

BC-R15/25/35 Burner Controller Circuit Information



Thank you for purchasing an Azbil Corporation product.

This manual contains information for ensuring the correct use of this product. It also provides necessary information for installation, maintenance, and troubleshooting.

This manual should be read by those who design and maintain equipment that uses this product. Be sure to keep this manual nearby for handy reference.

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.

Conventions Used in This Manual

- To prevent injury to the operator and others, and to prevent property damage, the following types of safety precautions are indicated:



Warnings are indicated when mishandling this product might result in death or serious injury.



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

- In describing the product, this manual uses the icons and conventions listed below.



Use caution when handling the product.



The indicated action is prohibited.



Be sure to follow the indicated instructions.

Handling Precautions:

Handling Precautions indicate items that the user should pay attention to when handling this module.



Note:

Notes indicate information that might benefit the user.



This indicates the item or page that the user is requested to refer to.

(1)(2)(3)

Numbers within parentheses indicate steps in a sequence or parts of an explanation.

Safety Precautions

WARNING

	This device is a combustion safety controller specifically designed for batch operation, to be used with combustion equipment that is started and stopped at least once in a 24-hour period. It cannot be used for continuous series combustion.
	If module operation is locked out, eliminate the cause of the lockout and reset it. Also do not repeat the reset many times. Mishandling this product may cause a major accident to combustion equipment.
	A reset signal must always be input near the equipment (burner, etc.), not remotely. 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.

CAUTION

	To use the device correctly, follow this user's manual as well as other manuals for combined equipment and combustion equipment. To plan a combustion safety controller system, consult with an Azbil sales representative thoroughly.
	Mounting, wiring, maintenance, inspection, calibration, etc. should be carried out by a professional with technical training in combustion systems and flame safeguard control devices.
	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.
	Wire this device in compliance with established standards, using the power source and installation methods specified in this user's manual. Not doing so may cause device failure or malfunction.
	A fuse is built into the control load line of this device. Do not short-circuit the load, or the fuse will melt. If the fuse has melted, replace the device.
	A ground-fault detection circuit is included in this device. Even if the power supply does not have high and low potential sides, if a ground fault occurs due to insulation failure of a load such as an ignition transformer, pilot valve, or main valves, this device will detect the ground fault and safely shut off and lock out the equipment.
	This device does not operate for about 8 seconds after the power has been turned ON. Take this into account if the output is used as an input signal for other equipment.

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Chapter 1. Overview

BC-R15/25/35 burner controllers are combustion safety controllers specifically designed for batch operation (systems which start and stop at least once within 24 hours). To ensure proper and effective use of BC-R15/25/35 controllers, this manual gives sample circuits and sample replacements of existing circuits.

When making use of these examples, take into account the characteristics and configuration of the facility and burner, or implement a risk assessment to determine the optimal instrumentation and method of operation.

■ Instructions for proper use

- This device has functions that are extremely important for the safe operation of combustion equipment. Therefore, use the device correctly, according to this user's manual.
- The device must be installed, wired, maintained, inspected and adjusted by experienced specialists who have gained knowledge and skills concerning combustion equipment and combustion safety devices.

■ Precautions on facility design

The facilities that use the combustion safety device must be designed taking into careful consideration the following safety guidelines and the like.

If the system is designed to a foreign specification, refer to laws and standards in the relevant country.

- "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" - JIS B 8407
- "Index of Safety Technology of Industrial Gas Combustion Equipment," by Japan Gas Association
- "Index of Safety Technology of Gas Boiler Combustion Facilities," by Japan Gas Association

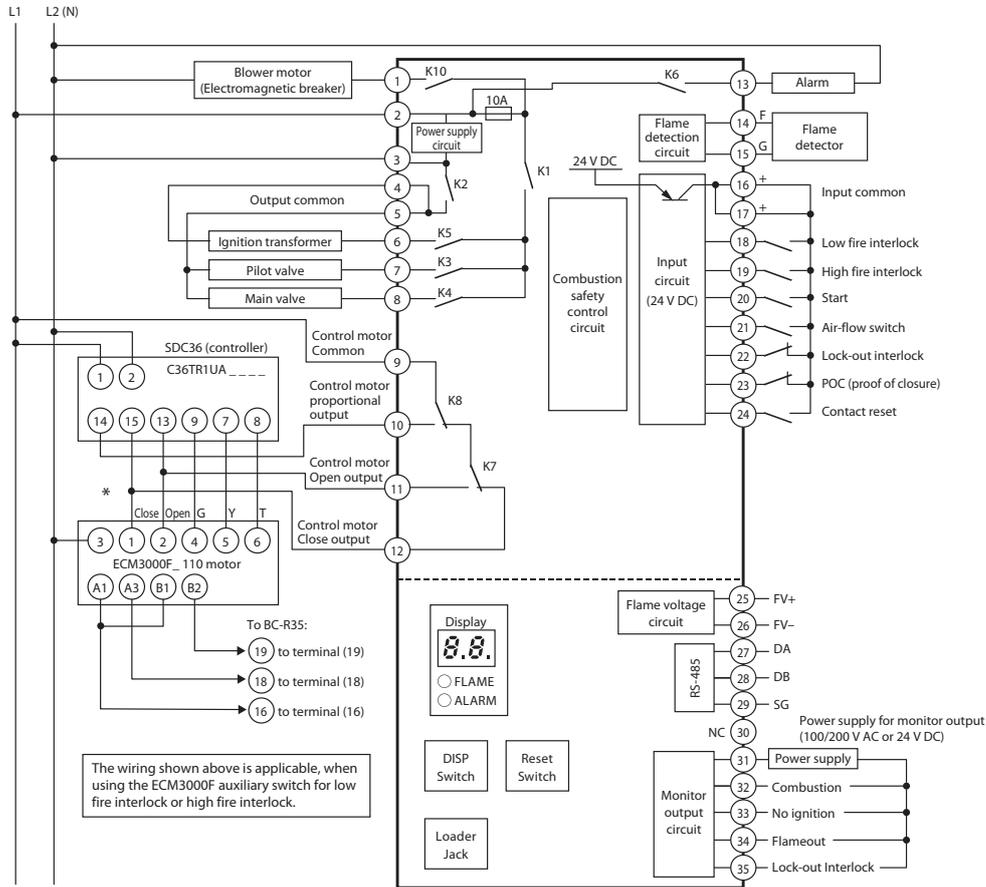
■ Most important points in ensuring safety

The design must take into consideration the following points to ensure safety.

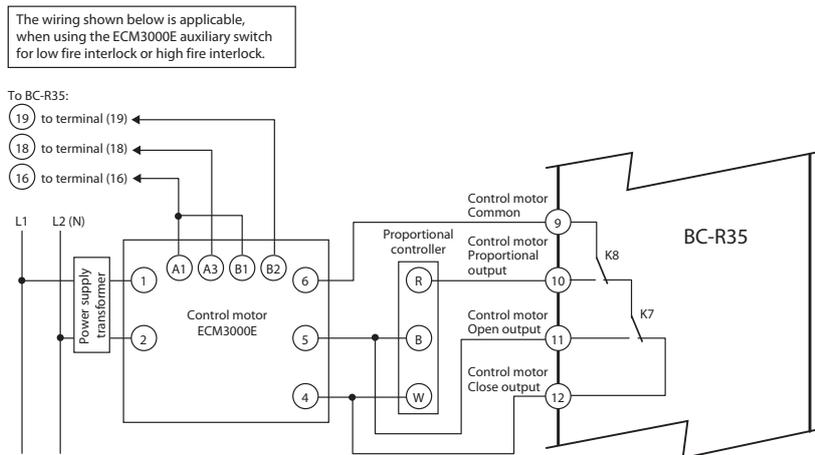
1. Connect the load directly to the device.
2. Make sure that the start check circuit operates correctly at startup.
3. Do not make a manual operation circuit or other bypass circuit for any loads.
4. Use a redundant shutdown system for both main valve and pilot valve.

