CP-UM-5781E

Burner Controller
BC-R25 Series Recycling Model
User's Manual for Installation

Thank you for purchasing the BC-R25 Series Recycling Model Burner Controller. This manual contains information for ensuring correct use of the BC-R25 Series Recycling Model. It also provides necessary information for installation, maintenance, and trouble-shooting. This manual should be read by those who design and maintain devices that use the BC-R25 Series Recycling Model. Be sure to keep this manual nearby for handy reference.

Please read the "Terms and Conditions" from the following URL before ordering or use:
http://www.azbil.com/products/bi/order.html

This device is not packaged with a sub-base. To use it, you must have a BC-R05A100 sub-base, which is sold separately.

NOTICE

Be sure that the user receives this manual before the product is used.

Copying or duplicating this user's manual in part or in whole is forbidden. The information and specifications in this manual are subject to change without notice.

Considerable effort has been made to ensure that this manual is free from inaccuracies and omissions. If you should find an error or omission, please contact the azbil Group.

In no event is Azbil Corporation liable to anyone for any indirect, special or consequential damages as a result of using this product.

SAFETY PRECAUTIONS

Safety precautions are for ensuring safe and correct use of this product, and for preventing injury to the operator and other people or damage to property. You must observe these safety precautions. Also, be sure to read and understand the contents of this user's manual.

⚠ WARNING
Warnings are indicated when mishandling this product might result in death or serious injury to the user.

⚠ CAUTION
Cautions are indicated when mishandling this product might result in minor injury to the user, or only physical damage to this product.

⚠WARNING

- **Use this device with combustion equipment that is started and stopped at least once in a 24 hour period.**
- **This device cannot be used for equipment with combustion continuing for 24 hours or longer.**
- **This device has functions that are extremely important for the safe operation of combustion equipment. Use it correctly in accordance with the user's manual.**
- **Check the model number carefully and check that the sequence timing is as specified by the combustion equipment manufacturer. Installing an incorrect model can result in an explosion hazard.**
- **Terminal 14 (F) retains an electrical charge even after the power is turned off. Do not touch terminal 14 (F) even after turning the power off. Doing so may result in an electric shock.**
- **Do not start regular operation of equipment without first completing the trail-run adjustments for this device, as well as the tests specified by the equipment manufacturer.**
- **Do not disassemble this device.**
  Doing so may cause malfunction, device failure, or electric shock.
- **If the system is locked out, do not reset it until the cause of the problem has been eliminated.**
- **Do not reset this device from a remote location.**
  If it is reset from a location where it is difficult to confirm the safety of combustion, there is a risk of explosion.
- **Do not use monitor output or alarm relay output as safety output.**

⚠WARNING

- **This device has a limited product life. Beyond the product life, the risk of device failure becomes higher. Replace this device within its product life.**

⚠CAUTION

- **Use this device correctly within the range of the rated specifications stated in the user's manual. Not doing so may cause device failure or malfunction.**
- **Make sure that the flame detector does not detect the ignition spark. If the flame detector can detect the spark, change the detector's line of sight or change the ignition electrode's position.**
- **After an ignition failure is detected, this device enters a reignition standby period. After the reignition standby period has passed, the combustion sequence restarts from the beginning.**
- **Do not connect a load that exceeds the rating stated in the specifications to the control load terminals (terminals 2–1, 2–6, 2–7, or 2–8), and do not short-circuit the load. Doing so will burn out the internal fuse, making the device unusable.**

UNPACKING

Model number	Product name	Q'ty	Notes
BC-R25 Recycling Model	Burner Controller	1	The sub-base is sold separately
CP-UM-5781E	User manual	1	This document
81429509-001	Label of the code	1	
—	Dedicated pin plug	1	

Related documents

For details on operations, calibration and maintenance, refer to manual CP-SP-1383E.

OVERVIEW

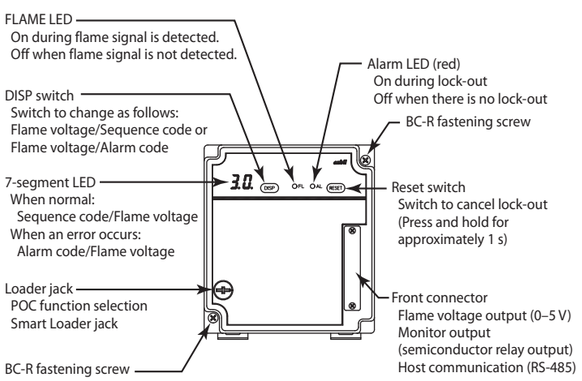
BC-R25 series Recycling Model series burner controllers are combustion safety controllers specifically designed for batch operation (systems which start and stop at least once within 24 hours), ensuring safety for oil and gas burners with on/off control and by automatic ignition and combustion supervision.

