using double shutoff Unlike synchronous ignition, this configuration allows ignition and extinction of each burner separately.

Introduction to Flame Safeguard System

Gas Safety Shutoff Valve Flow Calculation

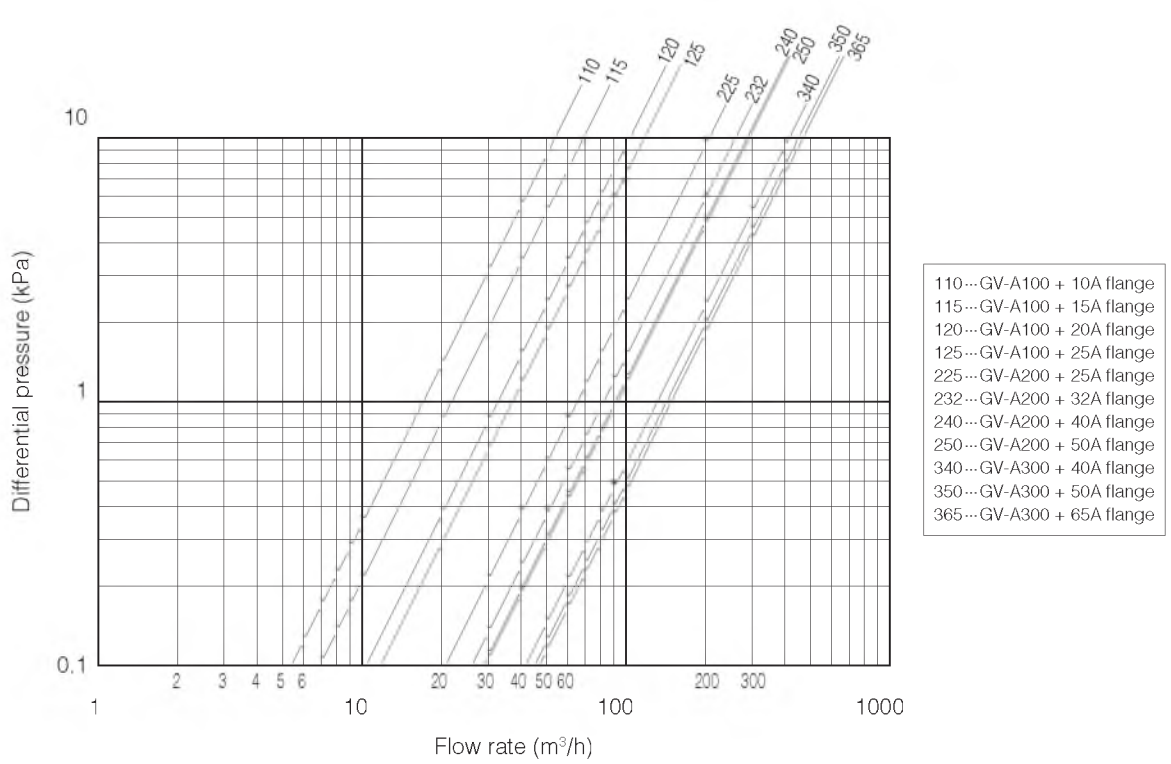
C_V is normally used as a coefficient for showing the valve flow-through rate (capacity), but safety shutoff valves often show the flow rate and C_V at a specific differential pressure or specific gravity determined by the gas.

Example:
The following table shows the C_V and flow rates for a GV-A high-performance industrial-use gas double electromagnetic valve (with two connected in series). The flow rate values are at 15 °C and 101.325 kPa.

Model	Connection bore	Flow rate m³/h differential pressure 250 Pa		C_V
		Specific gravity 0.65	Specific gravity 1.53	
GV-A100	10A (Rp 3/8)	8.5	5.6	5.8
	15A (Rp 1/2)	10.9	7.1	7.5
	20A (Rp 3/4)	16.4	10.7	11.2
	25A (Rp 1)	18.6	12.1	12.7
GV-A200	25A (Rp 1)	32.8	21.4	22.4
	32A (Rp 1 1/4)	41.1	26.8	28.1
	40A (Rp 1 1/2)	45.6	29.7	31.2
	50A (Rp 2)	46.4	30.3	31.7
GV-A300	40A (Rp 1 1/2)	65.9	43.0	45.0
	50A (Rp 2)	71.4	46.5	48.8
	65A (Rp 2 1/2)	74.3	48.4	50.8

C_V and flow rate can be read from this table only if the differential pressure is 250 Pa and the gas type is natural gas 13A (specific gravity: 0.65) or propane gas (specific gravity: 1.53).

The following graph shows the relationship between flow rate and differential pressure when natural gas 13A is flowing through a GV-A. The flow rate values are at 15 °C and 101.325 kPa.



This graph makes it possible to find the flow rate for any given differential pressure, for natural gas 13A only.

General Safety Code for Industrial Combustion Furnaces: JIS B 8415: 2008

Outline of revisions to JIS B 8415 (November 2008)

Background

- **Safety methods through risk assessment created as ISO standard and introduced to Japan**
  - ISO 12100 (Basic concepts, general regulations for design)
  - JIS B 9700 (Basic concepts for safety and design of machinery)
  - Industrial Safety and Health Act Revision (Industrial Safety and Health Act)
- **Coordination with Western standards**
  European EN 746, USA NFPA 86
- **Standards supporting new technology**
  Support for high-function industrial furnaces (regenerative burners, etc.)

Position

- **JIS B 9700-1 Machinery Safety: Equipment regulations defined in basic concepts and general rules (Type C)**
  - Positioning in standards systems that also meet ISO standards

Scope

- **Heating equipment using gas or liquid fuel (industrial furnaces, etc.)**
  - Metallurgy, metal processing plants
  - Glass production, ceramics, cement production plants, etc.

Items \ Standard	JIS B 8415 (2008) General safety code for industrial combustion furnaces	Revised Japan Gas Association (2009) Safety technology indices for industrial gas combustion equipment	EN 746-2 (Europe) (1997) Industrial thermoprocessing equipment, Part 2. Safety requirements for combustion and fuel handling system	NFPA 86 (USA) (2007) Standard for Ovens and Furnaces
Control and operation circuits	Intrinsic safety design based on risk assessment (prohibition of software interlocks by general-use PLC)	Aiming for fail-safe and foolproof control and operation circuits (prohibition of construction of combustion safety interlocks using only general-use PLC)	Intrinsic safety design based on risk assessment (EN 292)	Design requirements to minimize fire and explosion risks requires use of PLC with safety protection equipment
Interlocks	Installed in series in holding circuit for safety shutoff valve	Must be directly connected to the main control terminals of the flame monitor relay or flame safeguard control system	Should immediately shut off for safety when interlocks operate.	Interlock setting values must be shown in writing Must be connected directly
Installation requirements for safety shutoff valves (for main burner, pilot burner)	Two installed in series (shutoff within 1 second)	Two installed in series (shutoff within 1 second)	Two installed in series	Two installed in series
Flame monitoring equipment for industrial furnaces that burn continuously for 24 or more hours *1	Self-check at least once a day	Self-check at least once a day	Continuous combustion operation uses a self-checking type or regular checks	Continuous combustion operation uses a self-checking type or regular checks
Individual monitoring of pilot and main burner flames	Individual monitoring	Individual monitoring	Individual monitoring	Individual monitoring
Flame failure response time in flame monitoring equipment	Within 4 seconds (Flame failure safety time: within 5 seconds)	Within 4 seconds *2 (shutoff within 5 seconds)	Within 3 seconds	Within 4 seconds
Installation of overheat protectors inside furnace	Must not make shared use of a temperature controller used for control or the controller's temperature detector.	Must not make shared use of a temperature controller used for control or the controller's temperature detector.	Must not make shared use of a temperature controller used for control or the controller's temperature detector.	Must not make shared use of a temperature controller used for control. Excess temperature limit interlock requires temperature display and manual reset.
False flame operation during start check	Safety shutoff and lockout	Check request at start	-	Check request at start
Pre-operation check of combustion air pressure	Combustion air detector must be checked when burner is started, and if there is an abnormality the burner must not be started.	Combustion air detector must be checked when burner is started, and if there is an abnormality the burner must not be started.	Combustion air detector must be checked when burner is started, and if there is an abnormality the burner must not be started.	-
Prepurge air flow (number of changes of air)	At least 5 times	At least 5 times	Completely 5 times	At least 4 times
Airflow rate at prepurge	At least 50 % of peak	At least 50 % of peak	At least 25 % of peak	At least 25 % of peak
Burner flame amount at ignition	Forced low fire ignition	Low fire ignition/extinction	-	-
Pilot burner ignition timing	Within 10 seconds	Within 10 seconds	Within 5 seconds: 70 kW or less Within 3 seconds: over 70 kW	Within 15 seconds
Main burner ignition timing	Within 5 seconds	Within 5 seconds	Within 5 seconds: 70 kW or less Within 3 seconds: over 70 kW	Within 15 seconds
Direct spark ignition (direct ignition)	350 kW or less	350 kW or less Under 58 kW → within 5 seconds Under 117 kW → within 3 seconds 350 kW or less → within 2 seconds	350 kW or less 70 kW or less: within 5 seconds 70 kW-350 kW: within 3 seconds	-
Installation of seismic detector equipment	Installed as necessary (for seismic intensity 6 or higher)	Installed as necessary (for seismic intensity 6 or higher)	-	-

*1. The flame monitoring equipment refers to a flame detector and a flame safety controller (burner controller). *2. If there are other regulations that specify the flame failure response time, they should be followed.

RX Series Burner Interlock Module/Buner Control Module

The RX Series represents the next generation of combustion safety controllers for burners in industrial furnaces.
The burner interlock module (RX-L) and burner control module (RX-R) combine to provide a variety of interlock monitoring and ignition methods.
It is possible to set the interlock monitoring timing or change the ignition method settings by just selecting the preprogrammed safety functions using the PC loader.
Additionally, for flame detection the RX series supports the advanced UV sensor for continuous operation and UV sensor for batch operation, as well as flame rods.