(1) Internal block circuit and external connection terminals of the BC-R35 series

■ Interrupted pilot type (excluding the BC-R35F)



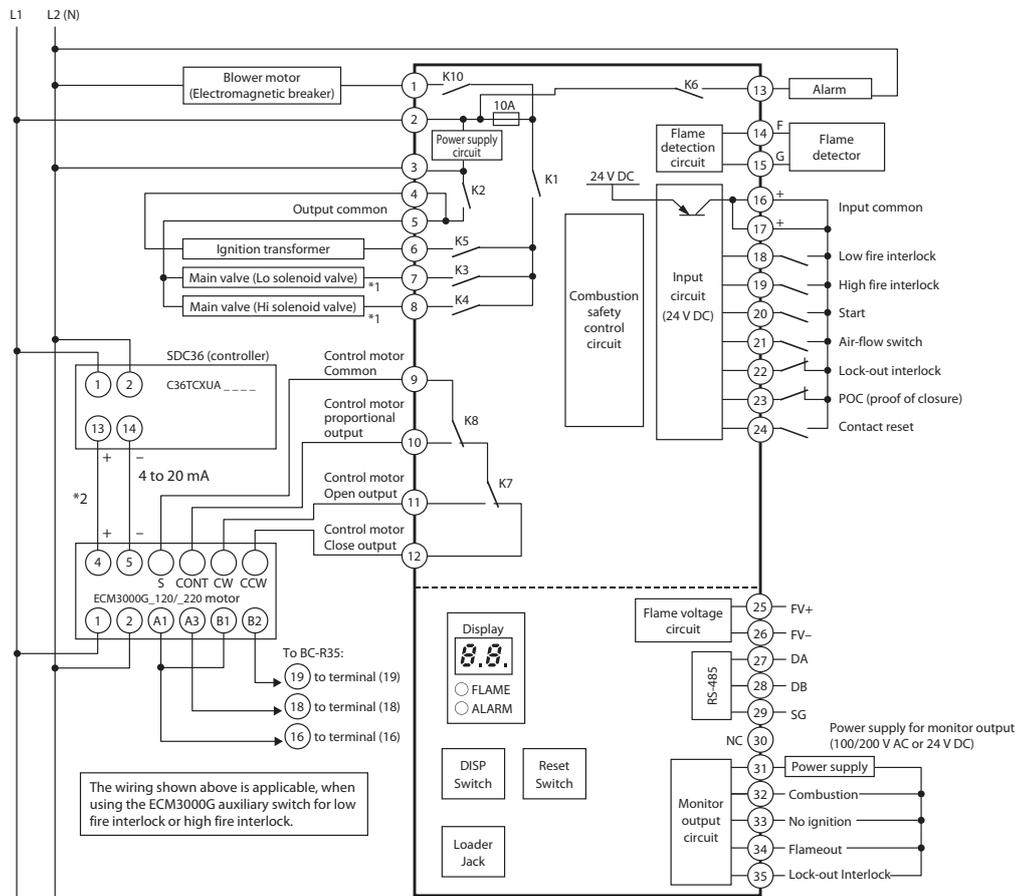
* The following wiring is applicable, when using a proportional controller/ ECM3000E, instead of the SDC36 controller/ ECM3000F.



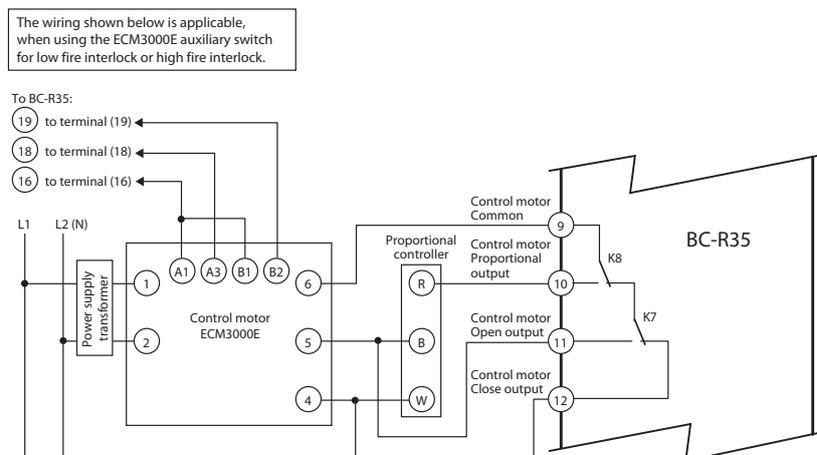
Notes

- Terminals 1-24 are on the subbase. Terminals 25-35 are on the front connector.
- 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 (terminal 16, 17) cannot be used in conjunction with other BC-R.
- Host communications (RS-485) and the Smart Loader Package are available only for BC-R35 models.
- If an inductive load is connected to the monitor output, add a protective circuit such as an RC snubber in parallel with the load.

Direct ignition type



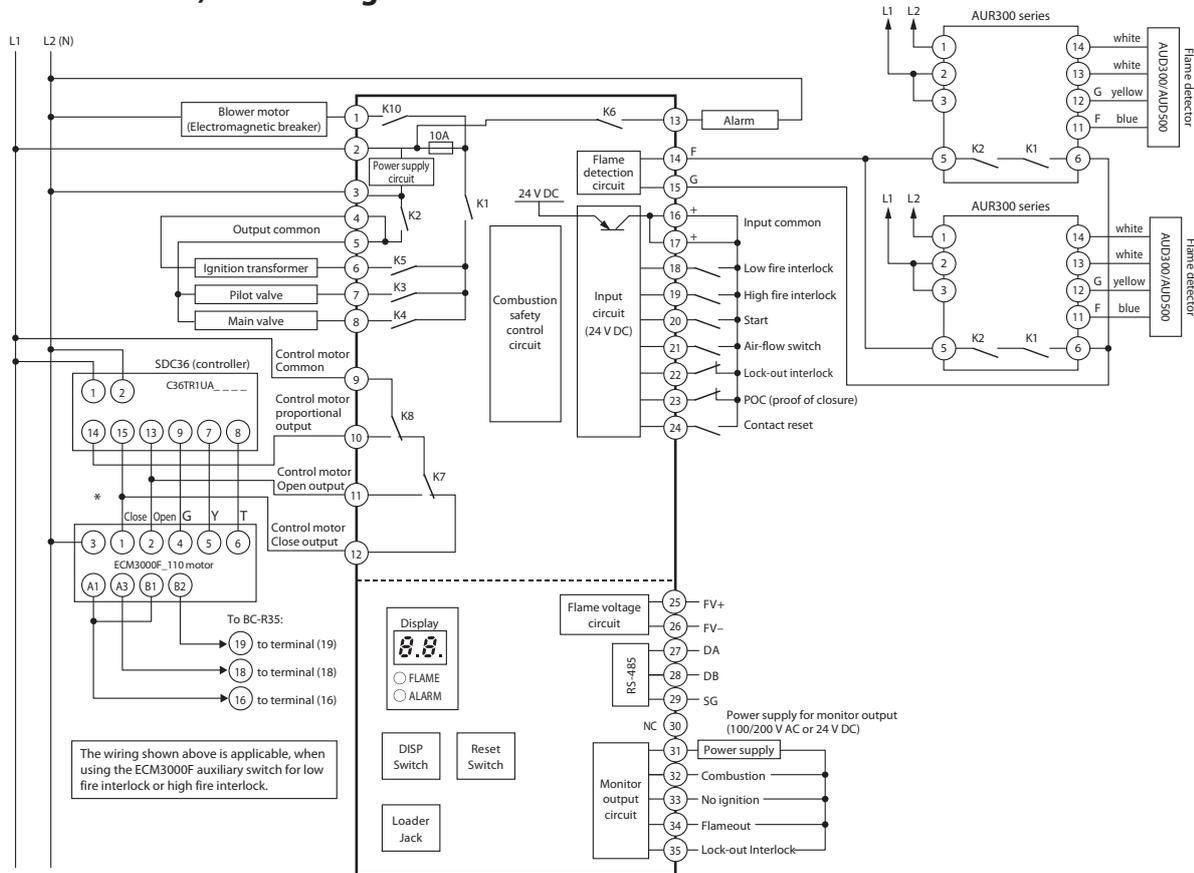
- *1 Content in () describes the situation when three-position (Off-Lo-Hi) control is used. If other than three-position control is used, connect to main valve (terminal 7).
- *2 The following wiring is applicable, when using a proportional controller/ ECM3000E, instead of the SDC36 controller/ ECM3000G.



Notes

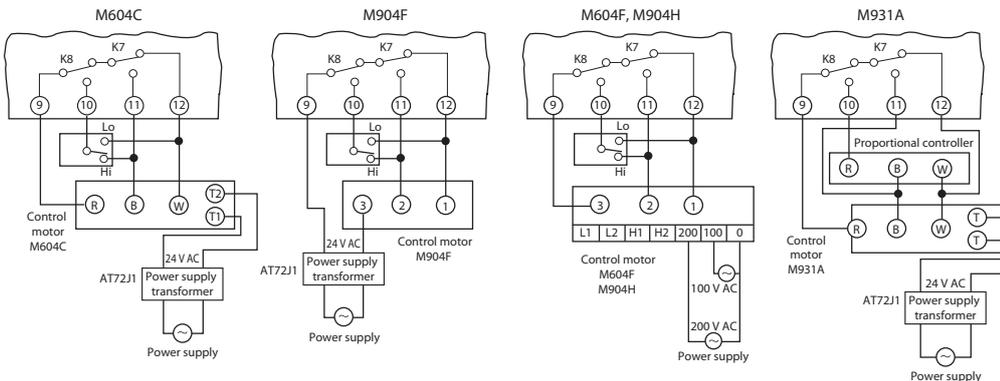
- Terminals 1-24 are on the subbase. Terminals 25-35 are on the front connector.
- Use contact reset (terminal 24) input in isolation. It cannot be used in conjunction with other BC-R contact reset inputs.
- Output common (terminals 4, 5) and input common (terminal 16, 17) cannot be used in conjunction with other BC-R.
- Host communications (RS-485) and the Smart Loader Package are available only for BC-R35 models.
- If an inductive load is connected to the monitor output, add a protective circuit such as an RC snubber in parallel with the load.