- For burners compliant with JIS B 8407-1 (for forced draft gas burners), if an ignition failure occurs, this device will attempt reignition.
- JIS-compliant safety design.
- POC (proof of closure) function based on shutoff valve closure confirmation switch input.
- 7-segment display for sequence codes and alarm codes.
- Monitoring output for external devices and alarm reset by external signal (contact input) are possible.
- Host communication (RS-485) allowing remote observation of status.
- DIN rail mounting and sub-base structure for easy installation and replacement.

This device must be used with compatible equipment shown below.

- JGA guideline-B01-88 (JGA: Japan Gas Association)
- JRA4004:2013 and JRA4016:2013
- JRA4013:2013 and JRA4023-2013
- JIS B 8407-1:2012

PART NAMES



STRUCTURE

■ Compatible Flame Detector (sold separately)

● UV sensor

Model number	Name
AUD15C1000	Advanced UV Sensor Tube Device
AUD100C100_	Advanced UV flame detector (Lead wire model without AUD15C)
AUD100C1000-A15	Advanced UV flame detector (Lead wire model with AUD15C)
AUD110C100_	Advanced UV flame detector (Terminal block model without AUD15C)
AUD110C1000-A15	Advanced UV flame detector (Terminal block model with AUD15C)
AUD120C120_	Advanced UV flame detector (1/2-inch mounting model without G1/2 adapter)
AUD120C121_	Advanced UV flame detector (1/2-inch mounting model included G1/2 adapter)

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

● Flame rod (Ionization)

Model number	Product name
C7007A	Flame rod holder
C7008A	Flame rod assembly

■ Optional Parts (sold separately)

Model number	Product name
BC-R05A100	Dedicated BC-R sub-base (a necessary requirement for the BC-R25 series)
81447514-001	Connector for front wiring Weidmueller BL3.5/11F Compatible wire: 0.2–1.5 mm² (AWG28–14)
81447514-002	Connector for front wiring (for right side wiring) Weidmueller BL3.5/11/270F Compatible wire: 0.2–1.5 mm² (AWG28–14)
81447515-001	Side boards (2)
SLP-BCRJ71	Smart Loader Package (no cable)
81441177-001	USB loader cable
FSP136A100	Analog flame meter
81447519-001	Jack cover (1)
81447531-001	Front connector cover (includes mounting screw)

MOUNTING

⚠WARNING

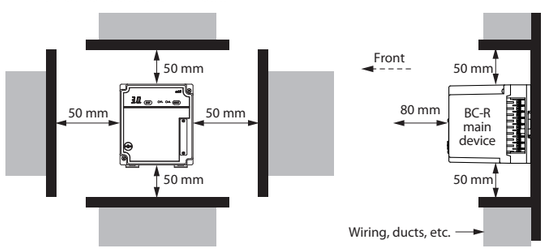
- **Ensure you turn off the power of this device and all auxiliary devices when mounting, removing or connecting the wires of this device. There is a risk of electrical shock.**

⚠CAUTION

- **Mounting, wiring, maintenance, inspection, calibration, etc. should be carried out by a professional with technical training in combustion systems and flame safeguard control devices.**
- **Do not install where exposed to any of the following:**
  - **Certain chemicals or corrosive gases (ammonia, sulfur, chlorine, ethylene compounds, acids, etc.)**
  - **Dripping water or excessive humidity**
  - **High temperatures**
  - **Sustained long-term vibration**
- **For mounting and wiring, follow the instructions in this user's manual or in the combustion equipment manufacturer's manual.**

■ Cautions regarding Installation

- Take space 50 mm above and below, 50 mm to the left and right, and 80 mm to the front, **as space for removal, wiring, and maintenance.** Also, do not install this device close to electric power devices or other sources of heat.