Features

●Provides combustion safety to meet the specifications of the combustion equipment
- Safety features are tailored to equipment specifications by means of the modular structure and wide range of selectable functions.
- Provides a variety of preinstalled safety functions, reducing the time spent on safety circuit review and validation.
- Functions can be selected and executed via the PC loader, without acquiring or creating special software.

●Conservation of space and wiring
- Side connectors between modules carry safety signals such as shutoff commands, eliminating the need for external wiring or relays, saving wiring and space.

●Maintenance support functions
- An operation log (number of starts, operating time, alarm history, etc.) is kept automatically without the need for any special settings.
- Status can be checked as necessary by connecting the PC loader.
- Various monitor outputs tailored to the structure of the combustion equipment are implemented, aiding in understanding the maintenance/troubleshooting situation and in determining the cause of a problem.

  Product status checks: 7-segment LED display
  Front panel indicators: Open collector monitor output
  Remote status monitoring: RS-485 (standard feature)

Buner Interlock Module (RX-L80/90)

The roles of the burner interlock module in the combustion safety architecture are the handling of burner interlock monitoring/processing and of the purge function. A maximum of 32 burner control modules can be combined to easily support multiple burner equipment. This module is also equipped with the ability to connect through RS-485 or Ethernet (only RX-L90) communications, making remote monitoring possible.

● 16 inputs
Individual OFF delay settings (to filter out chattering)
Function input (for batch startup, etc.)
Flame monitoring changeover for 760 °C or higher

● Purge functions
Prepurge from 5 s to 60 min (32 selectable patterns)
Postpurge setting for any time length
Postpurge stop by temperature contacts
Blower output
Motor control

● Displays
Status display (7-segment LED)
Status display (LED)

● Monitor output
22 open collector outputs (freely assignable)
RS-485 communication output (standard feature)

● Ethernet communication (only RX-L90)

Buner Control Module (RX-R40/20)

The roles of the burner control module in the combustion safety architecture are the ignition, flame monitoring, and safety shutoff functions. This unit can be combined with the burner interlock module to support a variety of combustion equipment.

● Ignition functions (for the 3 models below)
- Models with selectable ignition sequences (RX-R40/20)
  Interrupted pilot, intermittent or continuous pilot, direct ignition, flame relay function (selection by PC loader)
- Independent supervision model (RX-44)
  For independent supervision of the pilot and main burner. the RX-R44 and RX-R40 are used together.
- Independent supervision and external relay drive model (RX-46)
  For control of high-frequency loads using time proportional control, ON-OFF control, etc.
- Direct ignition and external relay drive model (RX-R22)
  For control of high-frequency loads using the direct ignition method

● Interlock input
4 inputs

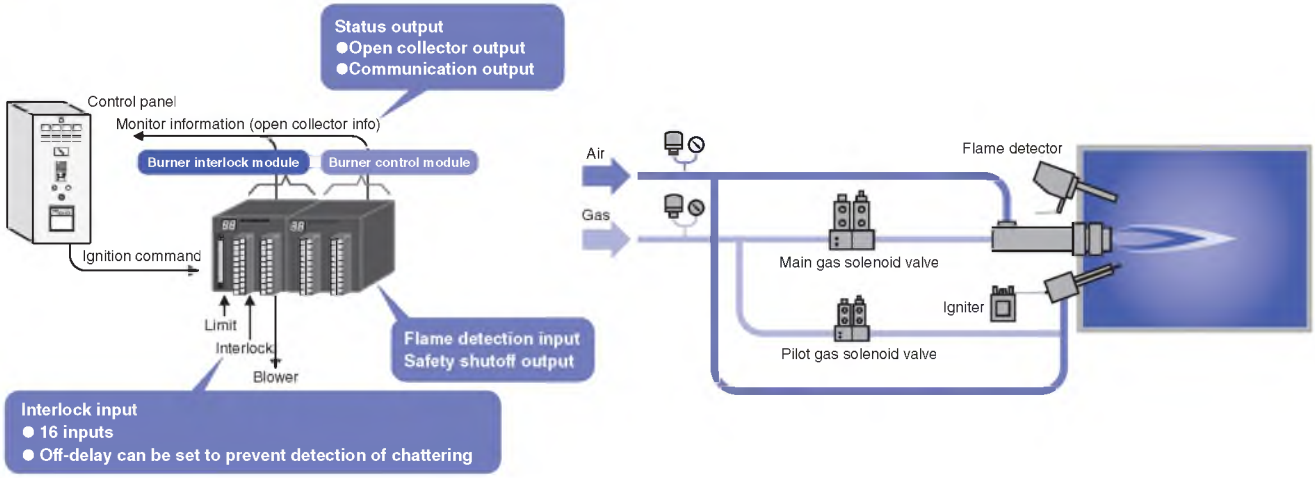
● Main unit displays
Status display (7-segment LED)
Status display (LED)

● Monitor output
11 open collector outputs (freely assignable)

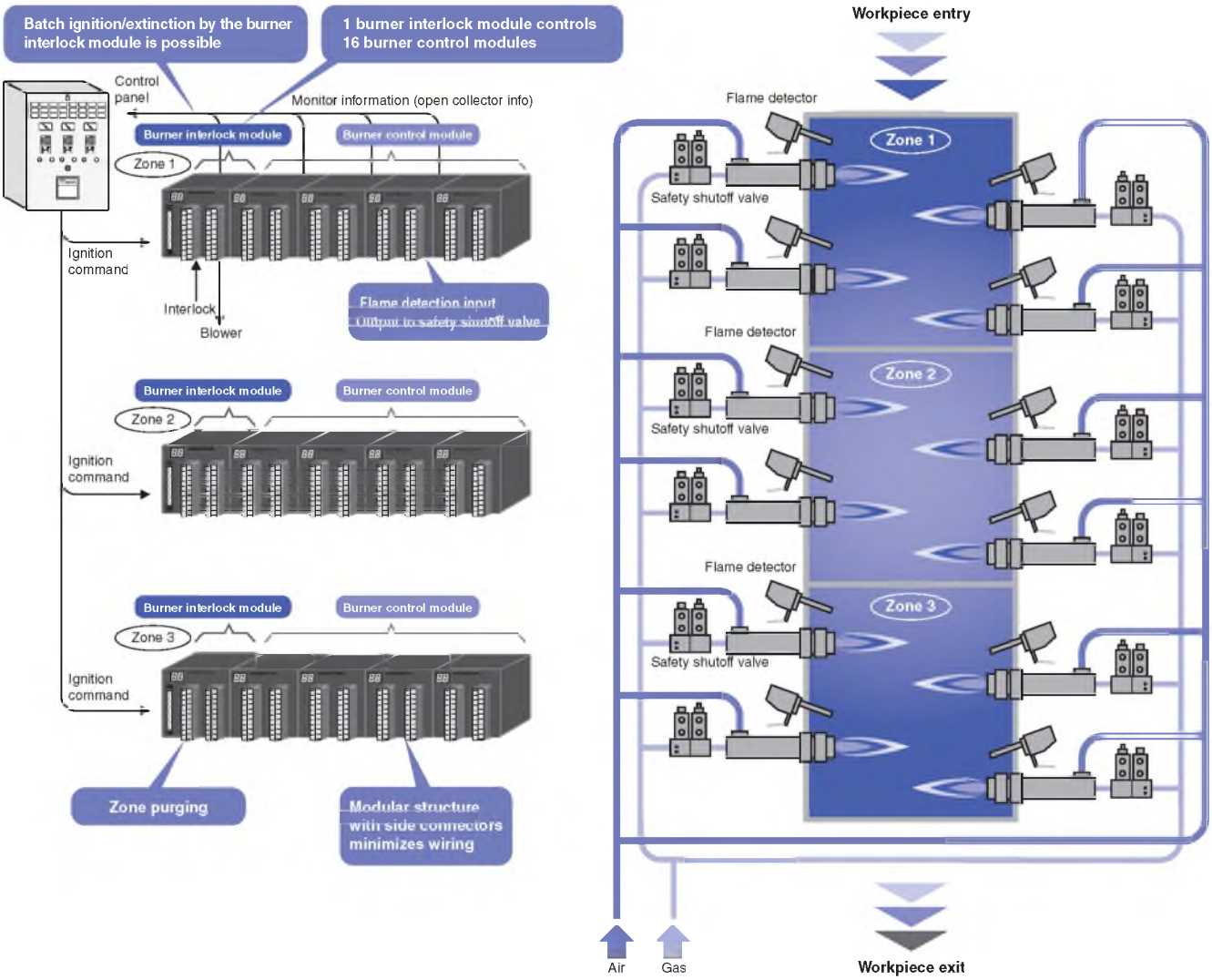
RX Series Burner Interlock Module/Buner Control Module

Sample configurations of single and multiburner systems

Single burner system



Multiburner system



RX-L80/90 Burner Interlock Module

The RX-L80, in combination with the burner control module (RX-R), executes the burner interlock monitoring and prepurge functions.
There are 16 inputs for burner interlock.
In addition to interlock input, this module can handle batch starting of multiple burners or batch ignition of multiple pilot burners.
Status information such as the state of interlocks, alarms, completed purges, etc., can be assigned to 22 transistor outputs and utilized by outputting to control panel indicator lamps or to a PLC for status monitoring.
These functions can be selected easily using the computer loader, without the use of special programs.
This product is equipped with RS-485 or Ethernet (only RX-L90) for the communications function.
Remote monitoring is possible with this device.