For compliance with the standard on remote control of boilers (standards circular No. 0331001) when using the BC-R35F



* See Page 2 and 3 for the following wiring is applicable, when using a proportional controller/ECM3000E, instead of the SDC36 controller/ ECM3000F.

• Wiring with other control motors

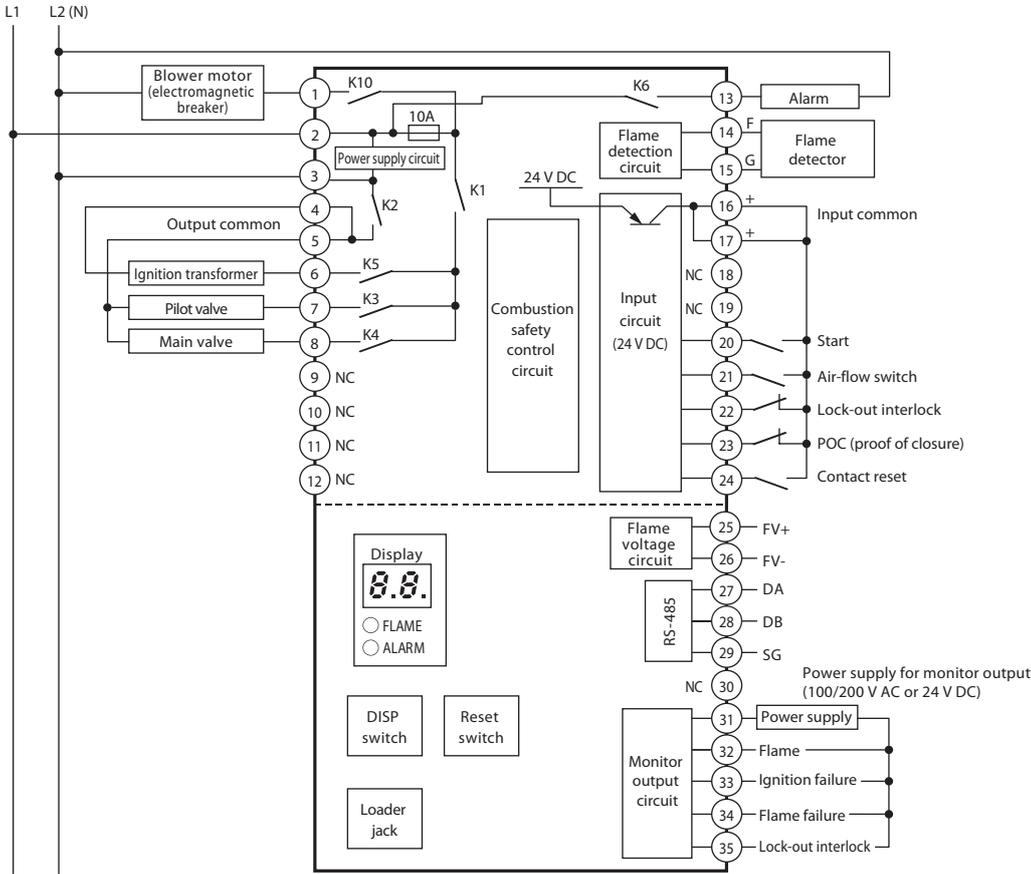


Notes

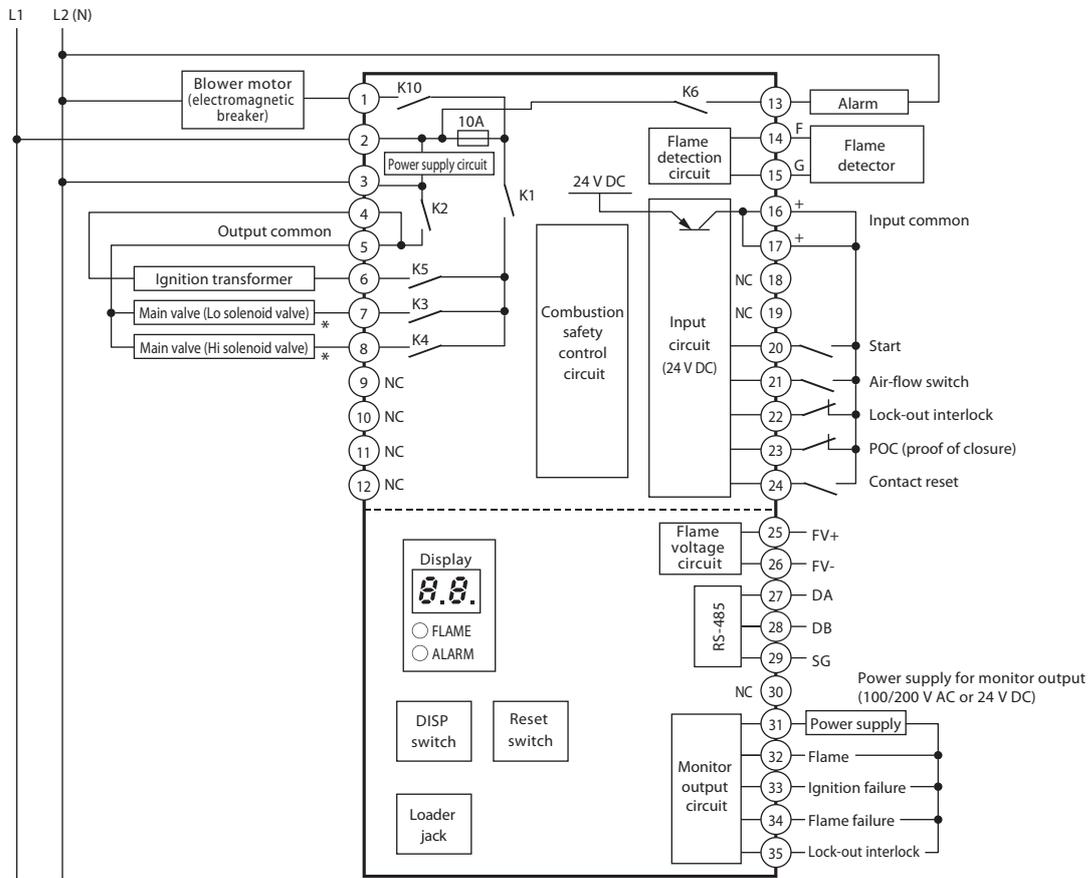
- This controller cannot be used for continuous combustion operation, even if it is used together with a flame detector that is designed for continuous operation.
- Terminals 1-24 are on the subbase. Terminals 25-35 are on the front connector.
- Use contact reset (terminal 24) input in isolation. It cannot be used in conjunction with other BC-R contact reset inputs.
- Output common (terminals 4, 5) and input common (terminal 16, 17) cannot be used in conjunction with other BC-R.
- Host communications (RS-485) and the Smart Loader Package are available only for BC-R35 models.
- If an inductive load is connected to the monitor output, add a protective circuit such as an RC snubber in parallel with the load.

(2) Internal block circuit and external connection terminals of the BC-R25 series

■ Interrupted pilot type



■ Direct ignition type

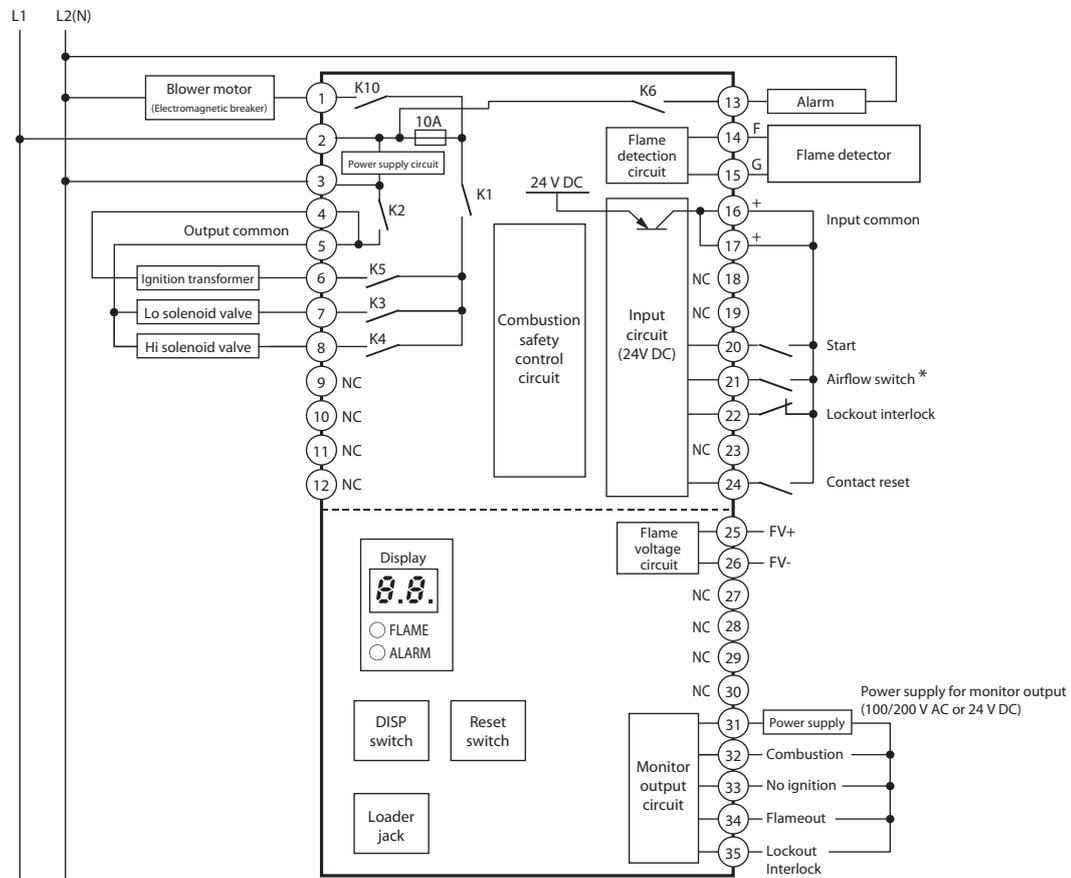


* Content in () describes the situation when three-position (Off-Lo-Hi) control is used. If other than three-position control is used, connect to main valve (terminal 7).

