

BC-R15 Series Burner Controller

Overview

BC-R15 Series burner controllers are combustion safety controllers specifically designed for batch operation (systems which start and stop at least once within 24 hours).

They ensure safety by automatically controlling the ignition, combustion monitoring, and fuel shutoff of oil burners. For combustion detection, AFD100/110 series visible light flame detectors are available.

They are equipped with a 7-segment display that is useful for maintenance, a trial operation mode that is convenient for trial operation and adjustment, as well as other functions helpful for status checking and troubleshooting.

Additionally, the product is equipped with host communications (RS-485) and a Smart Loader Package function for more detailed status monitoring and troubleshooting.

Features

Compliant with JIS standards

- Safe construction of combustion systems and equipment
 - Uses prepurge and ignition timing in compliance with JIS B 8407:2012 (for forced-air burners) and JIS B 8415:2008 (combustion equipment in compliance with the safety principles for industrial incinerators).
- JIS-compliant burner controller safety design
 - Safety design in compliance with JIS C 9730 (automatic electrical controls for household and similar use)
 - EN 298 compliance (certification pending)

Easy mounting and replacement

- DIN rail mounting
 - Easily mountable in the same way as other control devices and control relays

- Precautions on equipment instrumentation

- (1) The equipment used in the combustion safety system was designed with careful consideration of laws, standards, and safety guidelines. If the overall system is designed to a foreign specification, refer to the laws and standards in the relevant country.
 - Main Safety Policies in Japan
 - *Technical policy on Safety Standards for Combustion Equipment in Industrial Furnaces* (by the Ministry of Health, Labour and Welfare)
 - *Combustion Equipment in Compliance with the Safety Principles for Industrial Incinerators* (JIS B 8415)
 - *Forced Draught Burners—Part 2: Oil Burners* (JIS B 8407-2)
 - The index of safety technology of industrial gas combustion equipment* (by the Japan Gas Association)
 - *Index of safety technology of gas boiler combustion facilities* (by the Japan Gas Association)
- (2) This device monitors for failures in the relay contacts used for the combustion load (IG, PV, MV) output. An E09 error is output if there is voltage at a load terminal, due to a ground fault or wiring error, when this device is not outputting a load. If an E09 error occurs when this device is installed, recheck the wiring and eliminate the factor causing the error.
- (3) If the wiring from this device exceeds the recommended length, prevent malfunction due to the effects of external noise by running wires from the control panel to the casing through a conduit, keeping sufficient distance between power lines and input lines, and other measures. Check the operation of the system on installation.
- (4) A reset signal must always be input near the equipment (burner, etc.), not remotely.
 - If a reset is input from a location where it is not possible to check safety, there is a risk of explosion.



- Uses a sub-base structure
 - Sub-base is separable from the main unit
 - It is possible to change only the main unit, leaving the wired-in sub-base in place

Extensive communications with external devices

- Equipped with a 7-segment display
 - 7-segment display for sequence codes and alarm codes
 - Press the DISP switch to display the flame voltage.
- External status output
 - States such as ignition failure, flame failure, and combustion detection are output digitally (for use in panel displays)
- Warning reset by contact input
- Equipped with host communications (RS-485), allowing remote observation of status
- Status checking by Smart Loader Package

Specifications

Item		Description				
Application		Batch-operated combustion systems burning oil				
Compatible flame detector		AFD100 series visible light flame detector				
Sequence	Sequence timing	See model selection table.				
	Flame response	See model selection table.				
	Reset timing	1 s or longer (main unit reset switch or contact reset input)				
	Warning detection timing	False flame detection Error	Airflow switch Error 1*	Airflow switch Error 2*	Interlock error	
		5 s	1 s max.	180 s	1 s max.	
	Airflow switch monitoring	See model selection table.				
	Ignition failure	Lockout				
	Flameout	See model selection table.				
Electrical specifications	Rated supply power	100 to 230 V AC, 50 Hz or 60 Hz				
	Allowable power supply voltage	85 to 110 % of rated power supply				
	Power consumption:	10 W or less				
	Dielectric strength	1500 V AC for 1 min, or 1800 V AC for 1 s Between each terminal and ground, except for combustion sensor connection terminals (terminals 14, 15)				
	Insulation resistance:	At least 50 MΩ with a 500 V DC megger Between each terminal and ground, except for combustion sensor connection terminals (terminals 14, 15)				
	Contact rating	Blower motor (with electromagnetic breaker)	Ignition transformer	Lo solenoid valve	Hi solenoid valve	Alarm
		100 VA	300 VA	200 VA	200 VA	75 VA
	Monitor outputs	4, maximum 30 mA each				
	Flame detection level	When ignition is detected: 1.3 V DC max. When detected as extinguished: 0.5 V DC min.				
	Flame voltage output	Flame voltage output range: 0.2-4.8 V DC				
	Input	Startup, lockout interlock, contact reset, airflow switch* Note: Each input is a non-voltage contact input, with allowable contact resistance up to 500 Ω				
	Service life	10 years when used eight hours per day, or 100,000 start/stop cycles (at 25 °C, room temperature, rated voltage)				
Transport and storage conditions	Ambient temperature	-20 to +70 °C				
	Ambient humidity:	5–95 % RH (no condensation)				
	Vibration	0-9.8 m/s ² (10–150 Hz, 1 octave/minute, 10 cycles, in the X, Y, & Z directions)				
	Shock:	0-300 m/s ²				
	Package drop test:	60 cm drop height (free drop onto 1 corner, 3 edges, 6 sides)				
Operating conditions	Ambient temperature	-20 to +60 °C				
	Ambient humidity:	10–90 % RH (no condensation)				
	Vibration	0–3.2 m/s ² (10–150 Hz, 1 octave/minute, 10 cycles, in the X, Y, & Z directions)				
	Shock	0 to 9.8 m/s ²				
	Mounting angle	Reference plane +/-10°				
	Dust	0.3 mg/m ³ or less				