Specifications

Operating environment	Ambient temperature		-20 to +55 °C
	Storage temperature		-20 to +70 °C
	Ambient humidity		10 to 90 % RH (without condensation)
	Vibration		0 to 3.2 m/s² (10 to 150 Hz for 2 h each in x, y, and z directions)
	Shock		0 to 9.8 m/s²
Electrical specifications	Rated voltage		24 Vdc
	Allowable supply voltage		21.6 to 26.4 Vdc
	Power consumption		9 W max.
	Dielectric strength		• DC circuit terminals 500 Vac for 1 min · Between 24 Vdc power terminals and input function terminals · Between 24 Vdc power terminals and monitor output connector · Between 24 Vdc power terminals and RX-R/RX-L control signal terminals • AC circuit terminals 1500 Vac for 1 min or 1800 Vac for 1 s · Between power terminals H & G and relay outputs H & G on the one hand, and DC circuit terminals & connectors · Between blower output terminals and DC circuit terminals & connectors · Between control motor output terminals and DC circuit terminals & connectors
	Insulation resistance		At least 50 MΩ with a 500 Vdc megger · Between power supply terminals H & G plus relay outputs H & G on the one hand, and DC terminals & connectors · Between blower output terminals and DC circuit terminals & connectors · Between control motor output terminals and DC terminals & connectors
	Operating life		7 years of continuous use, 10 years of use 8 hours per day, or 100,000 relay contact operations (at 25 °C)
	Startup input		Contact input (24 Vdc, 10 mA) *Usable with devices having contact resistance of 250 Ω or less
	Reset input		Contact input (24 Vdc, 20 mA) *Usable with devices having contact resistance of 250 Ω or less
	Interlock input		Contact input (24 Vdc, 20 mA) *Usable with devices having contact resistance of 250 Ω or less
	Relay output		400 VA (with relay contact welding detection) *1
	Blower output (no-voltage output)		350 VA
	Control motor output (no-voltageoutput)		100 VA
	Monitor outputs (transistor outputs)		22 (0.1 A max. each, 1 A max./module, 30 Vdc max.)
Communication specifications	RS-485 communi-cations	Communication protocol	CPL
		Signal level	RS-485-compliant
		Communication/ synchronization type	Half-duplex, start/stop synchronization
		Maximum cable length	500 m
		Terminating resistor	External (150 Ω, 1/2 W min.)
		Transmission speed	38400 bps max.
	Ethernet comm.	Protocol	MODBUS/TCP
	RX-R control signal	Communication protocol	RX-R control protocol
		Maximum cable length	50 m
	RX-L control protocol	Communication protocol	RX-L control protocol
		Maximum cable length	500 m
General specifications	Mass		Approx. 550 g
	Color		Black
	Structure		Two-piece construction with a separable base and main unit
	Certifications		EN 298 *2 (pending)
Cable specifications	Reset		Max. 10 m
	Interlock contact input		Max. 200 m
	Signal line type/length		See table

*1. Cannot be used for dry output. For relay output, be sure to connect an AC power load (10 VA min.)
*2. Safety and control devices for gas burners and gas burning appliances.

Table 1

Signal	Cable type	Max. cable length
RX-R control	0.2 to 1.5 mm² (AWG 28-14) *1	50 m
RX-L control		500 m
Reset	0.3 to 1.25 mm² (AWG 22-18) *2	10 m
Start		200 m
IN1 to IN16		
RS-485 comm.	0.2 to 1.5 mm² (AWG 28-14) *3	500 m
Blower output	JIS C 3306, 0.75 mm² (dia. 0.18, 30 strands min.)	—
Motor output		

*1. Recommended: JCS4364 cable for light electrical instruments (twisted shielded cable for instruments), 8 cores (4 pairs)
*2. Max. wire dia. 2 mm. Recommended crimp terminal: V1.25-3 (RAV1.25-3), made by JST Mfg. Co., Ltd.
*3. Recommended: JCS4364 cable for light electrical instruments (twisted shielded cable for instruments), 4 cores (2 pairs)

Model Selection

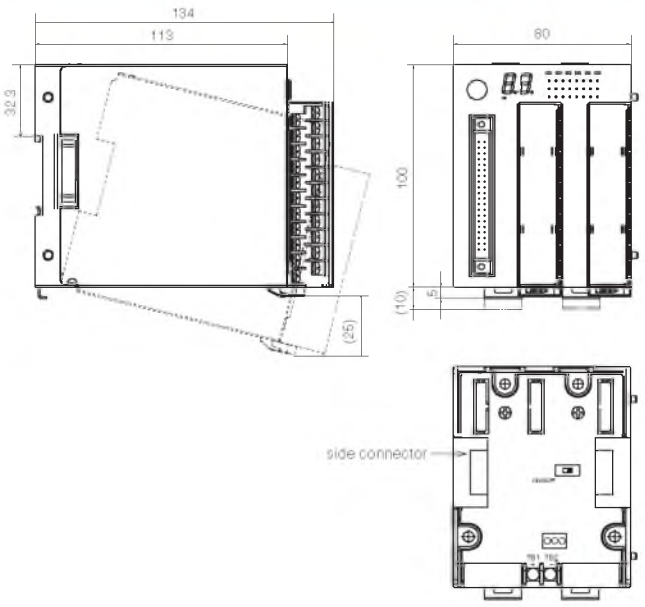
Item	Model No.	Description
Buner interlock module	RX-L80A1010010	RS-485 communications
	RX-L80A101001D	RS-485 + inspection certificate
	RX-L90A1010010	RS-485 and Ethernet
	RX-L90A101001D	RS-485 and Ethernet + inspection certificate

Optional Parts (sold separately)

Item	Model/part No.	Description
Transistor output connector	81446847-001	FCN361J040-AU jack (1, solder type), and FCN-360C040-B cover (1), both made by Fujitsu Components
RX-R/RX-L control signal connector	81447402-001	BL3.5/7SNSW (part No. 161019) made by Weidmuller (qty. 2)
Smart Loader Package	SLP-RXMJ70	For maintenance (with cables)
	SLP-RXMJ71	For maintenance (without cables)
	SLP-RXMJ70	For function selection (with cables)
	SLP-RXMJ71	For function selection (without cables)
Surge absorber	83968019-001	

Dimensions

(Unit: mm)



RX-R40/20 Burner Control Module

The RX-R40/20, in combination with the RX-L burner interlock module and flame detector, handles ignition operations and flame monitoring. If the burner flame goes out, this module executes shutoff safely.
This product supports a variety of flame detectors, including the Advanced UV Sensor (for continuous operation) as well as flame rods.
There are 11 open connector outputs to be used for monitoring, which can be assigned to handle alarms such as ignition failure or flame failure, in addition to the status of the load.
These monitor outputs can be output to the control panel so that the status output and situation can be checked onsite during maintenance or when a sudden problem arises.
These functions can be selected easily using the computer loader, without the use of special programs.

Specifications

Operation modes	Continuous operation (RX-R40 series), batch operation (RX-R20 series)			
Compatible flame detectors	AUD100 series, AUD300/500			
Models	Models with selectable ignition sequences (RX-R40/20) (* Interrupted pilot, intermittent or continuous pilot, direct ignition, flame relay function) Independent supervision model (RX-R44) Independent supervision, external relay drive model (RX-R46) Direct ignition, external relay drive model (RX-R22)			
Sequence timing	Pilot ignition time	Pilot only time	Main ignition time	Flame response time
	4.5 ± 0.5 s, 9 ± 1 s* *Select using the SLP-RX	5 ± 1 s	4.5 ± 0.5 s	3 ± 1 s
Flame voltage range (at standard temp. and humidity and rated [illegible])	With flame: 1.5 to 4.0 Vdc Without flame: 0.0 to 0.6 Vdc			
Recommended flame [illegible]	Stable 2.0 Vdc or more			
Flame voltage output	0 to 5 Vdc			
Environmental specifications	Allowable ambient temperature	-20 to +55 °C		
	Storage temperature	-20 to +70 °C		
	Allowable humidity	10 to 90 % RH (without condensation)		
	Vibration	0 to 3.2 m/s² (10 to 150 Hz for 2 h each in x, y, and z directions)		
	Shock	0 to 9.8 m/s²		
Electrical specifications	Rated voltage	24 Vdc		
	Allowable supply voltage	21.6 to 26.4 Vdc		
	Load power: Rated voltage	100/200/220 Vac (depending on the model No.)		
	Load power: Allowable voltage	-15 to +10 % of the rated voltage		
	Power consumption	8 W max.		
	Dielectric strength	• DC terminals 500 Vac for 1 min, or 600 Vac for 1 s · Between the 24 Vdc power terminals and the input function terminals · Between the 24 Vdc power terminals and the monitor output connector · Between the 24 Vdc power terminals and the RX-R control signal terminals • AC terminals 1500 Vac for 1 min, or 1800 Vac for 1 s · Between relay outputs and power terminals H and G on the one hand, and DC terminals and connectors on the other		
	Insulation resistance	50 MΩ min. with a 500 Vdc megger ·Between relay outputs and power terminals H and G on the one hand, and DC terminals and connectors on the other		
	Operating life	7 years of continuous use or 100 000 relay contact operations (at 25 °C)		
	Startup input	Contact input (24 Vdc, 10 mA) *Usable with devices having contact resistance of 250 Ω or less.		
	Reset input	Contact input (24 Vdc, 20 mA) *Usable with devices having contact resistance of 250 Ω or less.		
	Interlock input	Contact input (24 Vdc, 20 mA) *Usable with devices having contact resistance of 250 Ω or less.		
	Contact capacity	Ignition transformer: 300 VA., Pilot valve: 200 VA., Main valve: 200 VA		
	Monitor outputs	11 (each 0.1 A max., 0.8 A max./module., 30 Vdc max.)		
General specifications	Mass	Approx. 600 g		
	Color	Black		
	Structure	Two-piece construction with a separable base and main unit		
	Standards compliance	EN 298 (pending)*		
Wire and cable specifications	Flame detector	• AUD100 series, AUD 300C/500C Signal wires F, G: 600 V, indoor PVC insulation (IV wire, JIS C3307), 2 mm², max. length 200 m • Flame rod Signal wires F, G: 5C-2V or 7C-2V high-frequency coaxial cable		
	Reset	Max. cable length: 10 m.		
	Interlock contact input	Max. cable length: 200 m.		
	Signal line type/length	Refer to table 1		

* EN 298: Automatic gas burner control systems for gas burners and gas burning appliances with or without fans.