Notes

- Terminals 1-24 are on the subbase. Terminals 25-35 are on the front connector.
- 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 (terminal 16, 17) cannot be used in conjunction with other BC-R.
- Host communications (RS-485) and the Smart Loader Package are available only for BC-R25 models.
- If an inductive load is connected to the monitor output, add a protective circuit such as an RC snubber in parallel with the load.

(3) Internal block circuit and external connection terminals of the BC-R15 series



* Only for models with airflow switch observation.

Notes

- Terminals 1-24 are on the subbase. Terminals 25-35 are on the front connector.
- 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.
- Host communications (RS-485) and the Smart Loader Package are available only for BC-15 models.
- If an inductive load is connected to the monitor output, add a protective circuit such as an RC snubber in parallel with the load.

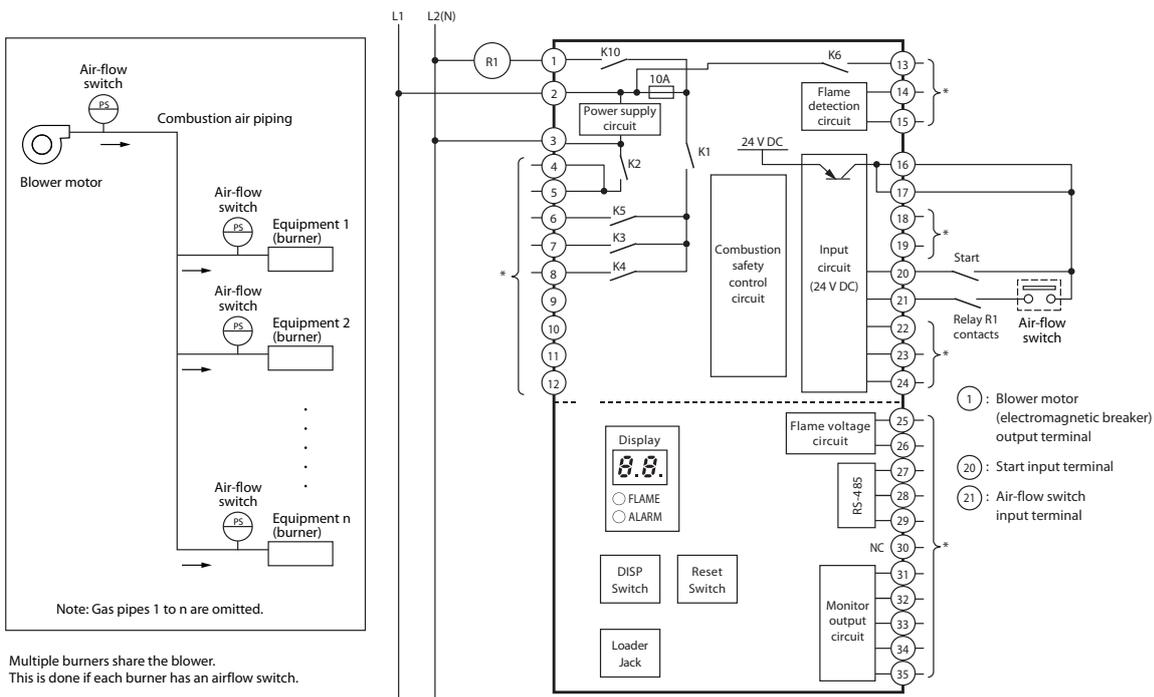
Chapter 2. Sample Circuits for the BC-R15/25/35

(1) If a check for airflow switch OFF at startup is not possible

If each burner has an airflow switch, checking if the airflow switch is OFF when the controller starts is not possible, because other equipment or devices start and stop the blower motor.

In such a case, design the circuit to do the following. Check if the airflow switch is OFF when the blower motor starts. After the check, start the burner controller only if the blower air pressure is normal, and if the pressure is abnormal, stop the procedure.

A BC-R controller is required for each burner.



In this circuit, relay R1 is connected to the blower motor output (terminal 1) so that the contacts of relay R1 and the airflow switch are connected in series (terminal 21). Thus, when the burner controller starts, the check for whether the airflow switch of each burner is OFF is disabled. Then, the airflow status is monitored in the parts of the sequence that follow. If an airflow switch is somehow turned OFF during pre-purge or combustion, lockout will occur.

WARNING



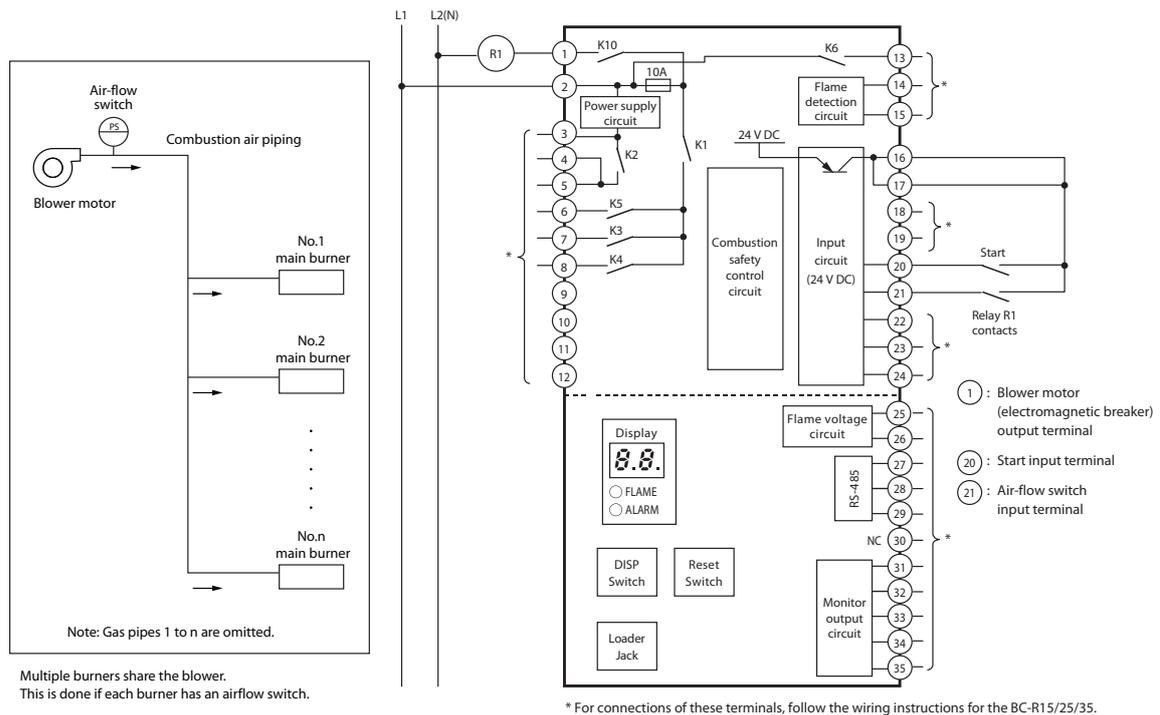
In this circuit, the burner controller does not check if the airflow switch is OFF at startup. In the unlikely event that an airflow switch malfunctions, a serious accident may occur. Before applying this circuit, the equipment manufacturer and the equipment user should do a risk assessment to determine the operating conditions and restrictions.

(2) If the burner controller does not monitor the airflow switch

In this case, other equipment or devices start and stop the blower motor and the burners do not each have an airflow switch (the burner controller does not monitor the airflow switch)

In such a case, design the circuit to do the following. Check if the airflow switch is OFF when the blower motor starts. After the check, start the burner controller only if the blower air pressure is normal, and if the pressure is abnormal, stop the procedure.

A BC-R controller is required for each burner.



In this circuit, relay R1 is connected to the blower motor output (terminal 1) so that the contacts of relay R1 and the airflow switch are connected in series (terminal 21).