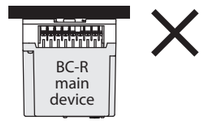


- This device must install within a grounded and conductive control panel to ensure safety.
- Do not pull the wiring while it is attached to the device. Doing so can cause failures of the connectors or this device itself.

■ Installation Orientation

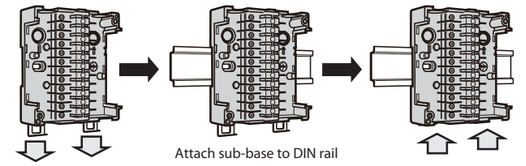
Attach the device in the orientation shown below.

Do not install it in the orientations illustrated below.



■ Mounting on DIN Rail

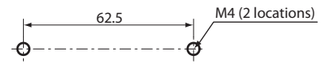
(1) Pull down the sub-base's DIN rail clamps.
(2) Attach to the DIN rail while checking above and below the sub-base.
(3) Push up the DIN rail clamps to attach the sub-base (sold separately) to the DIN rail.



■ Mounting in a Panel

Units: mm

(1) Drill two M4 screw holes into the panel.

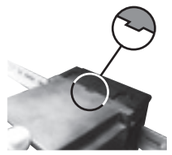


(2) Use screws to mount the sub-base on the panel.
(Max. tightening torque: 1.2 N·m)

■ Mounting/Removing the Device

● Mounting

(1) Align the indentation in the center of the top of this device with the projection on the sub-base.



(2) Once aligned as in (1), push straight down-wards slowly.

(3) Tighten the device's retaining screws to secure it in the sub-base.
(Max. tightening torque: 0.5 N·m)

● Removal

(1) Remove the retaining screws from this device.
(2) Pull it out horizontally while holding down the sub-base.

TRIAL OPERATION MODE

For details on the trial operation mode, refer to Section CP-SP-1383E.

FUNCTION SELECTION MODE

For details on the POC selection method and various settings, refer to Section CP-SP-1383E.

WIRING CONNECTION

⚠WARNING

Connect the load (ignition transformer, solenoid valve, etc.) directly to the output terminals of this device. If it is not directly connected, combustion safety cannot be ensured.

⚠CAUTION

Follow all applicable regulations when doing the wiring work.

Run the high-voltage ignition transformer cable separately and keep it at least 30 cm away from the device.

Make sure that ignition transformer high-voltage cables are properly connected to prevent faulty contact. Faulty contact can generate high-frequency radio waves, causing malfunction.

The ignition transformer ground lead should be connected directly to the burner itself or to a metallic part electrically connected to the burner.

Keep power lines and ignition transformer high-voltage cables separate from the flame detector wires.

Supply power at the voltage indicated on the model number label of the device.

In keeping with technical standards for electrical equipment, the burner frame must be connected to an earth ground by a wire having a resistance of less than 100 Ω.

After wiring work, be sure to check that the wiring is correct. Incorrect wiring can cause damage or malfunction.

If the wires from this device exceed the recommended length, to prevent malfunction due to external electrical noise, take measures such as keeping power lines away from the input lines between the control panel and the combustion equipment. After wiring, check that the equipment is operating properly.

Be sure to connect non-voltage contacts to the inputs of this device (terminals 16–24).

Make sure that loads connected to the terminals do not exceed the rating indicated in the specifications.

When discarding this product, dispose of it as industrial waste, following local regulations.

After the power has been turned ON, leave sufficient time before checking the output. This device does not operate for about 8 seconds after the power has been turned ON.

If there is an inverter or the like that generates strong electrical noise near this device, take noise-suppression measures, referring to the user's manual for the noise-generating equipment.

Do not design instrumentation that shuts off the power to this device as soon as alarm output is generated. Doing so can corrupt this device's operation history records.

Do not connect a load that exceeds the rating stated in the specifications to the control load terminals (terminals 2–1, 2–6, 2–7, or 2–8), and do not short-circuit the load. Doing so will burn out the internal fuse, making the device unusable.

■ Wiring of the Flame Detector

⚠CAUTION

Connect terminal F of the AUD110C Advanced Ultraviolet Flame Detector to terminal 14 (F), and connect terminal G to terminal 15 (G). For the AUD100C/120C, connect the blue signal lead to terminal 14 (F), and the white lead to terminal 15 (G). If the power is turned ON with incorrect wiring, the AUD15C tube unit will be damaged.