Host communication specifications	Communication standard	RS-485
	Transmission route	3-wire system
	Transmission speed (bps)	4800, 9600, 19200
	Transmission distance	500 m max.
	Communication method	Semi-duplex
	Synchronization method	Asynchronous
	Data format	8 data bits, 1 stop bit, even or odd parity 8 data bits, 2 stop bits, even or odd parity
	Device address	1 to 32
	Connection method	1:N (15 units max.)
	Other	Based on RS-485
General descriptions	Protective structure	IP40 (with a sideboard (81447515-001) attached to the sub-base (BC-R05)) IP10 (sub-base (BC-R05) only)
	Excess voltage category	II
	Pollution degree	PD2
	Case color	Black
	Case material	Denatured PPE resin (UL94-V0 PTI materials group IIIa)
	Structure	Sub-base and main unit
	Mounting Orientation	Vertical or horizontal However, for horizontal attachment, 7 segment display can only be mounted so that it faces directly upward. (DIN rail mounting or direct mounting through base screw holes)
	Dimensions	W95 × H105 × D110 mm
	Standards compliance	JIS C 9730-2-5: 2010 <u>Certifications</u> CE Marking • Gas Appliances Regulation (2016/426/EU) based on EN 298: 2012 • Low Voltage Directive (2014/35/EU) based on EN 60730-2-5: 2015 • Electromagnetic Compatibility Directive (2014/30/EU) based on EN 61000-6-2: 2005, EN 61000-6-4: 2007+A1: 2011 • RoHs Directive (2011/65/EU) based on EN IEC63000: 2018
Weight	Approximately 600 g (incl. sub-base)	
Wiring types and maximum wiring length	- Start, airflow switch, lockout interlock Copper wire with 600 V PVC insulation, 1.25 mm ² , recommended length: 20 m or less, maximum wiring length: 100 m - Contact reset Copper wire with 600 V PVC insulation, 1.25 mm ² , wiring length: 10 m max. - AFD100 Series (F, G) Copper wire with 600 V PVC insulation, 1.25 mm ² , wiring length: 10 m max. - RS-485 communications (3-wire system) 0.2–1.5 mm ² shielded, twisted pair cable (recommended) wiring length: 500 m max. - Frame voltage output signal circuit Copper wire with 600 V PVC insulation, 0.75 mm ² or larger, wiring length: 10 m max.	

*Only for models with airflow switch monitoring.

Model Selection

(Note: The dedicated sub-base and sideboard are not provided with the BC-R15 series controller. Please order them separately.)

Model number	Airflow switch monitoring	Prepurge method	Prepurge cycle	Main ignition time	Post ignition ^{*2}	Flameout	Flame response	Postpurge
BC-R15A7G004_	Yes	Preignition ^{*3}	20±2 s	4.5±0.5 s	11±1.5 s	Lockout	2 s max.	0 s
BC-R15A7H003_		Preignition ^{*3}		4.5±0.5 s	11±1.5 s	Recycling ^{*4}	1 s max.	
BC-R15A7H005_		Preignition ^{*3}		4.5±0.5 s	15±1.5 s	Recycling ^{*4}	1 s max.	
BC-R15A7J002_		Prepurge		4.5±0.5 s	7±1 s	Lockout	2 s max.	
BC-R15A7K007_		Prepurge		7±1 s	7±1 s	Recycling ^{*4}	1 s max.	
BC-R15A7L004_	None*1	Preignition ^{*3}		4.5±0.5 s	11±1.5 s	Lockout	2 s max.	
BC-R15A7M003_		Preignition ^{*3}		4.5±0.5 s	11±1.5 s	Recycling ^{*4}	1 s max.	
BC-R15A7M005_		Preignition ^{*3}		4.5±0.5 s	15±1.5 s	Recycling ^{*4}	1 s max.	
BC-R15A7N002_		Prepurge		4.5±0.5 s	7±1 s	Lockout	2 s max.	
BC-R15A7P007_		Prepurge		7±1 s	7±1 s	Recycling ^{*4}	1 s max.	

_ : As the last model No. digit, "0" = without inspection data, "D" = with inspection data

*1 A switch monitor should be used for burners that are configured for use without an airflow rate detector, as specified in JIS B 8407-2, *Forced Draught Burners—Part 2: Oil Burners*.

*2 From the completion of the main ignition time to the post-ignition time

*3 The ignition transformer is ON during prepurge.

*4 When a flame failure occurs, after the flame response time elapses, a recycling type model moves to prepurge after the 5 s of re-ignition standby time and 2 s of start check time elapse.

Recycling is done once. If there is a second flame failure, a lockout occurs.

Compatible flame detector (sold separately)

- Visible light flame detector

Model number	Item	Notes
AFD100A0700	Visible light flame detector	Light reception direction: front, top-view type
AFD100B0700		Light reception direction: side, side-view type

Optional accessories (sold separately)

Model number	Name	Notes
BC-R05A100	Dedicated sub-base for BC-R	Required for all products in the BC-R15 series
81447514-001	Connector for front wiring	Qty.: 1. Weidmueller model number : BL3.5/11F, compatible wire: 0.2-1.5 mm ² (AWG28-14)
81447514-002	Connector for front wiring (For right-side wiring)	Qty.: 1. Weidmueller model number : BL3.5/11/270F, compatible wire: 0.2-1.5 mm ² (AWG28-14)
81447515-001	Sideboards	Qty.: 2 Not included in the sub-base
FSP136A100	Analog flame meter	
81447519-001	Jack cover	Qty.: 1 (1 is included with the controller)
81447531-001	Front connector cover	Packaged with mounting screws (1 is included with the controller)
81447596-001	Plate compatible with R4780/ R4715 mounting	For replacing R4715, R4780, R440H, R4751, and R4781