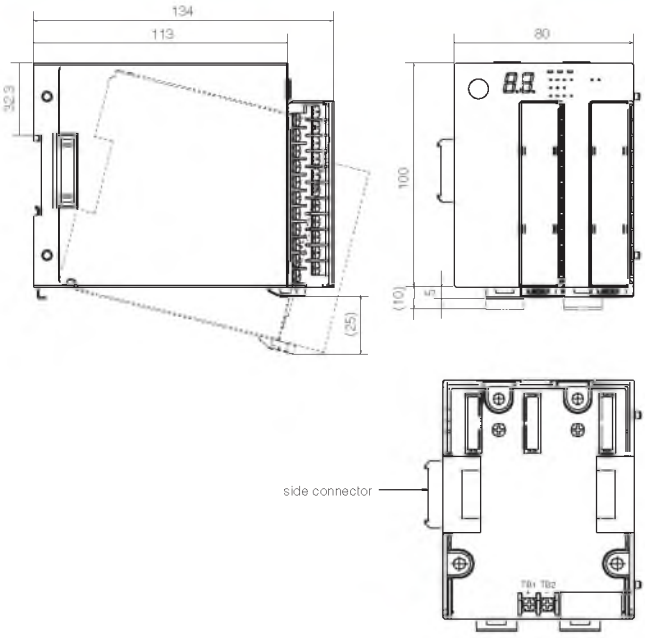
Table 1

Signal	Cable type	Max. cable length
RX-R control signal	0.2 to 1.5 mm² (28-14 AWG)*	50 m
Reset signal	0.3 to 1.25 mm² (22-16 AWG)	10 m
Start signal		200 m
IN1 to IN4		

* Recommended: JCS4364 cable for light electrical instruments (twisted shielded instrument cable), 8 cores (4 pairs)

Dimensions

(Unit: mm)



RX-R40/20 Burner Control Module

Overview of settings

Setting		No.	Description
Model type settings	Combustion mode selection	1-1	Selects the combustion mode.
	RX-R purge conditions	1-2	Toggles air pressure switch operation check ON/OFF.
	Pilot ignition time	1-3	Selects a pilot ignition time.
	(Not used)	1-4	—
	760 °C mode setting.	1-5	Selects whether or not 760 °C mode is used.*3
Control settings	Startup conditions	2-1	Selects startup conditions for RX-R.
	Reset conditions	2-2	Selects conditions for canceling lockout.
	Standby time after recovery from lockout	2-3	Sets the standby time before ignition when restarting a locked-out RX-R. The process will not proceed during standby, even if a startup signal is received.
	Startup delay time	2-4	Sets a delay time for beginning the start check.
	Air valve OFF delay time for combustion	2-5	Sets the air valve output OFF delay time for combustion*1
	Timeout time for air pressure OFF confirmation	2-6	Sets a timeout time if there is a failure to confirm that the air pressure switch input is OFF during the start check.*2
Input settings	Input functions	3-1	Selects the input functions of IN1 to IN4.
	Interlock OFF delay	3-2	Selects the OFF delay time for IN1 to IN4.
RX-R control settings	RX-R station address	4-1	Sets the RX-R control communication station address.
Monitor output settings	Flicker setting	5-1	Selects a flicker display for an interlocked output (ON/OFF alternating output).
	Monitor output settings	5-2	Selects signals for assignment to monitor outputs 1 through 11 (M-1 to M-11).
	Monitor output logic	5-3	Sets monitor output logic (direct, reverse), excluding alarm output (MS-AL-P, MS-AL-N).
Display settings	Warning display settings	6-1	Selects a warning display method for the 7-segment LED on front of the module.

*1. Valid with the following settings.
· RX-R purge conditions (1-2) = "ON"
· In Monitor output settings (5-2), monitor outputs M-9 to M-11 = "AV-DRV"
*2. Valid when RX-R purge conditions (1-2) = "ON."
*3. 760 °C mode is disabled for the RX-R20 series regardless of settings.

Model Selection

●Models with selectable ignition sequence RX-R40/20

Model No.	Flame detector	Flame response	Load power
RX-R40C013100	AUD300C/500C	3 ± 1 s *1	100 Vac
RX-R40C013200			200 Vac
RX-R40C013600			220 Vac
RX-R20C013100	AUD100/110 (AUD15)	3 ± 1 s *1	100 Vac
RX-R20C013200			200 Vac
RX-R40B013100	Flame rod	3 ± 1 s *2	100 Vac
RX-R40B013200			200 Vac
RX-R20B013100	Flame rod	3 ± 1 s *2	100 Vac
RX-R20B013200			200 Vac

*1. At a flame voltage of 3 V.
*2. At a flame voltage of 2 V.
Time-limited pilot/overlapping pilot/direct ignition etc. can be selected with the loader.
Suffix "D": inspection certificate included.
Example: RX-R40C01310D

●Individual monitoring model RX-R44

Model No.	Flame detector	Flame response	Load power
RX-R44C013100	AUD300C/500C	3 ± 1 s *1	100 Vac
RX-R44C013200			200 Vac
RX-R44C013600			220 Vac
RX-R44B013100	Flame rod	3 ± 1 s *2	100 Vac
RX-R44B013200			200 Vac

*1. At a flame voltage of 3 V.
*2. At a flame voltage of 2 V.
Suffix "D": inspection certificate included.
Example: RX-R44C01310D

●Individual monitoring, external relay drive model RX-R46

Model No.	Flame detector	Flame response	Load power
RX-R46C013100	AUD300C/500C	3 ± 1 s*	100 Vac
RX-R46C013200			200 Vac
RX-R46C013600			220 Vac

* At a flame voltage of 3 V.
For time proportioning control or ON-OFF control of high-frequency loads, this model was designed so that the load can be connected to the outside of the RX-R.
Example: RX-R46C01310D

●Direct ignition, external relay drive model RX-R22

Model No.	Flame detector	Flame response	Load power
RX-R22C013100	AUD100/110 (AUD15)	3 ± 1 s*	100 Vac
RX-R22C013200			200 Vac

* At a flame voltage of 3 V.
Suffix "D": inspection certificate included.
Example: RX-R22C01310D

Optional Parts (sold separately)

Item	Model no./part no.	Description
RX-R/RX-L control signal connector	81447402-001	BL3.5/7SNSW (2) (Part no.: 161019) made by Weidmuller
Smart Loader Package	SLP-RXMJ70	For maintenance (with cables)
	SLP-RXMJ71	For maintenance (without cables)
	SLP-RXEJ70	For function selection (with cables)
	SLP-RXEJ71	For function selection (without cables)
Surge absorber	83968019-001	

Combining and wiring the RX-L80/90 and RX-R40/20

1.The method of combining the RX-L80/90 and RX-R40/20 depends upon how the pilot burner and main burner operate.
2.Configuration according to operation method, and wiring of terminal block A

•Interrupted pilot
- For continuous operation equipment (applicable to batch operation as well)

RX-L80 /90	RX-R40

- For batch operation equipment

RX-L80 /90	RX-R20

•Intermittent pilot, continuous pilot
- For continuous operation equipment (applicable to batch operation as well)

RX-L80 /90	RX-R44	RX-R40

- For a device with continuous operation and external relay drive (applicable to batch operation as well)

RX-L80 /90	RX-R46	RX-R40

•Direct ignition
- For batch operation equipment with direct ignition and external relay drive

RX-L80 /90	RX-R22

AUD300C1000 Advanced Ultraviolet Flame Detector

The AUD300C1000 Advanced Ultraviolet Flame Detector is designed to detect ultraviolet radiation from an oil or gas burner flame, for use with both batch and continuous operation.
The AUD300C is used in combination with a dedicated burner controller. By means of the built-in shutter, any malfunction of the UV flame detector or burner controller is detected by the continuous self-checking (Dynamic Self-Check) function, ensuring highly reliable combustion safety control.

Specifications

Applicable types of flames *1	City gas, Natural gas, Propane gas, Kerosene, Heavy oil, Coke oven gas, Hydrogen, Chlorine, Ammonia, Naphtha, Ethylene, etc.
Combined burner controller	RX-R40, RX-R44, RX-R46, AUR450C, AUR300C, AUR350C
Shutter voltage	Approx. 24 Vdc (supplied from Burner Controller)
Self-checking cycle	Approx. 75 cycles/ min.
Insulation resistance	Between flange unit mounting conduit and F-terminal (or blue lead wire), between flange unit mounting conduit and G-terminal (or yellow lead wire), between flange unit mounting conduit and S1-terminal (or white lead wire), between flange unit mounting conduit and S2-terminal (or white lead wire): 50 MΩ min. by 500 Vdc megger at the above each location. (However, the tube unit must be removed.)
Dielectric strength	Between flange unit mounting conduit and F-terminal (or blue lead wire), between flange unit mounting conduit and G-terminal (or yellow lead wire), between flange unit mounting conduit and S1-terminal (or white lead wire), between flange unit mounting conduit and S2-terminal (or white lead wire): 1500 Vac for 1 min or 1800 Vac for 1 sec at the above each location. (However, the tube unit must be removed.)
During flame detection (while the shutter is opening and closing)	-20 to +120 °C (However, when no flame is detected (shutter continuously open), the maximum ambient operating temperature is 100 °C.)
Ambient storage temperature	-20 to +70 °C
Ambient humidity	90 %RH at 40 °C max. (without condensation)
Vibration resistance	4.9 m/s² max., 10 to 55 Hz for 2 hours each in X, Y and Z directions
Impact resistance	300 m/s² in vertical and horizontal directions
Pressure resistance for flange	350 kPa
Protection	IP66 (except a conduit tube connection port)
Mounting posture	-45 to +90° (in vertical direction)
Mounting	G1 (at the mounting section for sighting pipe)
Lead wires	AWG18 heat resistant silicone cables, with 2.4 m color lead wires
Electric wire pipe mounting conduit	1/2-14NPSM
Flame signal wire requirements and extension distance	Requirements: 600 V vinyl insulation wires, IV wires with 2.0 mm², Max. 200 m
Materials	Main body: Heat resistant resin Mounting section: Aluminum
Main body color	Purple (equivalent to DIC257)
Weight	Approx. 630 g
Expiration date of tube unit and shutter unit	3 years
Standards compliance *2	CE, UL, CSA

*1 For applications using coke oven gas, hydrogen, chlorine, ammonia, naphtha, ethylene, etc., in which the burner structure may impose restrictions on the mounting of the flame detector, it is necessary to check that flame monitoring is reliable.
*2 Standards approvals are valid only for a combination of AUR450C, AUD300C, and Q241A104

● For further details, please refer to specifications sheet No. CP-SS-1806E.