ALARM CODES

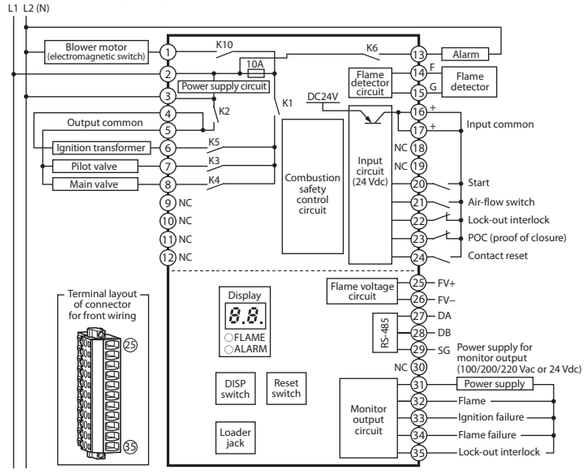
Display	Name	Description
E0	Interlock error	Lock-out interlock operated
E1	False flame	The flame signal is detected for 5 s during pre-purge
E2	Air-flow switch error (1)	The air-flow switch turned Off during combustion
E3	Air-flow switch error (2)	The air-flow switch stayed On for 180 s during start check
		The air-flow switch stayed Off for 180 s during pre-purge
E6	Ignition failure	Ignition could not be detected with ignition trial
E7	Flame failure	The flame signal disappeared in the sequence after ignition trial
E8	POC (proof of closure) error	The shutoff valve closure check switch was detected to be Off (open) when the main valve was closed
		The shutoff valve closure check switch was detected to be On (closed) when the main valve was open
E9 + Sub-code (2-digit)*	Device error	Abnormal voltage detected in output from the ignition transformer, pilot valve, or main valve, etc.

* For details, refer to Section CP-SP-1383E.

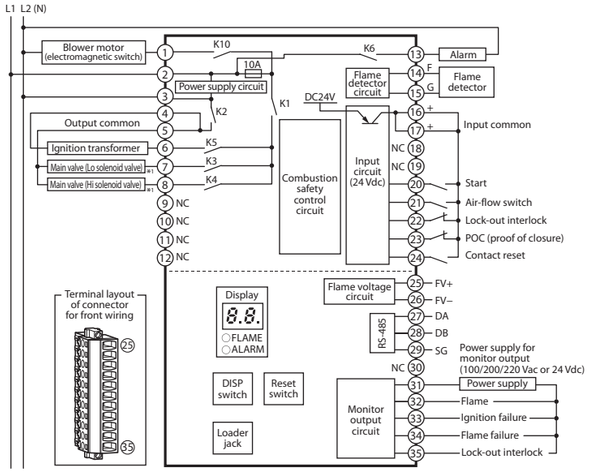
■ Example of Wiring Connection with External Device

(Terminals 1 to 24: sub-bases 25 to 35: front connector)

● Interrupted pilot type



● Direct ignition type



Note

- Use 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 (terminal 16, 17) cannot be used in conjunction with other BC-R.

*1. Content in ( ) describes the situation when three-position (Off-Lo-Hi) control is used. If other than three-position control is used, connect to main valve (terminal 7).

SEQUENCE CODES

- Interrupted pilot type

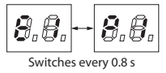
Display	Status content
P1	Start check
P2	Pre-purge
P4	Ignition trial
P5	Pilot stabilization
P6	Main trial
P8	RUN
P9	Post-purge
Pr	Reignition standby
--	Controlled shutdown

- Direct ignition type

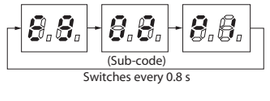
Display	Status content
P1	Start check
P2	Pre-purge
P4	Ignition trial
P5	Hi-valve ignition standby
P6	Hi-valve ignition
P8	RUN
P9	Post-purge
Pr	Reignition standby
--	Controlled shutdown

● Examples of sequence codes and alarm codes

- Alarm code: E0–E8



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



MODEL NUMBER COMPOSITION

● Interrupted pilot type

I II III IV V VI VII Example: BC-R25B1H0500

I Base model number	II Communications function	III Flame detector	IV Power supply	V Function code	VI Timing code	VII Additional functions	Description
BC-R							Burner Controller
	25						RS-485, with Smart Loader Package function
		B					Flame rod (Ionization)
		C					UV sensor
			1				100 Vac
			2				200 Vac
			6				220 Vac
				H			Recycling Model Interrupted pilot type
					050		Pre-purge time 35 s
					086		Pre-purge time 45 s
					122		Pre-purge time 60 s
					158		Pre-purge time 3 min
						0	None
						D	With inspection record (with data)