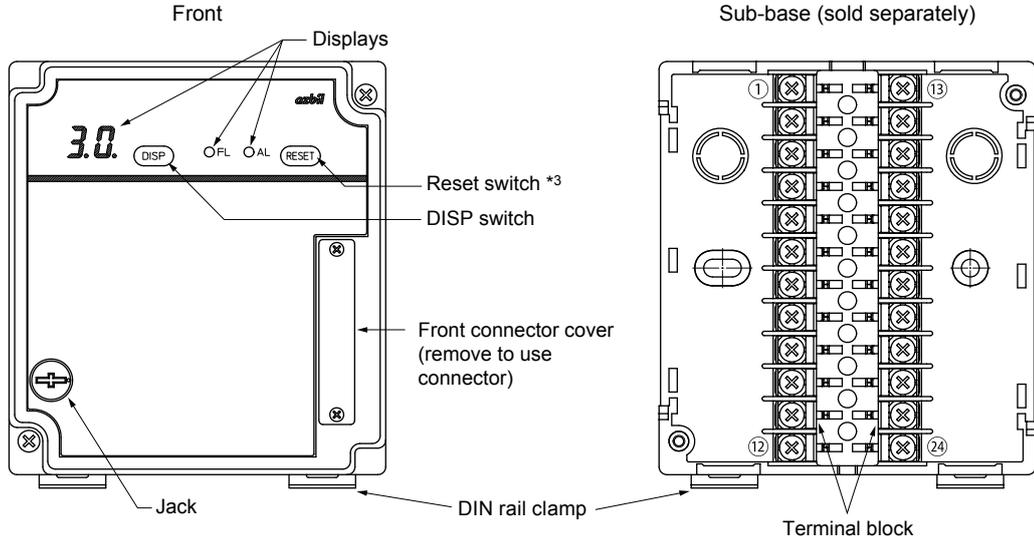
- Alternative BC-R models for existing R4424 and previous models

Previous models	Rated supply power	Flameout	Prepurge type	BC-R series alternative models
R4424C104-A, R4424C104-1, R4313C1007-5	100 V AC	Recycle	Prepurge	BC-R15A7P0070 (BC-R15A7K0070)*
R4424C204-A, R4424C204-1, R4313C1015-5	200 V AC			
R4424D1001-A, R4313D1005	100 V AC	Lockout	Preignition Prepurge	BC-R15A7L0040 (BC-R15A7G0040)*
R4424D1019-A, R4313D1013	200 V AC			
R4424D121-A, R4424C121-1, R4313B1009	100 V AC	Recycle	Preignition Prepurge	BC-R15A7M0050 (BC-R15A7H0050)*
R4424D221-A, R4424C221-1, R4313B1017	200 V AC			
R4424E104-A, R4424C104-1, R4313E1002	100 V AC	Lockout	Prepurge	BC-R15A7N0020 (BC-R15A7J0020)*
R4424E204-A, R4424C204-1, R4313E1010	200 V AC			

*Parentheses () indicate models with airflow switch monitoring.

Note: Detailed timing or tolerances may differ. For details, check the specification sheets.

Terminal numbers, front panel item names



Terminal Nos.

Front terminals

No.	Function	No.	Function
25	Flame voltage output (+)	31	Power supply for monitor output
26	Flame voltage output (-)	32	Monitor output, combustion
27	Host communications (RS-485) DA	33	Monitor output, ignition failure
28	Host communications (RS-485) DB	34	Monitor output, flame failure
29	Host communications (RS-485) SG	35	Monitor output lockout interlock input
30	NC		

Sub-base terminals

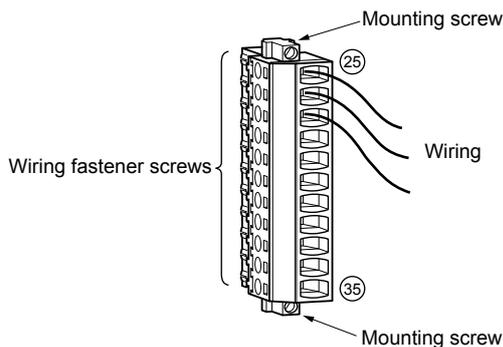
No.	Function	No.	Function
1	Blower motor (electromagnetic breaker) output	13	Warning output
2	AC power supply (L1)	14	Flame detector (F)
3	AC power supply (L2 (N))	15	Flame detector (G)
4	Output common 1	16	Input common 1
5	Output common 2	17	Input common 2
6	Ignition transformer output	18	NC
7	Lo solenoid valve	19	NC
8	Hi solenoid valve	20	Startup input ¹
9	NC	21	Airflow switch input ²
10	NC	22	Lockout interlock input
11	NC	23	NC
12	NC	24	Contact reset input ³

*1 After lockout is canceled, there is a stabilization time of about five seconds, during which the device does not start even if start input is turned ON.

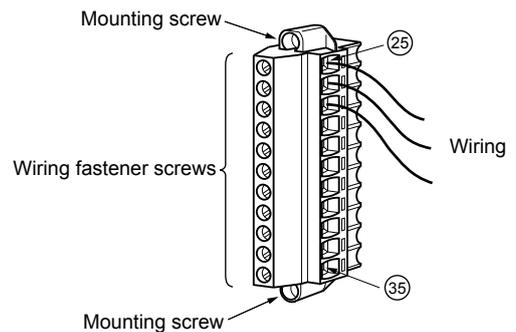
*2 Only on models with airflow switch monitoring.

*3 During postpurge for 20 seconds, no reset operation is accepted.