Model Selection

Item	Model No.	Lens type	Additional features	Special treatment
Advanced ultraviolet flame detector	AUD300C1000	Standard	None	None
	AUD300C100D		Inspection certificate provided	None
	AUD300C100T		None	Tropicalization
	AUD300C100DT		Inspection certificate provided	Tropicalization
	AUD300C1100	Condenser	None	None
	AUD300C110D		Inspection certificate provided	None
	AUD300C110T		None	Tropicalization
	AUD300C110DT		Inspection certificate provided	Tropicalization

Optional Parts (sold separately)

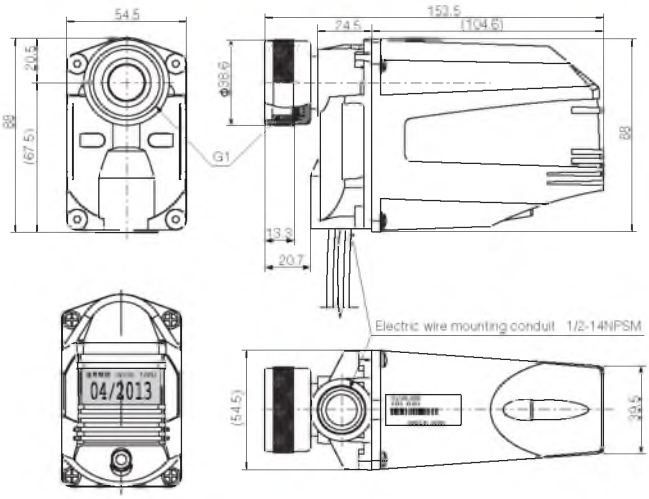
Item	Model No.
Bushing 1×¾	81409780-001
Packing nut	81409482-001

Maintenance Parts (sold separately)

Item		Model No.
AUD Maintenance Kit (includes shutter and tube units)	No inspection certificate	AUD60A1000
	Inspection certificate included	AUD60A100D

Dimensions

(Unit: mm)



◆ AUD Maintenance Kit ◆

〈Model No.:AUD60A1000〉

The AUD maintenance kit includes the assembled tube unit and shutter unit, as well as consumables such as the main unit flange and O-ring for the cover, expiration label, etc.

※ 1:Expiration date label

AUD500C11000 Advanced Ultraviolet Flame Detector

The AUD500C Explosion-Proof Advanced Ultraviolet Flame Detector (hereafter referred to as the AUD500C) is designed to detect ultraviolet radiation from an oil or gas burner flame, for use with both batch and continuous operation.
The AUD500C is used in combination with a dedicated burner controller. By means of the built-in shutter, any malfunction of the UV flame detector or burner controller is detected by the continuous self-checking (Dynamic Self-Check) function, ensuring highly reliable combustion safety control.

Specifications

Explosion-proof housing	Ex d IIC T4
Explosion-protection certified	Product qualified by Technology Institution of Industrial Safety (TIIS) and National Supervision and Inspection Center for Explosion Protection and Safety Instrumentation (NEPSI).
Applicable types of flame*1	City gas, natural gas, propane gas, kerosene, heavy oil, coke oven gas, hydrogen, chlorine, ammonia. naphtha, ethylene, etc.
Shutter voltage	Approx. 24 Vdc (supplied from Burner Controller)
Self-checking cycle	Approx. 75 cycles / min
insulation resistance	Between flange mounting part and F-terminal (or blue lead wire), between flange mounting part and G-terminal (or yellow lead wire), between flange mounting part and S1-terminal (or white lead wire), between flange mounting part and S2-terminal (or white lead wire): 50 MΩ min. by 500 Vdc megger at each of the above locations. (However, the tube unit must be removed)
Dielectric strength	Between flange mounting part and F-terminal (or blue lead wire), between flange mounting part and G-terminal (or yellow lead wire), between flange mounting part and S1-terminal (or white lead wire), between flange mounting part and S2-terminal (or white lead wire): 1500 Vac for 1 min or 1800 Vac for 1 s at each of the above locations. (However, the tube unit must be removed)
Ambient temperature	-20 to +60 °C
Ambient storage temperature	-20 to +70 °C
Ambient storage humidity	90 % RH at 40 °C max. (without condensation)
Vibration resistance	4.9 m/s² max., 10 to 55 Hz for 2 hours each in X, Y and Z directions
Pressure resistance for mounting part	690 kPa
Protection	IP67
Mounting posture	-45 to +90° (in vertical direction)
Mounting (on the monitoring pipe)	Flange: Parallel pipe thread G2-1/4, Adapter: Taper pipe thread R1
Accessory cable length	AWG18 heat-resistant silicone cables (4 cores), 3 or 10 m (depending on the model number)
Flame signal wire requirements and extension distance	IV wires with 2.0 mm² and max. 200 m in length
Materials	Aluminum
Color	Purple (equivalent to DIC257)
Mass	Approx. 2.5 kg
Expiration date of tube unit and shutter unit	3 years

*1. For applications using coke oven gas, hydrogen, chlorine, ammonia. naphtha, ethylene, etc., in which the burner structure may impose restrictions on the mounting of the flame detector, it is necessary to check that flame monitoring is reliable.

● For further details, please refer to specifications sheet No. CP-SS-1873E.

Maintenance parts (sold separately)

Item	Model No.
AUD Maintenance Kit (includes shutter and tube units)	AUD60A1010

◆ AUD Maintenance Kit ◆

〈Model No.:AUD60A1010〉

The AUD60A1010 maintenance kit includes the assembled shutter unit and tube unit, as well as consumables such as the AUD500C main unit flange and tight-fitting cover O-ring, expiration label, etc.

※ 1:Expiration date label

Example of an attached label

Model Selection

Item	Accessory cable length	Lens type	Model No
Advanced ultraviolet flame detector	3 m	Standard	AUD500C1100__
	10 m		AUD500C1110__
	3 m	Condenser	AUD500C1101__
	10 m		AUD500C1111__

Replace the blank (_ _) in the mobel number with one of the for choices below.
0: Standard product
D: Inspection certificate included
OT: Tropicalization
DT: Inspection certificate + tropicalization
Y: Traceability certificate included
E: Heavy duty coating + inspection certificate

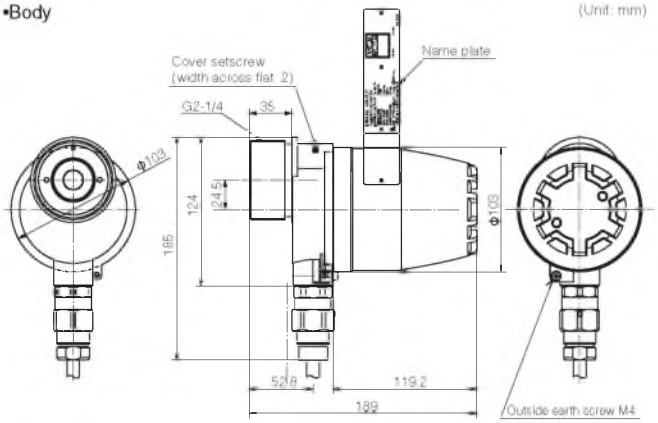
Optional parts (sold separately)

Note: This item is necessary.

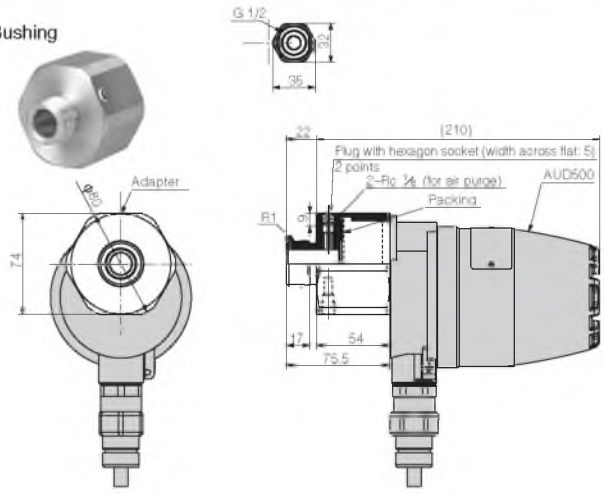
Item	Model No.
Adapter (G2-¼→ R1)	81441151-001

Dimensions

•Body (Unit: mm)



•Bushing



AUD100/110 Advanced Ultraviolet Flame Detector Socket for the AUD15 Tube Unit

The AUD100/110 is a dedicated socket for the AUD15 tube unit, and is designed for monitoring batch operation oil or gas burner combustion.
Two models, the AUD100 lead-wire model and the AUD110 terminal block model, are available to meet wiring or installation requirements.