● Direct ignition type

I II III IV V VI VII Example: BC-R25B1K0500

I Base model number	II Communications function	III Flame detector	IV Power supply	V Function code	VI Timing code	VII Additional functions	Description
BC-R							Burner Controller
	25						RS-485, with Smart Loader Package function
		B					Flame rod (Ionization)
		C					UV sensor
			1				100 Vac
			2				200 Vac
			6				220 Vac
				K			Recycling Model Direct ignition type
					050		Pre-purge time 35 s
					086		Pre-purge time 45 s
					122		Pre-purge time 60 s
					158		Pre-purge time 3 min
						0	None
						D	With inspection record (with data)

SPECIFICATIONS

Item		Description					
Application		Batch-operated combustion systems burning gas, oil, or gas/oil mixture					
Compatible flame detector		AUD100/110/120 series UV sensor, flame rod					
Sequence	Sequence timing	Pre-purge	Ignition trial	Pilot stabilization (Hi-valve ignition standby)*1	Main trial (Hi-valve ignition)*1	Post-purge	Inter-waiting
		35 s, 45 s, 60 s, 3 min (selected by model number)	4.5±0.5 s	8.5±1 s	4.5±0.5 s	20±2 s	5±0.5 s
	Flame failure response timing	AUD100/110/120 series UV sensor		Flame rod (Ionization)			
		2 s max. (nominal 1.5 s) (when flame voltage is 3 V)		2 s max. (nominal 1.5 s) (when flame voltage is 2 V)			
	Reset timing	1 s or longer (reset switch or contact reset input)					
	Alarm detection timing	False flame	Air-flow switch (1)	Air-flow switch (2)	Interlock error	POC (proof of closure) error	
		5 s	1 s max.	180 s	1 s max.	3 s	
	Air-flow switch observation	Available (performs observation of air-flow switch malfunction (1), (2))					
	Operation at ignition failure	Recycling (one time)					
	Operation at flame failure	Lock-out					
Electrical specifications	Rated power supply	100 Vac, 200 Vac, or 220 Vac (depending on the model), 50 Hz or 60 Hz					
	Allowable power supply voltage	85–110 % of rated power supply					
	Power consumption	10 W or less					
	Dielectric strength	1500 Vac for 1 min, or 1800 Vac for 1 s Between each terminal and ground (the DIN rail clamp), except for combustion sensor connection terminals (terminals 14, 15)					
	Insulation resistance	50 MΩ min. with 500 Vdc megger Between each terminal and ground (the DIN rail clamp), except for combustion sensor connection terminals (terminals 14, 15)					
	Contact rating	Blower motor (electromagnetic switch)	Ignition transformer	Pilot valve (main valve Lo solenoid valve)*1	Main valve (main valve Hi solenoid valve)*1	Alarm	
		100 VA	300 VA	200 VA	200 VA	75 VA	
	Monitor outputs*2	4 max. 30 mA each					
	Flame detection level	AUD100/110/120 series UV sensor		Flame rod (Ionization)			
		Flame establishment: 1.5–4.5 Vdc Flame-out detection: 0.2–0.6 Vdc		Flame establishment: 1.5–4.5 Vdc Flame-out detection: 0.0–0.2 Vdc			
	Flame voltage output	Recommended flame voltage: Must be stable at 2 Vdc or above Flame voltage output range: 0.2–4.5 Vdc		Recommended flame voltage: Must be stable at 2 Vdc or above Flame voltage output range: 0.0–4.5 Vdc			
	Input	Start, lock-out interlock, contact reset, air-flow switch, POC (shutoff valve proof of closure) Each input is a non-voltage contact input, with allowable contact resistance up to 500 Ω					
	Life	10 years when used for eight hours per day, or 100,000 start/stop cycles (at 25 °C, room humidity, rated voltage)					
Operating conditions	Ambient temperature	–20 to +60 °C					
	Ambient humidity	10–90 %RH (no condensation)					
	Vibration	0–3.2 m/s² (10–150 Hz, 1 octave/minute, 10 cycles, in each of XYZ directions)					
	Shock	0–9.8 m/s²					
	Mounting angle	Reference plane +/–10°					
	Dust	0.3 mg/m³ or less					
General specifications	Protection rating	IP40 (with sideboards (81447515-001) attached to the sub-base (BC-R05)) IP10 (sub-base (BC-R05) only)					
	Overvoltage category	II					
	Pollution degree	PD2					
	Case color	Black					
	Case material	Denatured PPE resin (UL94-V0 PTI Material group IIIa)					
	Structure	Sub-base and main device					
	Mounted orientation	Vertical or horizontal However, for horizontal attachment, 7 segment display can only be mounted so that it faces directly overhead (DIN rail mounting or direct mounting through base screw holes)					
	Standards	JIS C 9730-2-5:2010 (Automatic Electrical Controls For Household And Similar Use - Part 2-5: Particular Requirements For Automatic Electrical Burner Control Systems) Compliant with JIS C 9730-1:2010 (Automatic Electrical Controls For Household And Similar Use - Part 1: General Requirements)					
	Dimensions	W95 × H105 × D110 mm					
	Weight	Approximately 600 g (incl. sub-base)					
Wiring types and max. wiring length		• Start, air-flow switch, lock-out interlock, POC (shutoff valve proof of closure) Copper IV wire with 600 V vinyl insulation, 1.25 mm² Recommended condition: 20 m or less, max. wiring length: 100 m • Contact reset Copper IV wire with 600 V vinyl insulation, 1.25 mm², max. wiring length: 10 m • AUD100 Series (F, G) Copper IV wire with 600 V vinyl insulation, 1.25 mm², max. wiring length: 100 m • Flame rod (F, G) RG-11U (JAN standard: US DoD compliant specification) Or equivalent 5C2V, 7C2V (JIS standard) Recommended condition: 20 m or less, max. wiring length: 30 m • RS-485 communications (3-wire system) 0.2–1.5 mm² Shielded twisted pair cable (recommended) Max. wiring length: 500 m • Flame voltage output signal circuit IV wire 0.75 mm² or larger, max. wiring length 10 m					