Front wiring connector (81447514-001) terminal layout



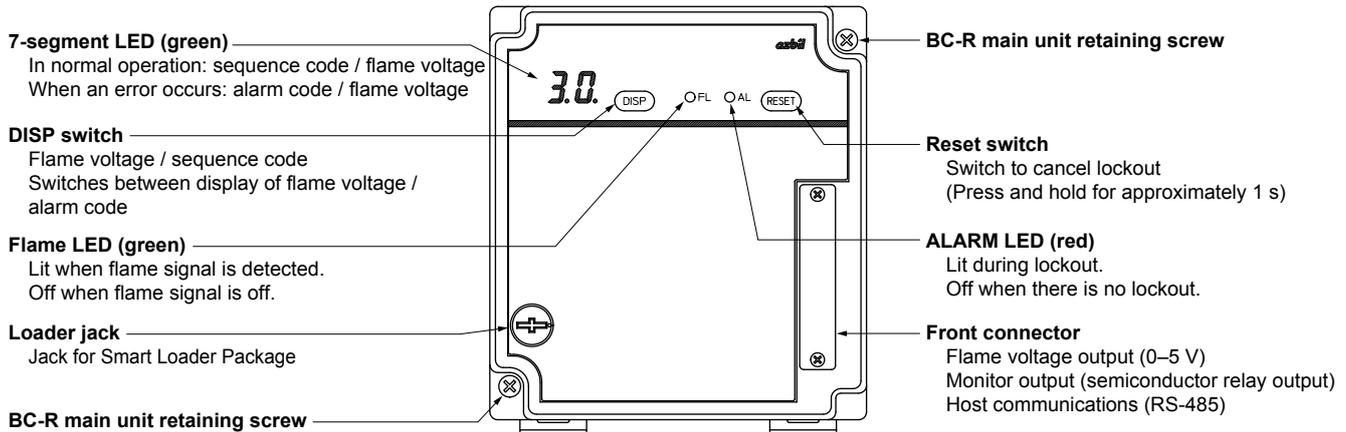
Front wiring connector (for right side wiring, 81447514-002) terminal layout



7-segment display, LED display, switches

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

Part Names



Warning codes

Display	Name	Content
E0	Interlock error	Lockout interlock
E1	False flame error	Flame signal was detected for five seconds during the prepurge
E2	Airflow switch error ^{*1}	The airflow switch turned off during combustion
E3	Airflow switch error ^{*2}	The airflow switch stayed on for 3 minutes during the start check
		The airflow switch stayed off for 3 minutes during the prepurge
E6	No ignition	Ignition could not be detected in the main ignition period
E7	Flame failure	During the sequence beginning with main ignition, the flame signal disappeared
E9 + Sub-code (2 digits)	Device error	Voltage error detected in output from the ignition transformer, Lo valve, Hi valve, etc.

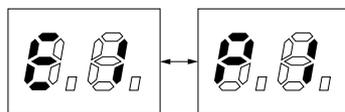
*Only on models with airflow switch monitoring.

Sequence codes

Display	Status content
P1	Start check
P2	Prepurge
P4	Main ignition
P5	Post ignition
P8	Steady combustion
P _r	Re-ignition standby
--	Stopped

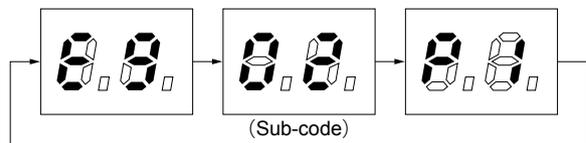
Examples of sequence codes and warning codes

- Warning code: E0-E7



Switches every 0.8s

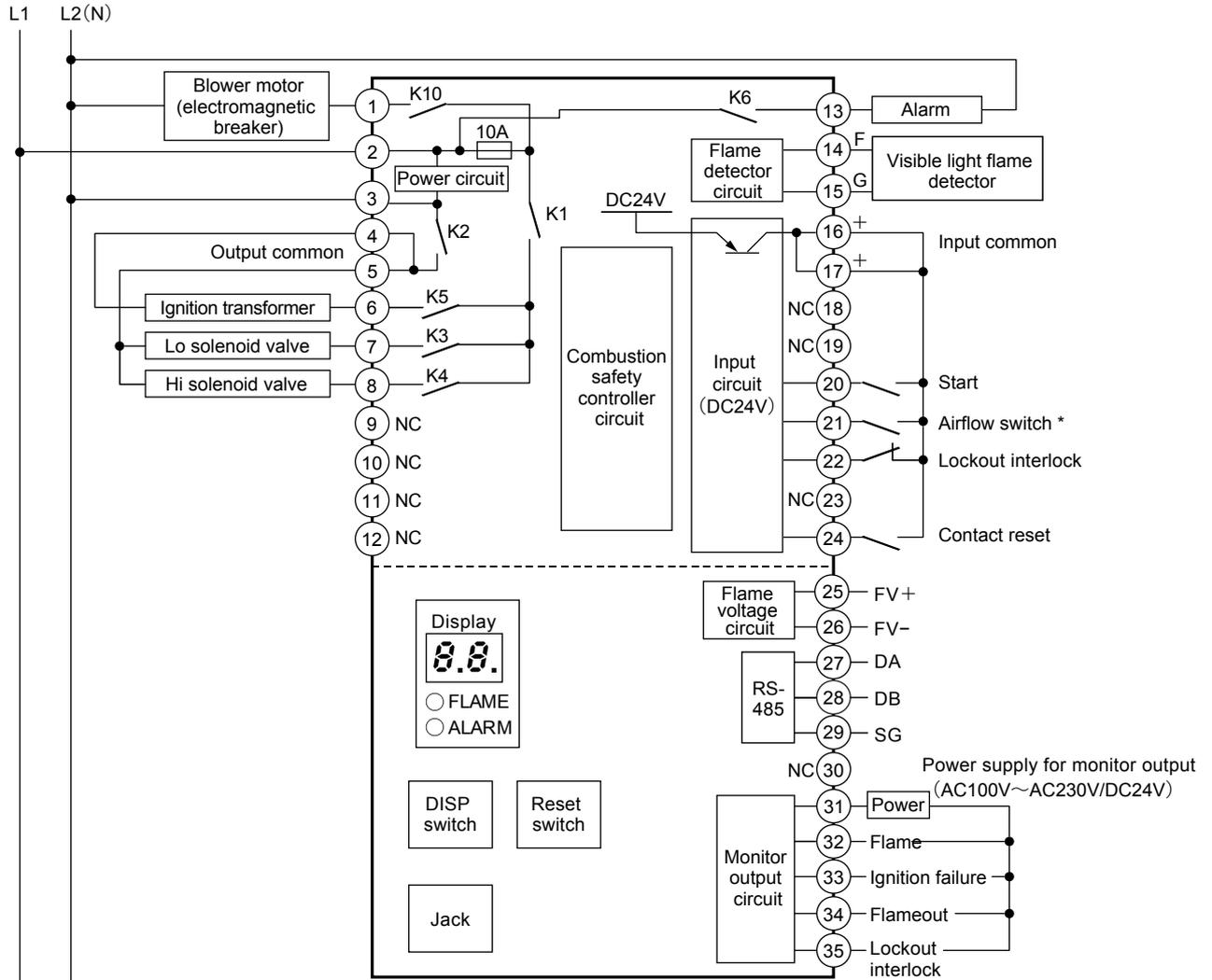
- Warning code: E9 + sub-code (2 digits)