Specifications

Item	Description	
Applicable type of fuel *1	City gas, natural gas, propane gas, kerosene, heavy oil, coke oven gas, hydrogen, chlorine, ammonia. naphtha, ethylene, etc.	
Mass	AUD100C	AUD110C
	Approx. 120 g (with the AUD15: approx. 140 g)	Approx. 120 g (with the AUD15: approx. 140 g)
Materials	Aluminum	Socket: Aluminum Terminal block: Heat-resistant resin (PBT + GF30) (black)
Insulation resistance	50 MΩ min by 500 Vdc megger (between each lead wire and the metal part of socket when the AUD15 is removed)	50 MΩ min by 500 Vdc megger (between each of terminals F and G and the metal part of socket when the AUD15 is removed)
Dielectric strength	1500 Vac for 1 min or 1800 Vac for 1 s (between each lead wire and the metal part of socket when the AUD15 is removed)	1500 Vac for 1 min or 1800 Vac for 1 s (between each of terminals F and G and the metal part of socket when the AUD15 is removed)
Ambient temperature	-20 to +120 °C	
Ambient storage temperature	-20 to +70 °C	
Ambient humidity	90 % RH at 40 °C (without condensation)	
Allowable pressure	35 kPa	
Vibration resistance	5 m/s² max. (10 to 60 Hz for 2 hours each in X, Y and Z directions)	
Protection	IP65 (JIS C 0920/IEC 60529) with pipes and wires connected	
Mounting nut	G1 (R1 and 1-11BSP are connectable)	
Lead wires	AWG #18 (approx. 1.2 mm²) flame retardant cross-linked polyethylene insulated cable, approx. 1800 mm long (blue and white) (only AUD100)	
Conduit	G1/2 (1/2-14BSPP is connectable)	
Flame signal wire	Standard: 2.0 mm², 600 Vac cable with PVC insulation ("IV cable"). Max. length: approx. 200 m	

*1. For applications using coke oven gas, hydrogen, chlorine, ammonia. naphtha, ethylene, etc., in which the burner structure may impose restrictions on the mounting of the flame detector, it is necessary to check that flame monitoring is reliable.

● For further details, please refer to specifications sheet No. CP-SS-1877E.

Model Selection

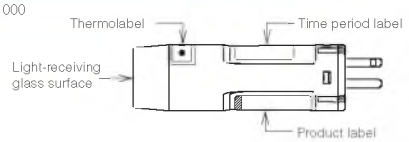
Item	Model No.
Lead-wire model without the AUD15	AUD100C100_
Lead-wire model with the AUD15	AUD100C1000-A15
Terminal block model without the AUD15	AUD110C100_
Terminal block model with the AUD15	AUD110C1000-A15

Replace the blank (_) in the mobel number with one of the for choices below.
0 : Standard
D : Inspection certificate
T*: Tropicalization treatment
B*: Inspection certificate + tropicalization treatment
* Only AUD110 Series

Optional parts (sold separately)

Item	Model No.
Tube unit (ultraviolet photoelectric tube) *1	AUD15C1000
Seal adapter *2	81403159
Analog flame meter	FSP136A100
Flame simulator	FSP300C100
Lens unit (focal length: 70 mm)	FSP100L70000
Lens unit (focal length: 70 mm) with inspection certificate	FSP100L7000D
Lens unit (focal length: 30 mm)	FSP100L30000
Lens unit (focal length: 30 mm) with inspection certificate	FSP100L3000D

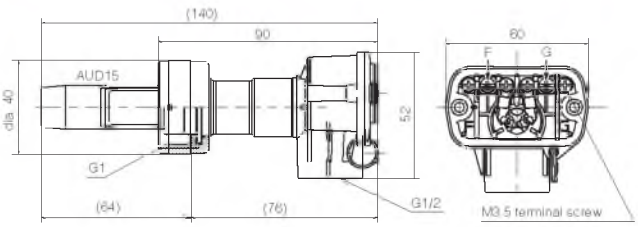
*1. AUD15C1000



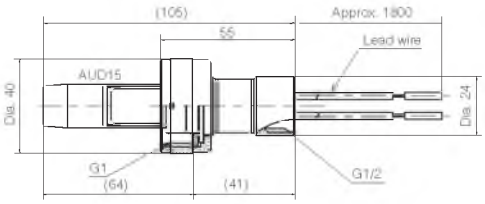
*2. Seal adapter (model No. 81403159)
Refer to the following dimensions

Dimensions

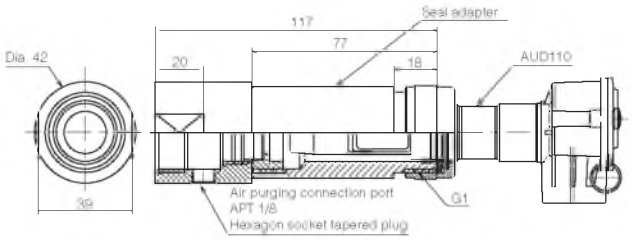
●AUD110C100_ with the AUD15 (Unit: mm)



●AUD100C100_ with the AUD15



●Seal adapter (model No.: 81403159)



AFD100A/B Visible Light Frame Detector

The AFD100A/B visible light flame detector is a batch operation flame sensor that detects visible light from an oil combustion burner flame.
There are two different types for different burner constructions, depending on whether the light is received from the front or side.

Be sure to combine this product with the burner controller appropriate for the AFD100.

C554A compatible replacement adapter

Specifications

Model	Direction light received	Type	Compatible Burner controller
AFD100A0700	Front	Top view	R4424 or R4440H series product that supports AFD
AFD100B0700	Side	Side view	
Illuminance-current characteristics [Conditions: VR = 5 V, at 25 °C]	At an illuminance of 10 lx (color temperature of 2,856 K), 30 µA or more. (Measurement conditions: supply voltage: 5 V, load resistance: 20 kΩ, room temperature/normal humidity)		
Dark characteristics	In total darkness (0 lx), 24 µA or lower. (Measurement conditions: supply voltage: 5 V, load resistance: 20 kΩ, room temperature/normal humidity)		
Dielectric strength	Commercial frequency 500 Vac, applied for 1 minute with no abnormalities (Between lead wires and flange, at room temperature and normal humidity)		
Insulation resistance	With a 500 Vdc megger, 50 MΩ or more. (Between lead wires and flange, at room temperature and normal humidity)		
Allowable ambient temperature	-20 to +60 °C		
Storage temperature	-20 to +70 °C		
Allowable ambient humidity	40 °C, 90 % RH or less (without condensation)		
Vibration resistance	Double amplitude 4.9 m/s², 10-55 Hz, 2 hours each in X, Y, Z directions		
Cable	Heat-resistant flat plastic cable, 0.75 mm² Black (terminal F), white (terminal G)		
Material	Main unit/flange: nylon 6 (blue)		
Mounting	Flange		
Mass	Approx. 25 g		

Model Selection

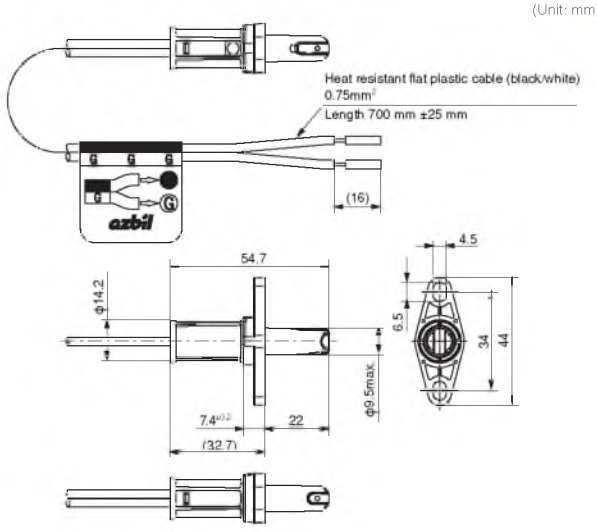
Item	Type	Model No.
Visible light flame detector	Top view	AFD100A0700
	Side view	AFD100B0700

Optional Parts (sold separately)

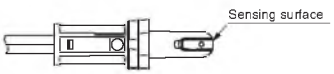
Item	Model No.
C554A1299-1 compatible replacement adapter	81447108-001
C554A06S1-1 compatible replacement adapter	81447108-002

Dimensions

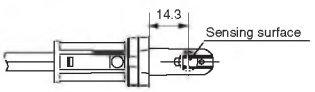
(Unit: mm)



●AFD100A0700 (top view type)



●AFD100B0700 (side view type)



AFD110A Visible Light Flame Detecter

The AFD110A visible light flame detector is a batch operation flame sensor that detects visible light from an oil combustion burner flame.

This product must be combined with an AFD-compatible Burner controller.

Specifications

Illuminance-current characteristics (Conditions: VR = 5 V, at 25 °C)	At an illuminance of 10 lx (color temperature of 2,856 K), 30 µA or more. (Measurement conditions: Supply voltage: 5 V, load resistance: 20 kΩ, room temperature/normal humidity)
Dark characteristics	In total darkness (0 lx), 24 µA or lower. (Measurement conditions: Supply voltage: 5 V, load resistance: 20 kΩ, room temperature/normal humidity)
Dielectric strength	Commercial frequency 500 Vac, applied for 1 minute with no abnormalities. (Between lead wires and flange, at room temperature and normal humidity)
Insulation resistance	With a 500 Vdc megger, 50 MΩ or more. (Between lead wires and flange, at room temperature and normal humidity)
Allowable ambient temperature	-20 to +60 °C
Storage temperature	-20 to +70 °C
Allowable ambient humidity	40 °C, 90 % RH or less (without condensation)
Vibration resistance	Double amplitude 4.9 m/s², 10-55 Hz, 2 hours each in X, Y, Z directions
Cable	Heat-resistant flat plastic cable, 0.75 mm² Black (terminal F), white (terminal G)
Protection	IP44 (with conduit and wiring connected)
Material	Aluminum
Mounting	G3/4 inch flange
Compatible burner controllers	R4424 or R4440H series product that supports AFD
Mass	Approx. 200 g

Model selection

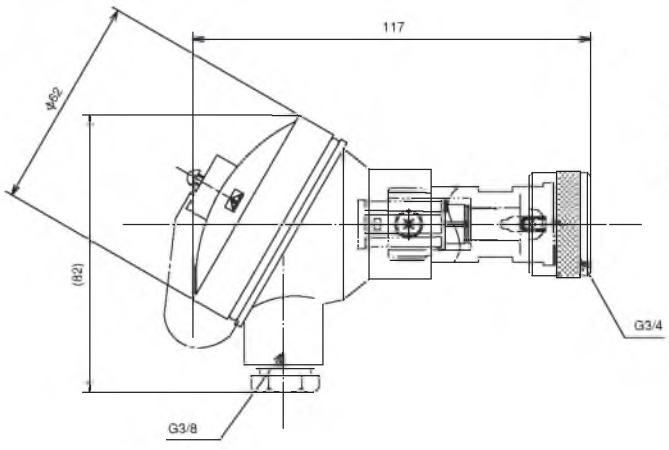
Item	Model No.
Visible light flame detector	AFD110A0000