⚠ WARNING

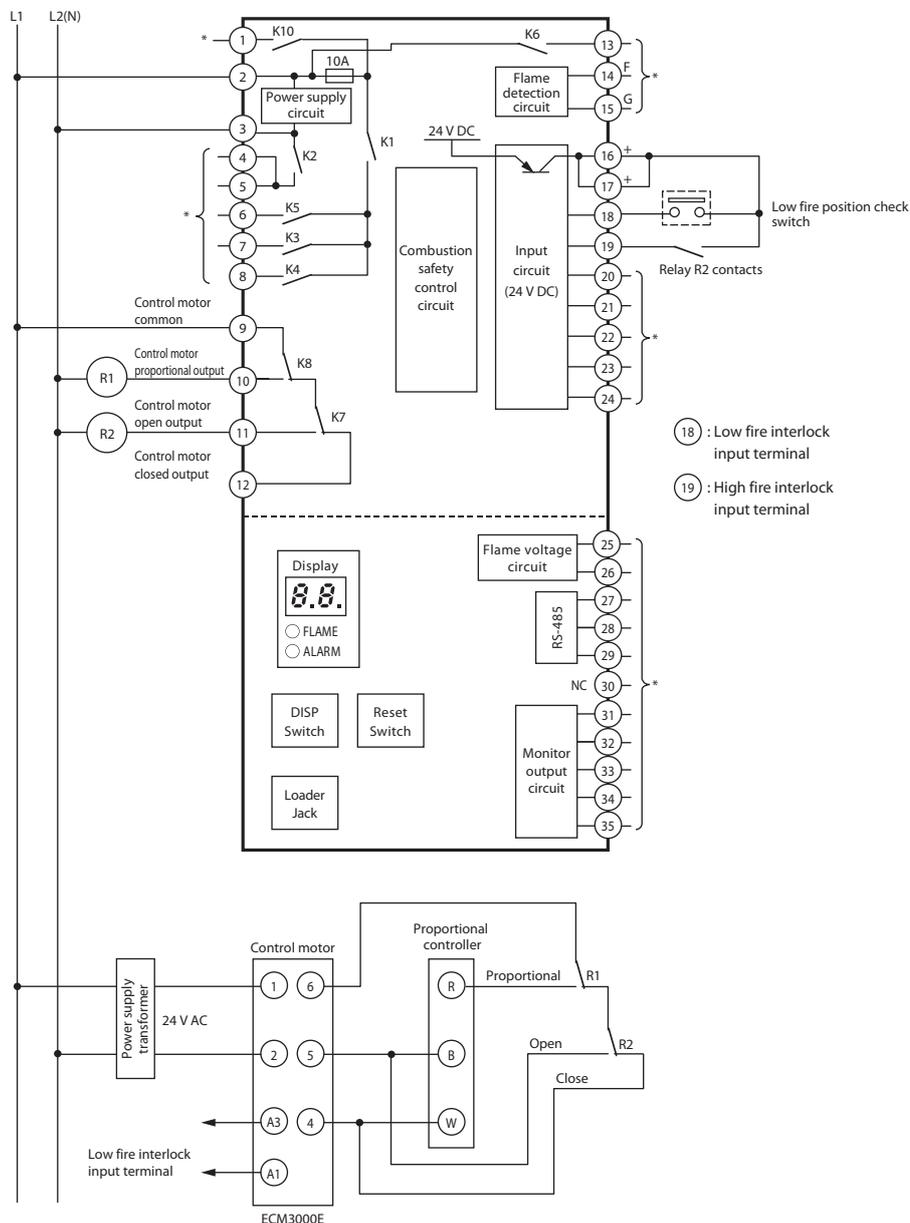
! In this circuit, the burner controller does not check if the airflow switch is OFF at startup. In the unlikely event that an airflow switch malfunctions, a serious accident may occur. Before applying this circuit, the equipment manufacturer and the equipment user should do a risk assessment to determine the operating conditions and restrictions.

(3) Case 1: Only the low fire position check switch is used with proportional combustion burners

In this case a pre-purge (low-high-low purge) is executed without a high fire position check switch

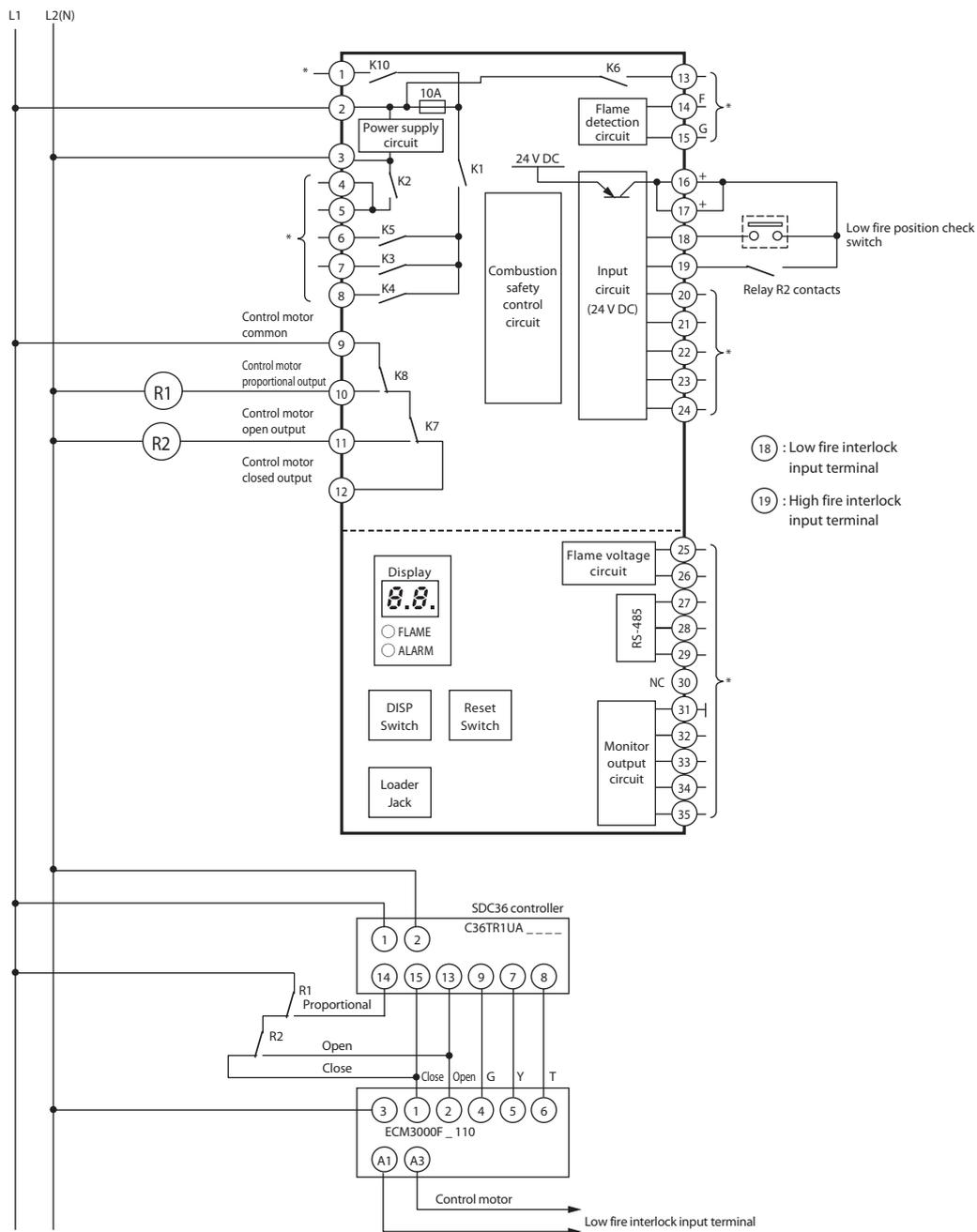
In this circuit, relays R1 and R2 are connected to the damper motor proportional output and the damper motor open output. The relay contacts are used to operate the damper motor to execute a low-high-low pre-purge. Since there is no high fire position check switch, the contacts of auxiliary relay R2 are connected to the high fire interlock input in order to do the pre-purge. After the pre-purge is complete, the damper motor moves to the low fire position. When the low fire position check switch, which is connected to the low fire interlock input, turns on, the BC-R starts low fire ignition. When main burner combustion starts, the damper motor proportional output and relay R1 turn ON to make the external proportional controller operate the damper.

■ If an external proportional controller is used



* For connections of these terminals, follow the wiring instructions for the BC-R15/25/35.

■ If a temperature controller is used



* For connections of these terminals, follow the wiring instructions for the BC-R15/25/35.