Switches every 0.8s

Internal block circuit, external connection terminals

(1–24 on the sub-base, 25–35 on the front connector)



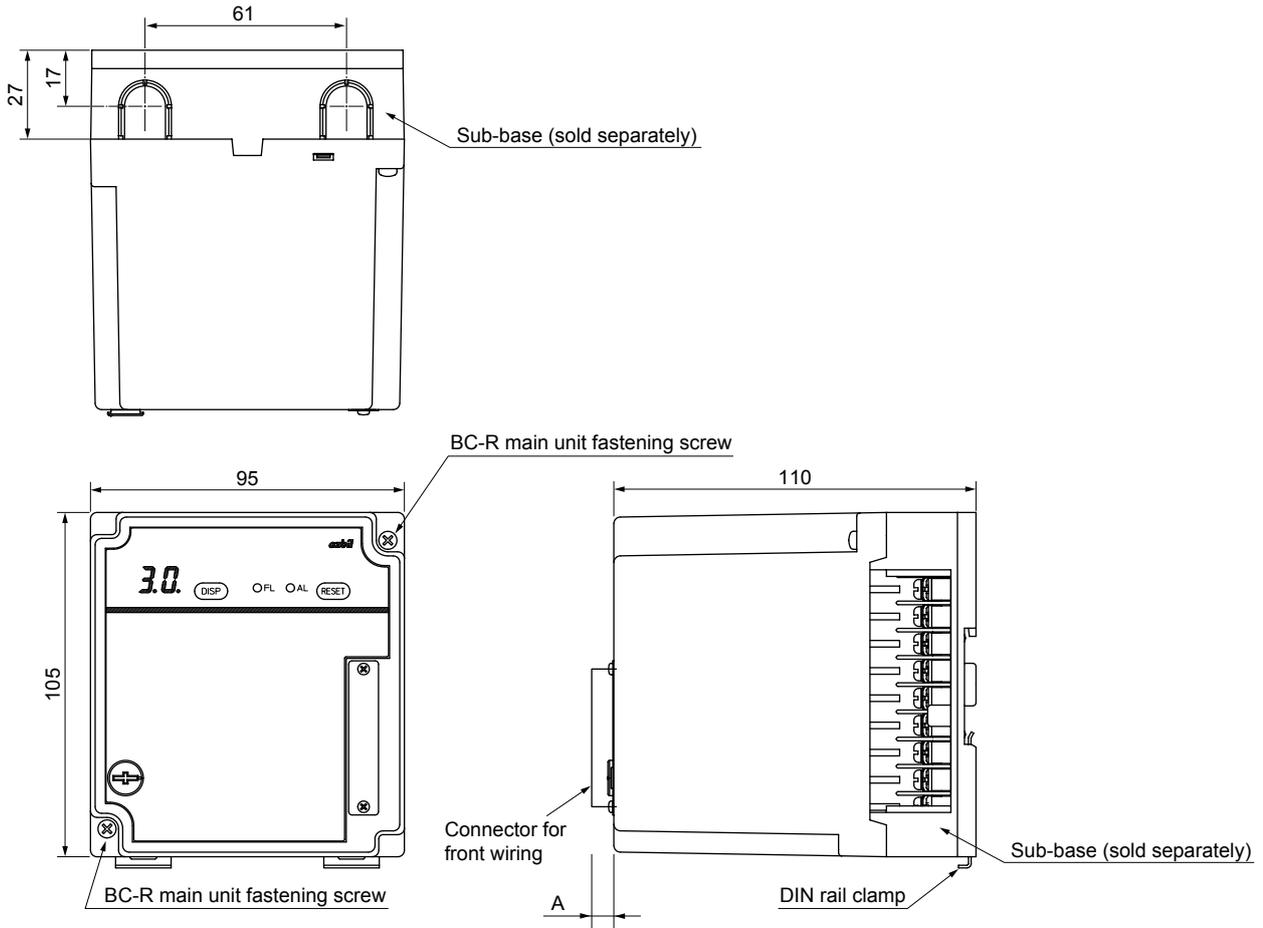
- Note
- Use contact reset (terminal 24) input in isolation. It cannot be used in conjunction with other BC-R contact reset inputs.
 - Output common (terminals 4, 5) and input common (terminals 16, 17) cannot be used in conjunction with other BC-R contact reset inputs.

*Only on models with airflow switch monitoring.

Dimensions

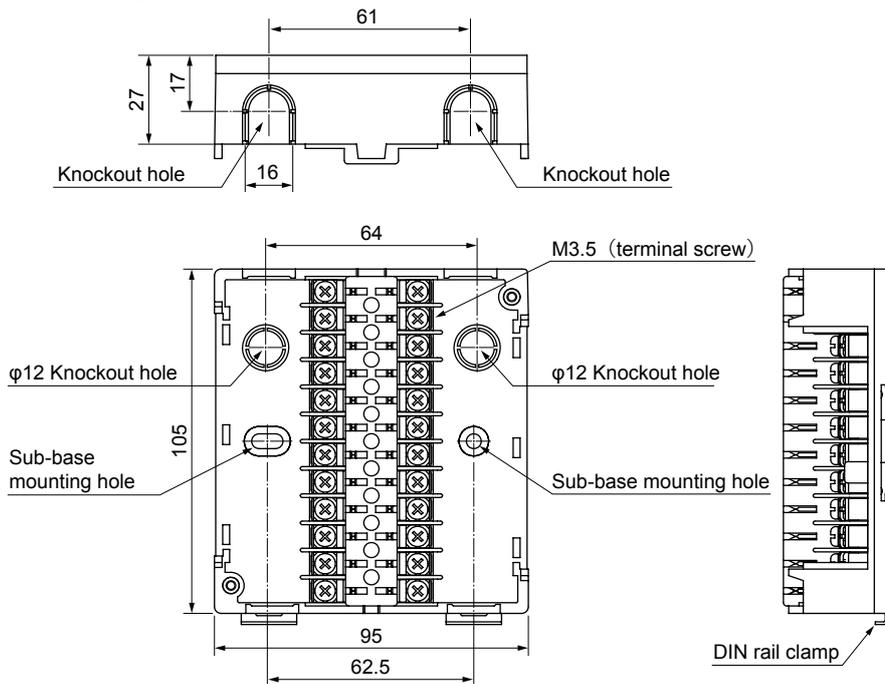
(Unit: mm)