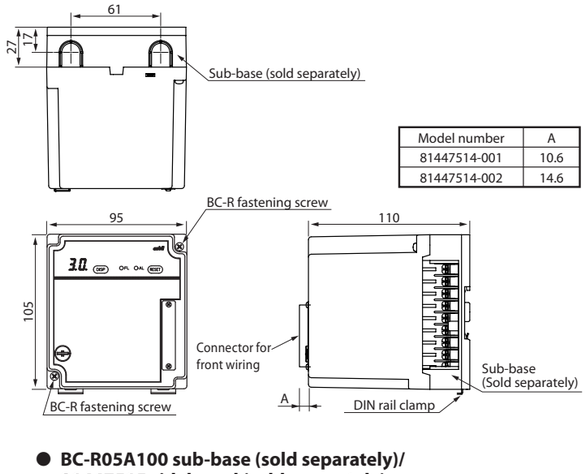
*1. Item in ( ) is for the case of direct ignition.

*2. If an inductive load is used, connect a protection circuit such as an RC snubber to the load in parallel.

EXTERNAL DIMENSIONS

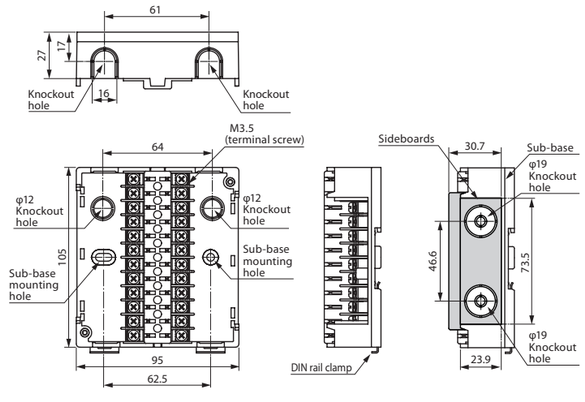
● BC-R25 series Recycling Model

Units: mm



Model number	A
81447514-001	10.6
81447514-002	14.6

● BC-R05A100 sub-base (sold separately)/ 81447515 sideboard (sold separately)



azbil

Specifications are subject to change without notice. (09)

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