⚠ WARNING



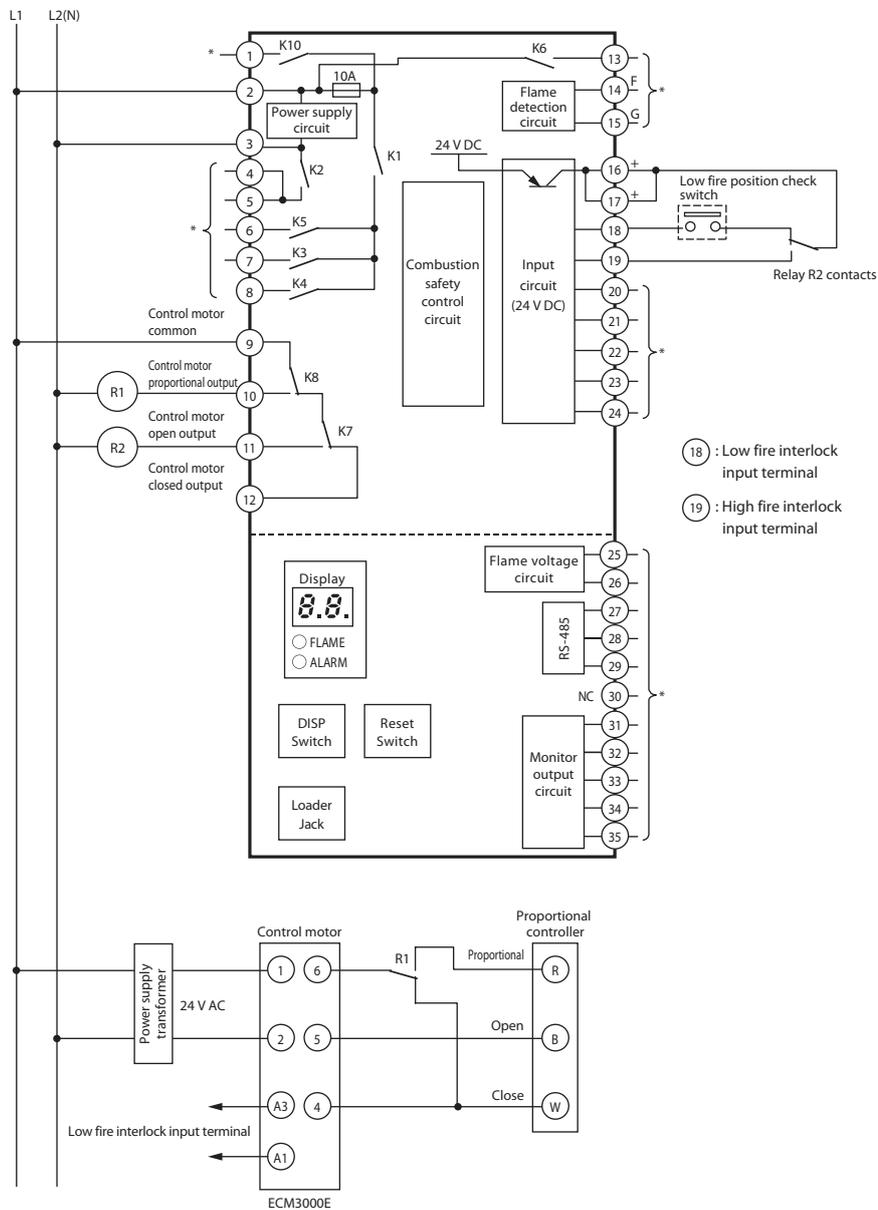
In this circuit, no high fire position check switch is connected to the burner controller. If the ventilation of the furnace is insufficient, in the worst case a serious accident could occur. Before applying this circuit, the equipment manufacturer and the equipment user should do a risk assessment to determine the operating conditions and restrictions.

(4) Case 2: Only the low fire position check switch is used with proportional combustion burners

If the damper motor executes a pre-purge in the low fire position (without a high fire position check switch)

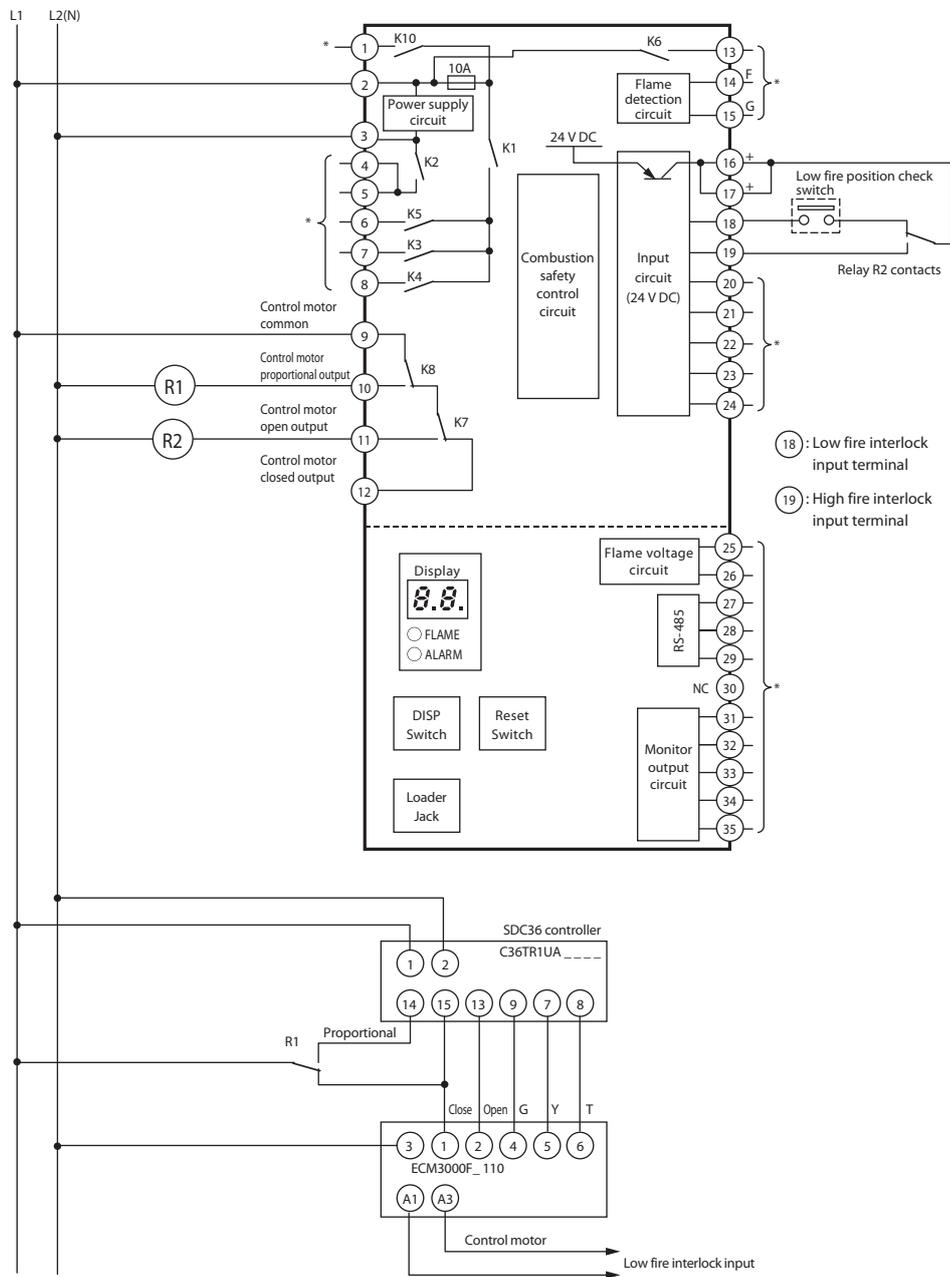
In this circuit, relays R1 and R2 are connected to the damper motor proportional output and the damper motor open output. Until main burner combustion starts, the damper motor is forced to take the low fire position because relay R1 is ON. When the BC-R35 starts, the damper motor open output turns relay R2 ON, which turns ON the high fire interlock input to execute a pre-purge. When the pre-purge is complete, if the low fire position check switch linked to the high fire interlock input turns ON, the BC-R will start low fire ignition. When main burner combustion starts, relay R1 turns ON to make the external proportional controller operate the damper.

■ If an external proportional controller is used



* For connections of these terminals, follow the wiring instructions for the BC-R15/25/35.

■ If a temperature controller is used



* For connections of these terminals, follow the wiring instructions for the BC-R15/25/35.

! WARNING



In this circuit, no high fire position check switch is connected to the burner controller because a pre-purge is executed in the low fire position. If the ventilation of the furnace is insufficient, in the worst case a serious accident could occur. Before applying this circuit, the equipment manufacturer and the equipment user should do a risk assessment to determine the operating conditions and restrictions.

Chapter 3. Sample Modifications of Existing Circuits

3 - 1 Precautions for BC-R use

(1) Precautions for use of BC-R25/35 input circuits

Input signal circuits are low voltage circuits for 24 V DC. Be sure to use non-voltage contacts for input signals.

Unless the airflow switch input, lockout interlock input, low fire interlock input, and high fire interlock input are connected, the input signal circuit will not work because the BC-R will consider there to be an input error. Make connection 1, 2, or 3 for each input as shown in the table below.