BC-R15 Burner Controller



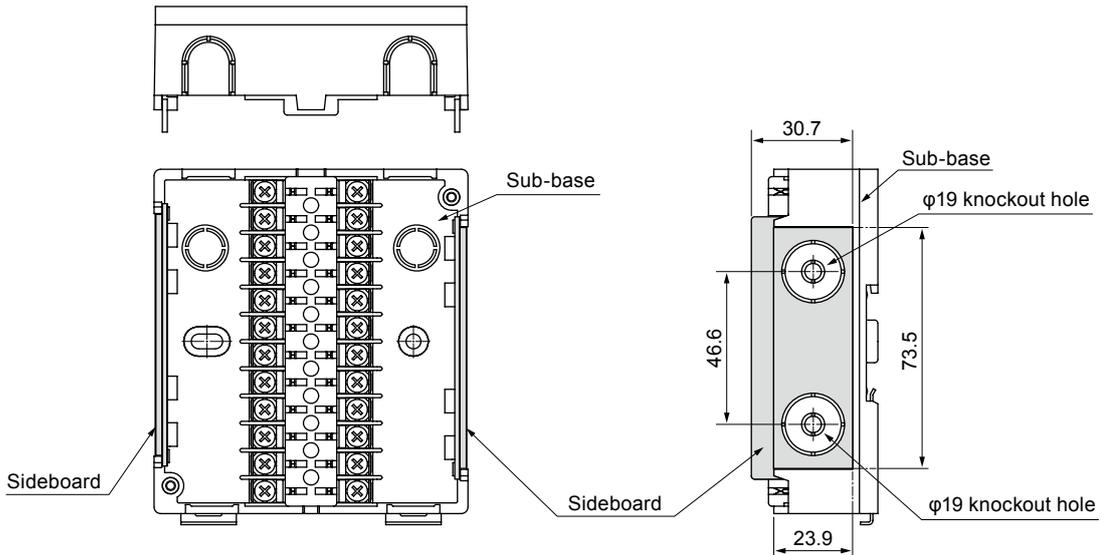
Model number	A
81447514-001	10.6
81447514-002	14.6

- Sub-base (BC-R05A100, sold separately)



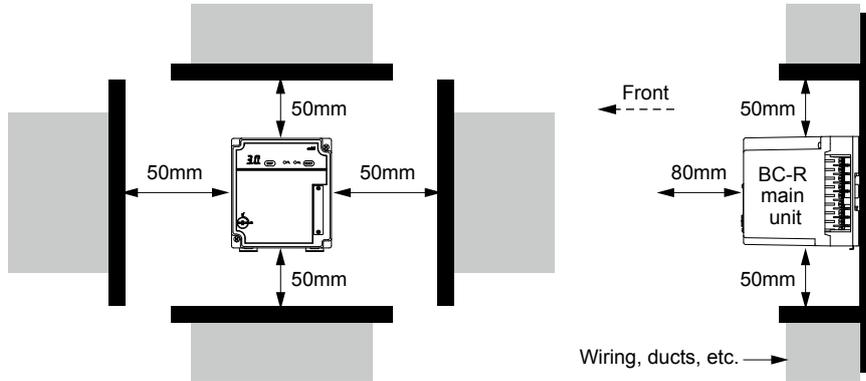
- Sideboard (81447515-001, sold separately)

(Unit: mm)



Precautions for installation

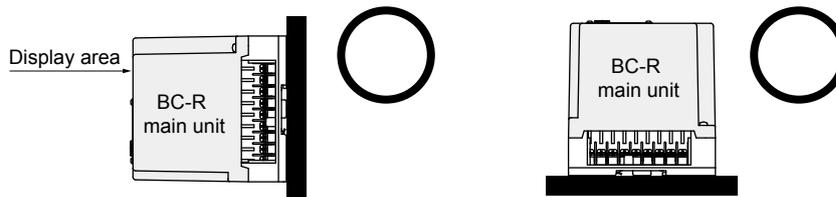
- (1) Leave space in the amount of 50 mm above, below, left, and right, and 80 mm in front of the device for removal, wiring, and maintenance. Also, do not install this unit close to electric power devices or other sources of heat.



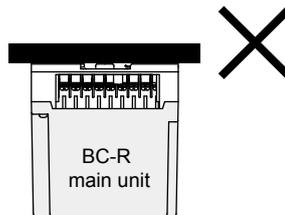
- (2) This device must be grounded within a grounded and conductive control panel to ensure safety.
- (3) Do not pull on the wiring while it is attached to the device. Doing so can cause failure of the connectors or the unit itself.

Installation orientation

Install the device in one of the orientations shown here.



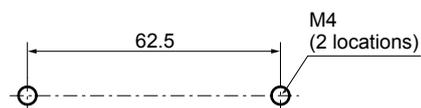
Do not install the device in the orientation illustrated below.