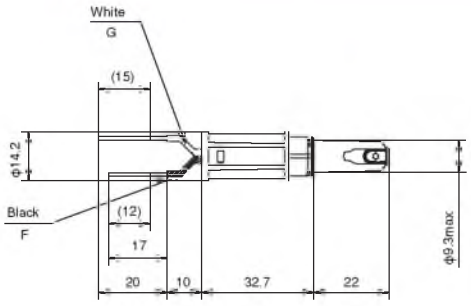
Optional Parts (sold separately)

Item	Model No.
Replacement sensor	AFD100A0035

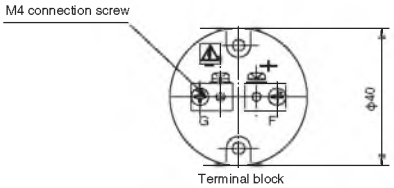
Dimensions

(Unit: mm)





Replacement sensor (AFD100A0035)



Terminal block

C6097A Gas Pressure Switch

The C6097A gas pressure switch is a pressure detector for city gas, natural gas, LP gas and air.
The external electrical circuit is turned on or off according to the preset value.
This device can be used in a variety of ways including detection of maximum/minimum gas/air pressure supplied to the gas burning device, burner blower interlock, or filter clogging.
As a supplementary part (sold separately), there is a switch-action display light for switching the gas pressure.

Specifications

Applicable fluids	Natural gas, liquefied petroleum gas, and air				
Model	C6097A0110	C6097A0210	C6097A0310	C6097A0410	C6097A0510
Control action	ON/OFF	ON/OFF	ON/OFF	ON/OFF	ON/OFF
Setting range	0.1 to 1 kPa	0.25 to 5 kPa	3 to 15 kPa	10 to 50 kPa	10 to 70 kPa
On-off differential (nominal value)	40 Pa (fixed)	60 Pa (fixed)	280 Pa (fixed)	700 Pa (fixed)	800 Pa (fixed)
Maximum Allowable pressure	20 kPa	30 kPa	50 kPa	150 kPa	150 kPa
Setting accuracy	0.1 ±0.06 kPa, 1 ±0.15 kPa	0.25 ±0.15 kPa, 5 ±0.75 kPa	3 ±0.9 kPa, 15 ±2.25 kPa	10 ±2.4 kPa, 50 ±7.5 kPa	10 ±3 kPa, 70 ±8 kPa
	Low pressure side: when at atmospheric pressure. High pressure side: when pressure is increasing.				
Output	SPDT contact output On pressure down, terminals 1-3 closed, terminals 2-3 open. On pressure rise, terminals 1-3 open, terminals 2-3 closed.				
Contact raiting	Resistive load: 250 Vac, 5 A Inductive load: 250 Vac, 3 A (power factor: 0.6) Minimum contact operating current and voltage: 50 mA, 24 Vdc				
Insulation resistance	100 MΩ min. between each terminal and non-live metal part with a 500 Vdc megger				
Dielectric strength	Betw. terminals with the same polarity: 1000 Vac, 50/60 Hz for 1 min Betw. each terminal and non-electrically charged metal parts: 1500 Vac, 50/60 Hz for 1 min Leakage current of 1 mA or less under these conditions				
Contact resistance	Initial 100 mΩ max. (measured by voltage drop method at 6–8 Vdc and 1 A)				
Fluid temperature	-15 to +60 °C (without freezing or condensation)				
Ambient temperature	-15 to +60 °C (without freezing or condensation)				
Durability	Over 100,000 operations at the rated contact voltage and current				
Wiring terminal	M3.5 screw terminal				
installation direction	Vertical, or horizontal with the pressure setting dial facing upwards.				
Protection	IP54				
Mass	260 g				
High-pressure gas contacting material	Die-cast aluminum (housing), NBR/nitrile rubber (diaphragm)				
Accessories (sold separately)	Switch operation indicator lamp (100/200 Vac) Model No.: 81404156				

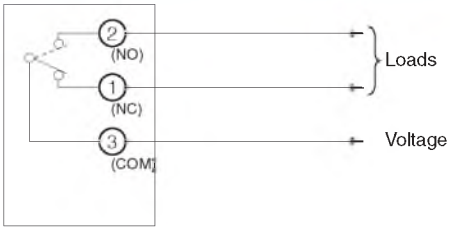
Model Selection

Item	Model No.
Gas pressure switch	C6097A0110
	C6097A0210
	C6097A0310
	C6097A0410
	C6097A0510

Optional Parts (sold separately)

Item	Model No.
Switch operation indicator lamp (100/200 Vac)	81404156

Wiring

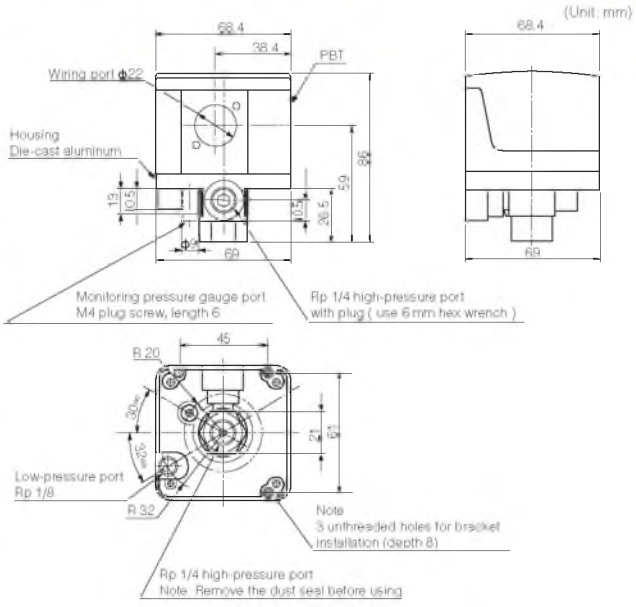


For a pressure rise:
Terminals 3–1 open
Terminals 3–2 closed

For a pressure drop:
Terminals 3–1 closed
Terminals 3–2 open

Dimensions

(Unit: mm)



Note. Use M4 self-tapping screw or provide the hole with M4 threads before use.

S7200A High Power Igniter

The S7200A igniter is a solid-state, high performance ignition transformer used with business and industrial oil-fired gun-type burners and gas-fired power burners.
Compared with our other products, this unit has twice the ignition energy, equivalent to the amount of a coil ignition transformer, therefore making it possible to use this transformer with burners that previously could be ignited only by using a coil ignition transformer.
Compared to the S720, the high-voltage cable can be extended to 2 meters, and at that length the power does not drop.

Specifications

Applicable burner	Oil-fired gun-type burner		Gas-fired power burner	
Model	S7200A100–OHR	S7200A200–OHR	S7200A100–GHR	S7200A200–GHR
Rated power and voltage	100 Vac 50–60 Hz	200 Vac 50–60 Hz	100 Vac 50–60 Hz	200 Vac 50–60 Hz
No. of electrodes	2		1	
Recommended air speed	10 + 15 m/s		10 + 15 m/s	
Time rating	60 min, 50 % *1		6 min, 20 %	
	Note: The percentage figure is the allowable usage rate for continuous ignition. For example, "6 min, 20 %" means that 1.2 min is the max. continuous discharge time (4.8 min rest).			
Characteristics	Half-wave			
High-voltage side connection	Bullet terminal			
Grounding method	Neutral ground		One ground wire	
Power consumption	70 VA	75 VA	55 VA	65 VA
Mass	Approx. 650 g			
Operating voltage	-15 % to +10 % of rated supply voltage			
High voltage side output voltage	Approx. 20 kV^{o-p} *2		Approx. 16 kV^{o-p} *2	
Recommended electrode spacing	3.5 ±0.5 mm		2.5 ±0.5 mm	
Electrical life	100,000 operations or 10 years under standard conditions (rated supply voltage, air speed between electrodes, room temperature, normal humidity)			
Induced lightning surge resistance	10 kV or more between wires and between wires and ground (1.2/50 µs, 100 Ω or more)			
Insulation resistance	Between ground terminal and input terminals using a 500 Vdc megger, 50 MΩ or more (excluding high voltage terminals)			
Dielectric strength	Between ground terminal and input terminals, 1800 Vac, 1 s without abnormalities (excluding high voltage terminals)			
Operating ambient temperature	-20 to +60 °C			
Operating ambient humidity	90 % RH or less at 40 °C (no leak discharge due to condensation between the secondary terminals and the secondary terminal and ground)			
Storage ambient temperature	-20 to +60 °C			
Ground terminal	If there is poor electrical contact between the ground terminal and the burner main unit, high frequency noise will occur and create electrical interference in other equipment, radios, TVs, etc. Be sure to remove the paint from the point of contact on the burner so that there is a good connection.			
Recommended high voltage cable	Standards /Dimensions	High-voltage AIRN (JIS3405) cable for use in vehicles or neon light wiring, 300 mm (standard) to 2000 mm (maximum) in length. (However, if the wire is longer than 600 mm, use an insulator to raise it by at least 50 mm. Separate the cables by at least 3 cm.)		
	Pullout strength	More than 290 kPa. AIRN cable (JIS3405) must be used to prevent the cable from pulling out during transport or under use conditions.		
Power cord	500 ±30 mm (plastic cabtyre cable, 2 cores / VCTFK, JIS3306 / 0.75 mm^2, 30/0.18 diameter 4.4 × 6.8 black)			
Case material	Polycarbonate			
Case color	Black			
Mounting	Mounted on metal plate (1 mm thick or more)			
Mounting position	Mounted such that ground terminal makes contact with metal plate.			

*1. This is the value when used in an ambient temperature of less than 40 °C and is 60 min. and 33 % when used in an ambient temperature between 40 °C and 60 °C.
*2. For the rated voltage, room temperature, normal humidity and 20 pF voltage divider input capacity.