Input	BC-R25	BC-R35	Connected device
Start	✓	✓	1. Start signal (contacts) 2. Jumper *
Airflow switch	✓	✓	1. Airflow switch 2. Contact input that is equivalent in operation to the airflow switch
Lockout interlock	✓	✓	1. Interlock switch 2. Jumper
POC (proof of closure)	✓	✓	1. POC (proof of closure) switch 2. Disable POC on the BC-R. 3. Contact input that is equivalent in operation to the POC switch
Low fire interlock	-	✓	1. Low fire check switch 2. Contact input that is equivalent in operation to the low fire check switch
High fire interlock	-	✓	1. High fire check switch 2. Contact input that is equivalent in operation to the high fire check switch

* The BC-R does not operate for about 8 seconds after the start input has been turned ON. Note that accordingly, even with bypass of the start input, the BC-R cannot operate at the same the power (terminals 2 and 3) is turned on.

(2) If the R4750 or R4780 is replaced with BC-R25/35

For replacement of an R4750 or R4780 intermittent pilot model, there is no intermittent pilot model in the BC-R series.

However, the same operation as an intermittent pilot can be obtained by replacing the R4750 or R4780 with a BC-R direct ignition model and connecting the pilot valve to the BC-R25/35 main valve (Lo solenoid valve) terminal and the main valve to the BC-R25/35 main valve (Hi solenoid valve) terminal.

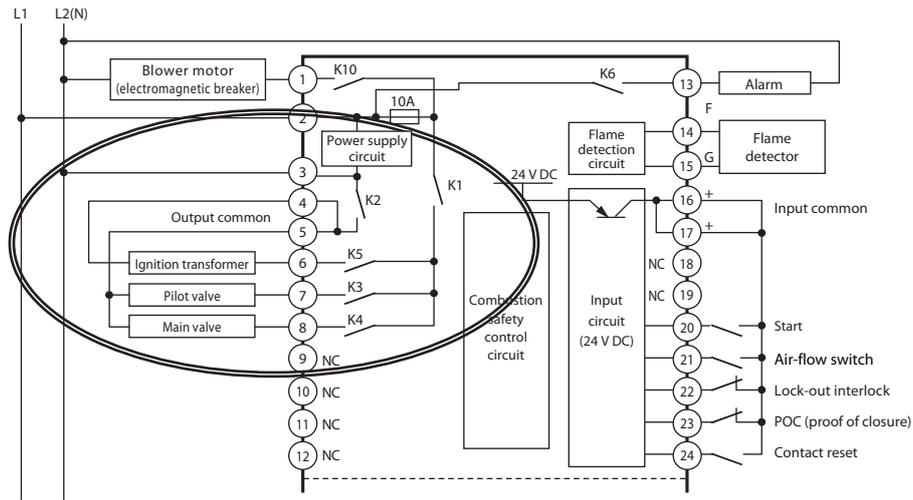
Therefore, use a BC-R direct ignition model to replace a R4750 or R4780 intermittent pilot model.

Model number	flame detector	Pilot	BC-R25/35
R4750B	Flame rod	Intermittent pilot	BC-R25B direct ignition model
R4750C	UV sensor	Intermittent pilot	BC-R25C direct ignition model
R4780B	Flame rod	Intermittent pilot	BC-R35B direct ignition model
		Interrupted pilot	--
R4780C	UV sensor	Intermittent pilot	BC-R35C direct ignition model
		Interrupted pilot	BC-R35C interrupted pilot model
R4780D	AFD	Intermittent pilot	--
		Interrupted pilot	BC-R35A interrupted pilot model
R4780F	Contacts	Intermittent pilot	--
		Interrupted pilot	BC-R35F interrupted pilot model

(3) Precautions for wiring the load when replacing R4750 or R4780 with BC-R25/35

In the BC-R25/35, as shown below, the loads are provided with a double break using the contacts of relays K1 and K2 in order to detect a ground fault or contact welding of control relays (K5, K3, K4) for loads [ignition transformer, pilot valve (main valve: Lo solenoid valve), main valve (main valve: Hi solenoid valve)].

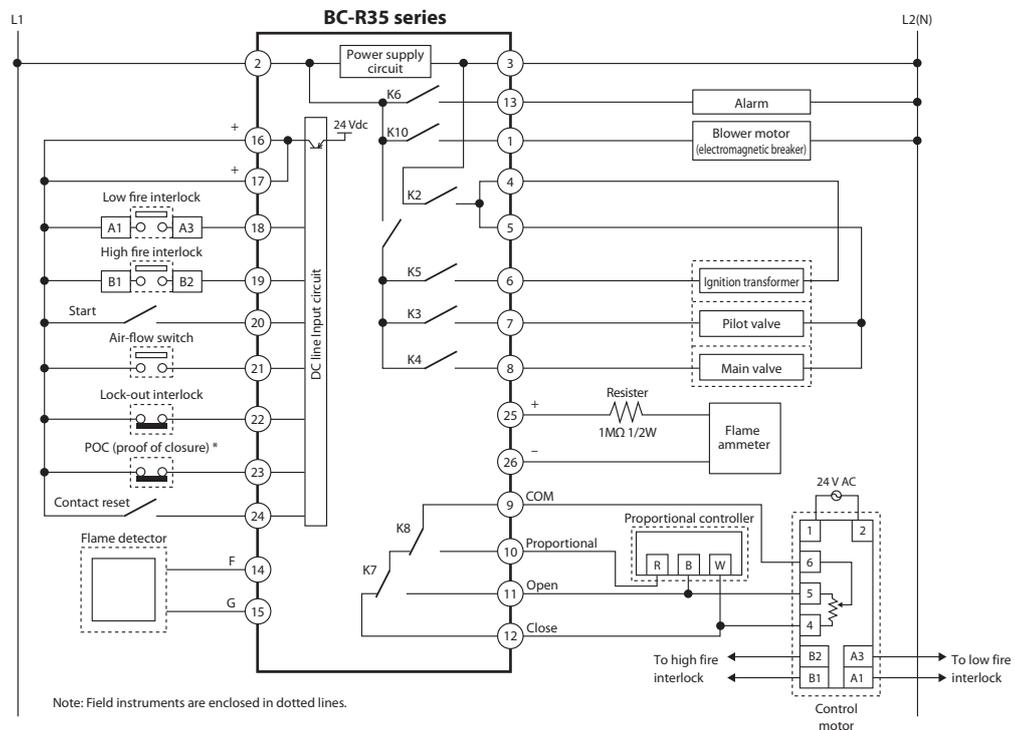
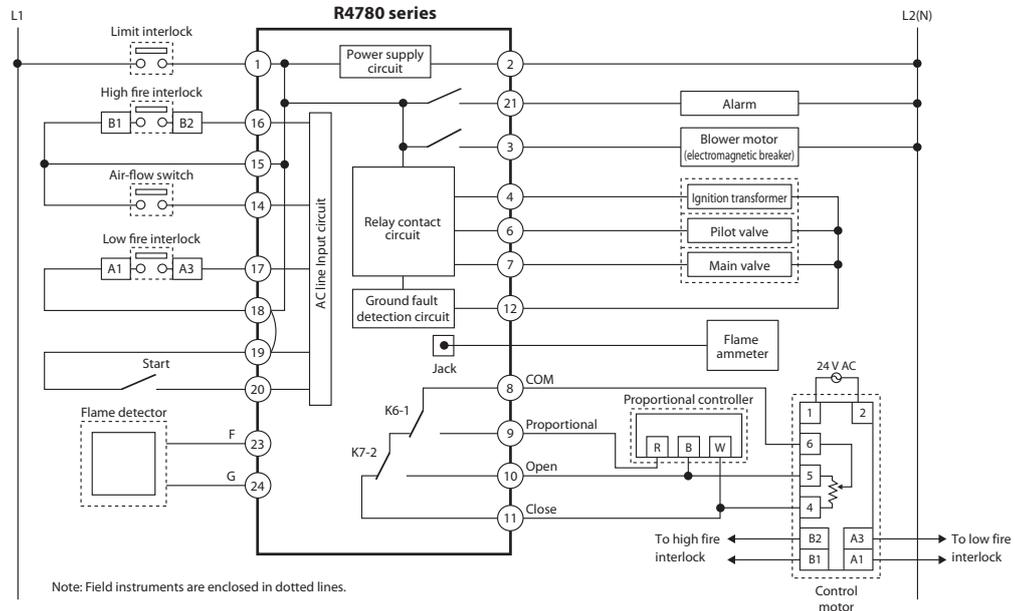
If the R4750 or R4780 is replaced with the BC-R, connect the ignition transformer, pilot valve, and main valve to the load output terminal and output common terminal 4 or 5.