Mounting in a Panel

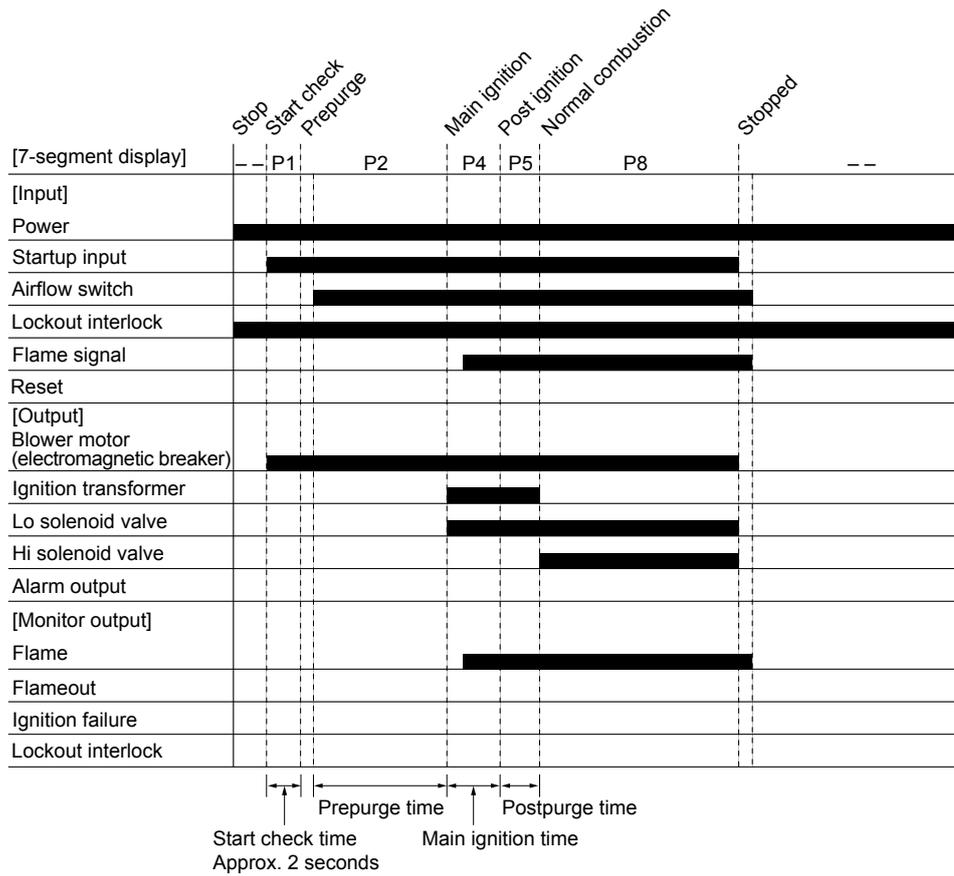
- [1] Screw two M4 internal threads into the panel.
- [2] Use screws to mount the sub-base on the panel.
(Maximum tightening torque: 1.2 N•m)

(Unit: mm)