Model selection

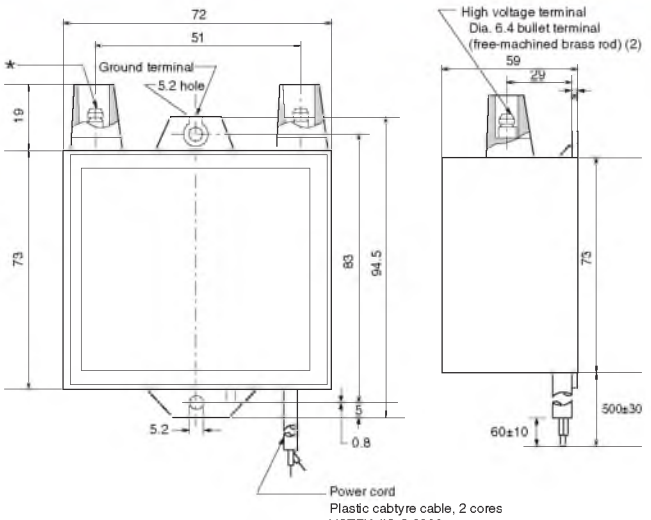
Item	Model No.
Gun type oil burner	S7200A100-OHR
	S7200A200-OHR
Power gas burner	S7200A100-GHR
	S7200A200-GHR

Optional Parts (sold separately)

Item	Cable length	Model No.
High voltage cable (10 units)	30 cm	YS7200A300-S2
	50 cm	YS7200A500-S2
	1 m	YS7200A1000-S2
	2 m	YS7200A2000-S2

Dimensions

(Unit: mm)



*Models with number S7200A□□□-G□□ for gas-fired power burners have only one terminal output and therefore there is no bullet terminal on this side.

FSP136A Analog Flame Meter

The FSP136A analog flame meter is an optimal support tool for maintenance and troubleshooting.
The analog flame meter is used for measuring the flame voltage or flame current of combustion safety equipment.
In addition, the flame current level can be easily recorded by connecting to the recorder jack.

Specifications

●Analog flame meter

Compatible models	AUR300C/350C, AUR450C, RA890F/G, R4750, R4780, FRS100B/C, FRL100/101,.etc
Operating principle	Moving coil
Operating/storage temperature range	0 to 40 °C
Operating/storage humidity range	80% RH max. at 40 °C (no condensation allowed)
Operating direction	Vertical (unit has a strap on top)
Indication accuracy	±2.5 % FS
Recorder output accuracy	
Color	Black
Mass	Approx. 450 g

●Range selection switch

Measurement range differs according to the model to be measured, and analog meter indication differs according to the measurement range. The table below shows the differences.

Range selection switch position	Model to be measured	Analog meter display	Recorder output
OFF	-	No display	-
15UA	R485B*, RA890F/G, R4750C, R4780B/C, R7257A*, R7258A*, R7259B*	Display in the 0-15 µAdc range.	Output in the 0-150 mVdc range.
SPL (special)	R7247B/C, R7476A	Display in the 0-15 µAdc range. If the flame current fluctuates greatly, a smoothed value is displayed.	Output in the 0-150 mVdc range. If the flame current fluctuates greatly, a smoothed value is output.
7.5V	FRL100/101, FRS100B/C, AUR300C/350C, AUR400C/450C,	Display in the 0-7.5 Vdc range.	-

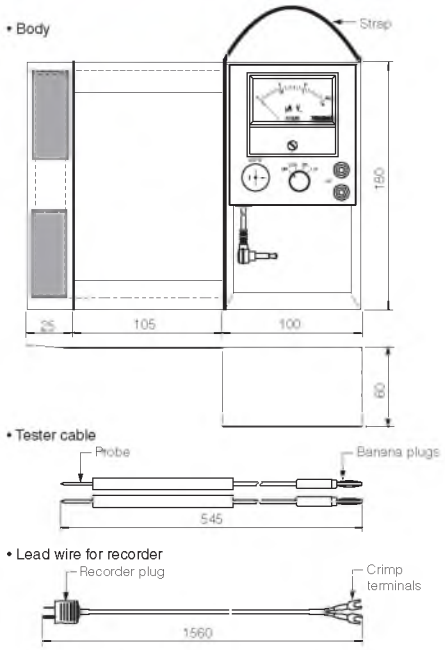
*: discontinued model

Model Selection

Item	Model No.
Analog flame meter	FSP136A100

Dimensions

(Unit: mm)



FSP300C100 Flame Simulator

The flame simulator has the same characteristics as a combustion flame. If problems occur with the combustion safety controller, for example, or when the burner sequence is being checked, the flame simulator can be connected to the flame detection circuit in order to check easily for errors in the flame detector, burner controller, amplifier, external circuits, etc., without actually using a burner.

Specifications

Compatible equipment / Simulator	Combustion safety controller		Flame detector		Method of checking action of flame relay 2K (Caution: Simulator must not touch any point other than those indicated.)	Figure
	Burner controller	Amplifier	Flame roc	Ultraviolet flame detector		
FSP300C100 (black)	RX-R40C	Built-in	-	AUD300C AUD500C	○ Attach the FSP300C100 to the relay terminals and connect lead wires to terminals F, G, S and S. ○ Connect lead wires F and G to RX-R40 terminals B6 (F) and A7 (G), and then connect the S and S lead wires to terminals B9 and A9. ○ Change the FLAME MODE switch on the FSP300C to SYNC.	Fig. 1
	RX-R20C	Built-in	-	AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to RX-R20 terminals B6 (F) and A7 (G). ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 2
	AUR350C AUR300C	Built-in	-	AUD300C AUD500C	○ Attach the FSP300C100 to the AUR350C/300C terminal block (S, S, G, F). ○ Change the FLAME MODE switch on the FSP300C to SYNC.	Fig. 3
	FRS100C	Built-in	-	AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to FRS100C terminals 5 (F) and 6 (G). ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 4
	RA890G	Built-in	-	AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to RA890G terminals F and G. ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 5
	R4150P (discontinued as of Sept. 2003)	R7259B (plug-in type)	-	AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to R4150P terminals F and G. ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 6
	R4750C	Built-in	-	AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to R4750P terminals F and G. ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 7
	R4780C	Built-in		AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to R4780C terminals 23 (F) and 24 (G). ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 8
	WN200A (discontinued as of Dec. 2000) WN210A (discontinued as of Dec. 2000)	R7259B (plug-in type)		AUD110C/100C C7035A C7027A	○ Attach the FSP300C100 to the relay terminals and connect the lead wires tc terminals F and G. ○ Connect lead wires F and G to WN200A/210A terminals F1 and G. ○ Change the FLAME MODE switch on the FSP300C to ON.	Fig. 9

Model Selection

Item	Model No.
Flame simulator	FSP300C100

FSP300C100 Flame Simulator

Dimensions

(Unit: mm)

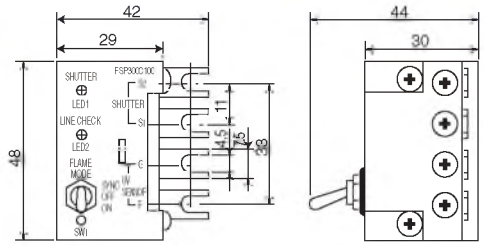
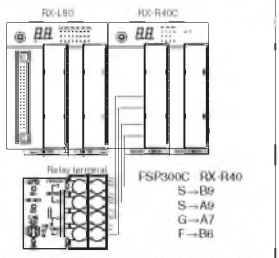
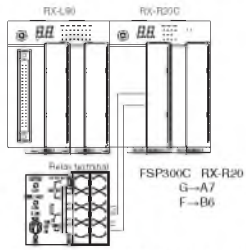


Figure1 FSP300C100-RX-R40C



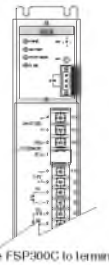
*Attach the FSP300C100 to the relay terminals.

Figure2 FSP300C100-RX-R20C



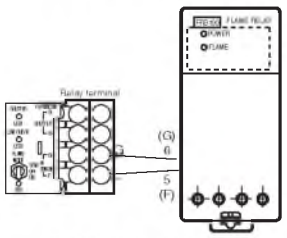
*Attach the FSP300C100 to the relay terminals.

Figure3 FSP300C100-AUR300/350



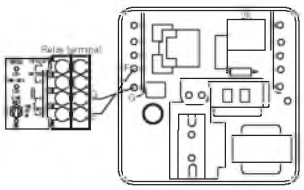
*Attach the FSP300C to terminals 11 through 14.

Figure4 FSP300C100-FRS100C



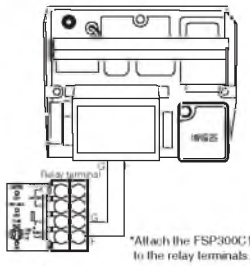
*Attach the FSP300C100 to the relay terminals.

Figure5 FSP300C100-RA890G



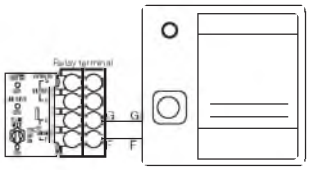
*Attach the FSP300C100 to the relay terminals.

Figure6 FSP300C100-R4150P



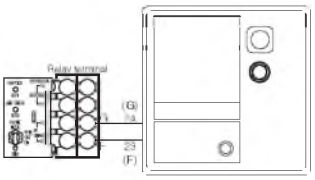
*Attach the FSP300C100 to the relay terminals.

Figure7 FSP300C100-R4750C



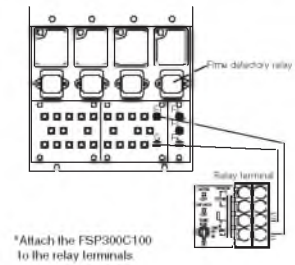
*Attach the FSP300C100 to the relay terminals.

Figure8 FSP300C100-R4780C



*Attach the FSP300C100 to the relay terminals.

Figure9 FSP300C100-WM200A/WN210A



*Attach the FSP300C100 to the relay terminals.