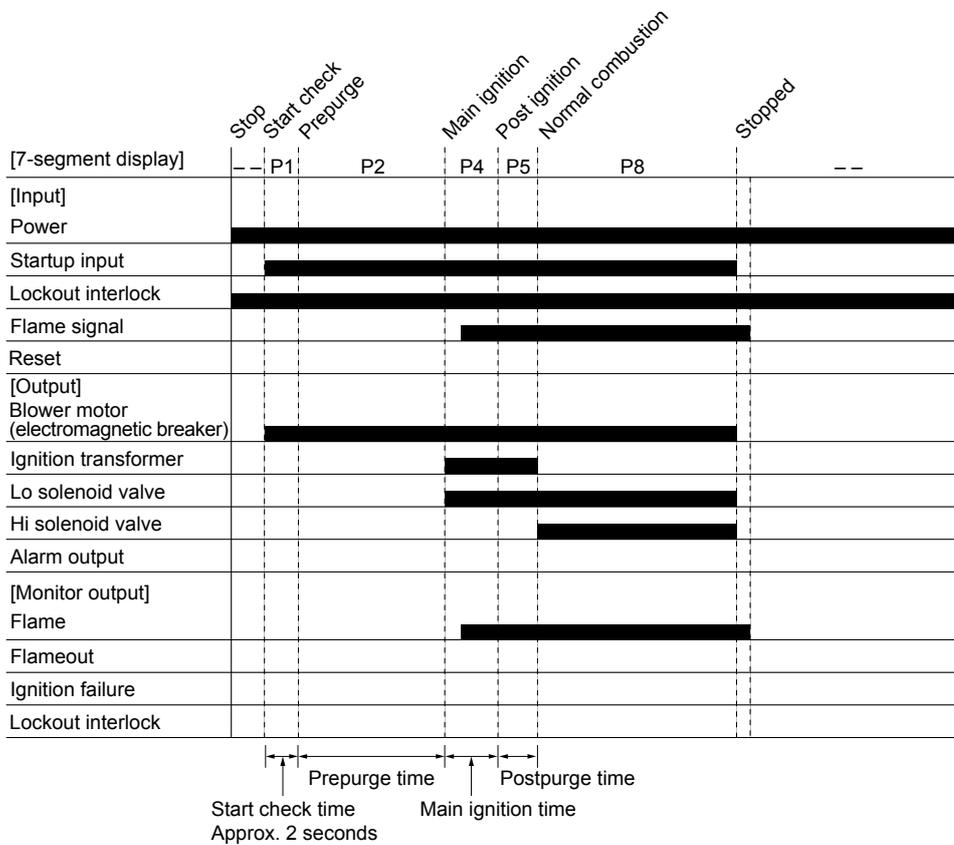


Operation Sequence

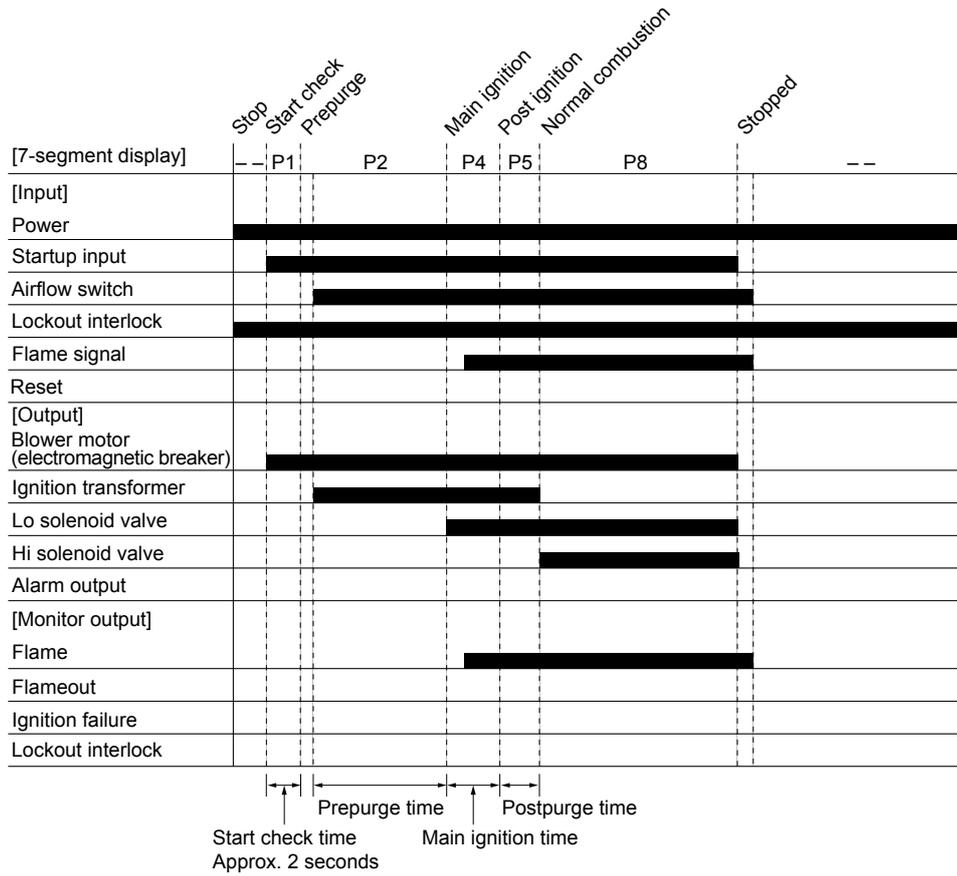
• 1-1. Normal operation (with prepurge and airflow switch)



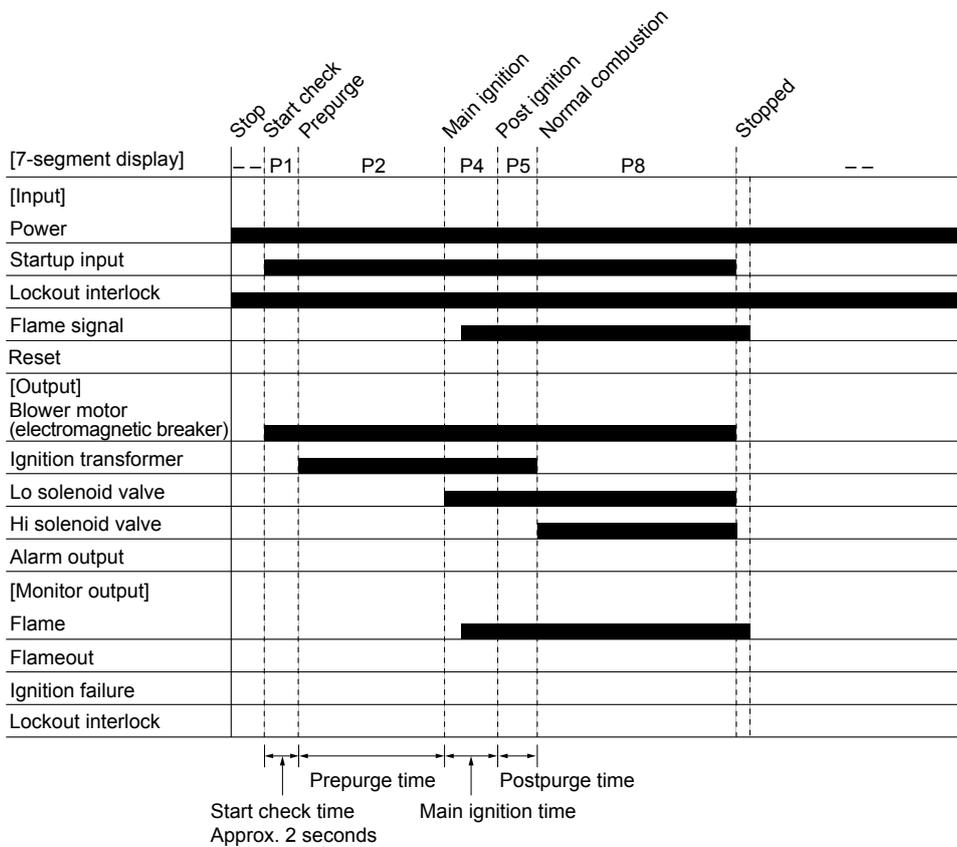
• 1-2. Normal operation (without prepurge airflow switch)



● 1-3. Normal operation (with preignition, prepurge and airflow switch)



● 1-4. Normal operation (without preignition, prepurge and airflow switch)



Customer Specification Check Sheet, BC-R15 series

This sheet will help you to select the optimum BC-R15 series product for your specifications.

Please use it to facilitate communication with our sales staff.

Combustion equipment type		
Combustion equipment description		
Flame detector		AFD100/AFD110 visible light flame detector
Ignition method (circle the applicable product)		
Supply power voltage		100–230 V AC
Sequence	Prepurge	seconds or minutes
	Ignition standby	seconds
	Post ignition	seconds
	Flame response	seconds
Input (whether there is input, the specifica- tions, etc.)	Lockout interlock input	
	Start input	
	Contact reset input	
	Airflow switch input	
–MEMO–		

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

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

Specifications are subject to change without notice.



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