3 - 2 Examples of Basic Circuit Modification

(1) Modified circuit when the R4780 is replaced with the BC-R35

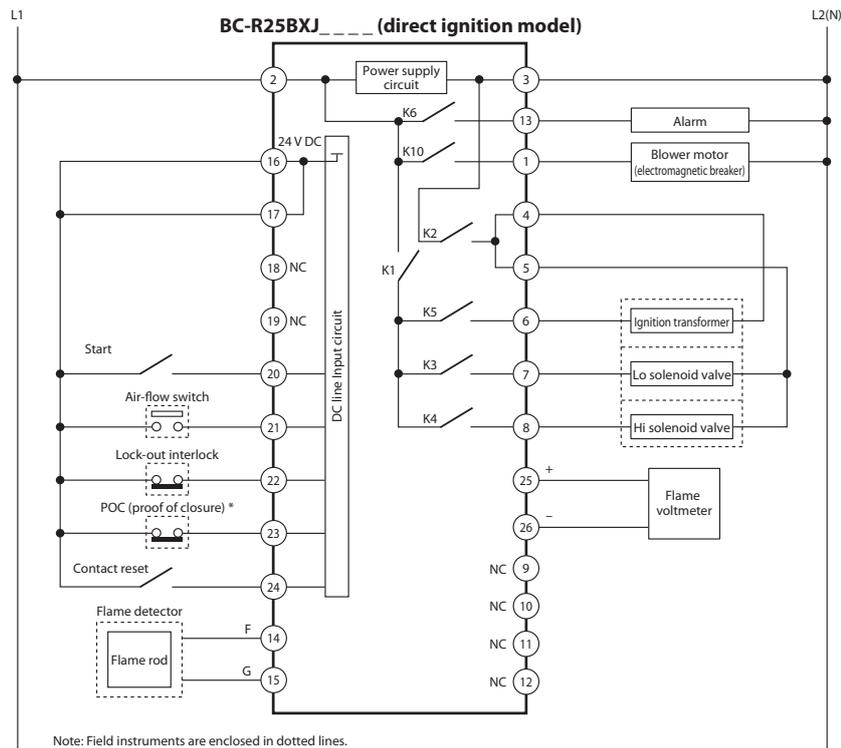
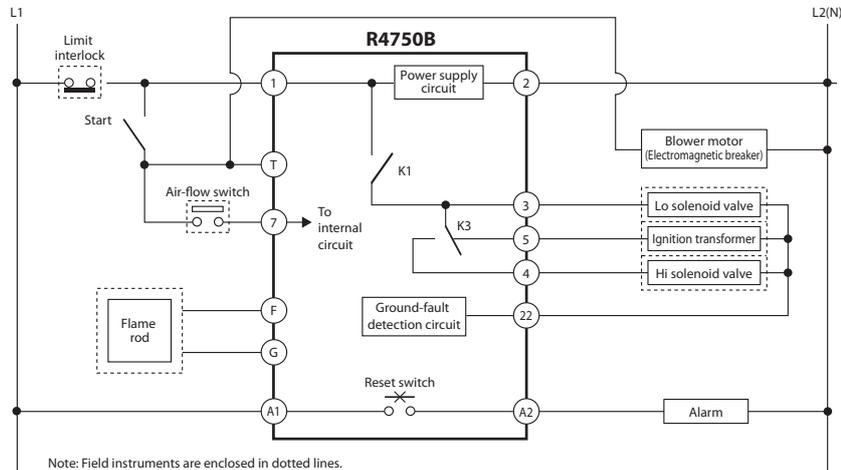
An interrupted pilot wiring diagram is shown below.



* If POC (proof of closure) was not used in the existing circuit, disable POC. For details, see user's manuals for the BC-R35.

(2) Modified circuit when the R4750B is replaced with the BC-R25B

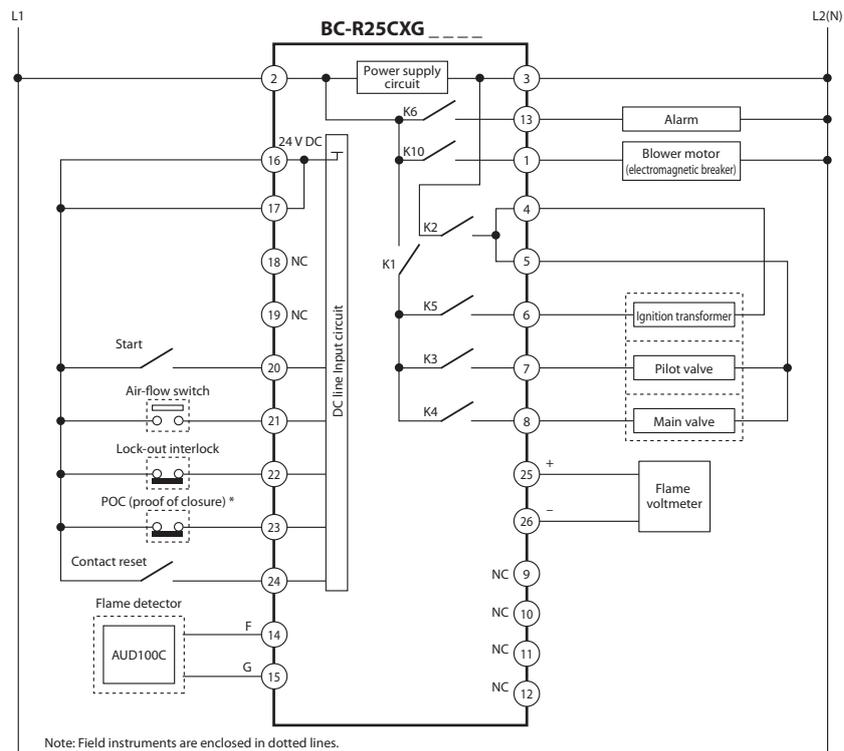
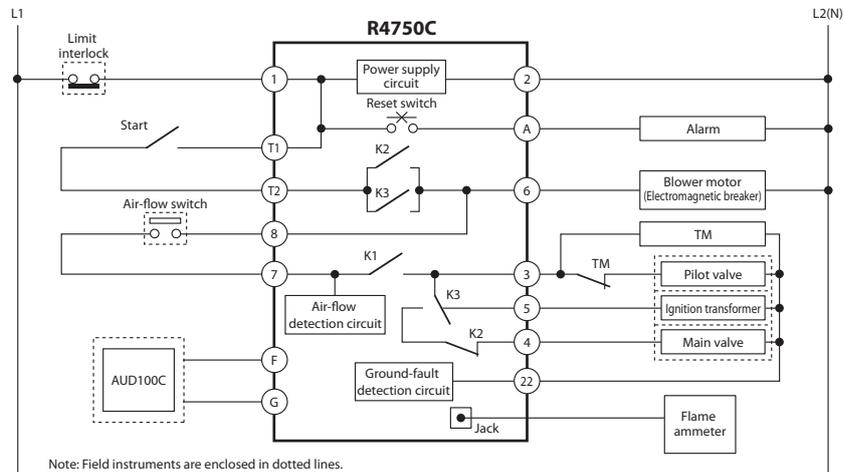
In the circuit below, 3-position control by a direct ignition model is assumed. For this reason, the R4750B pilot valve and main valve are referred to as Lo solenoid valve and Hi solenoid valve, respectively.



* If POC (proof of closure) was not used in the existing circuit, disable POC. For details, see user's manuals for the BC-R25.

(3) Modified circuit when the R4750C is replaced with the BC-R25C

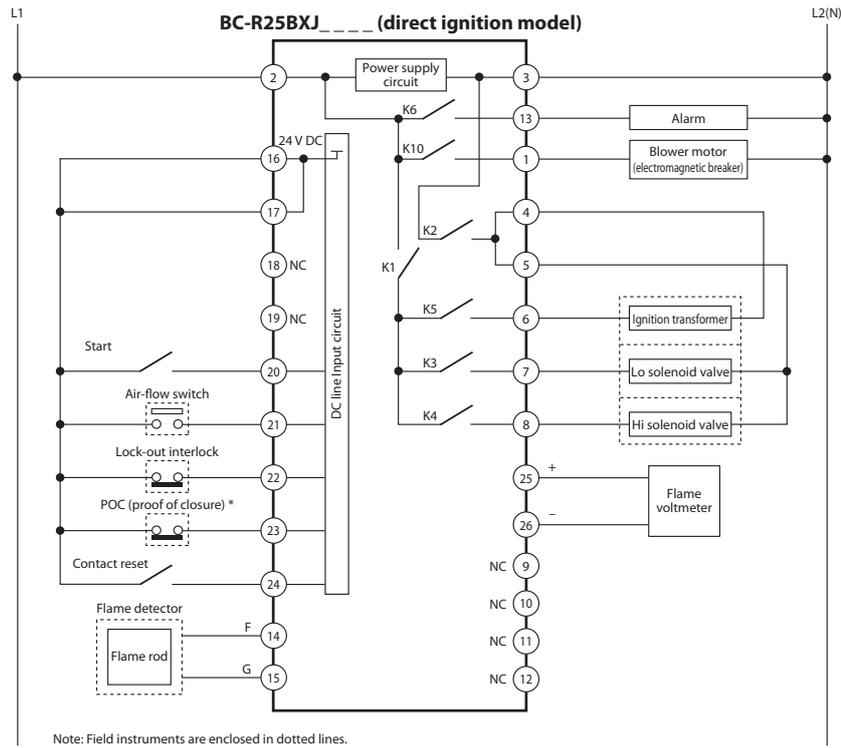
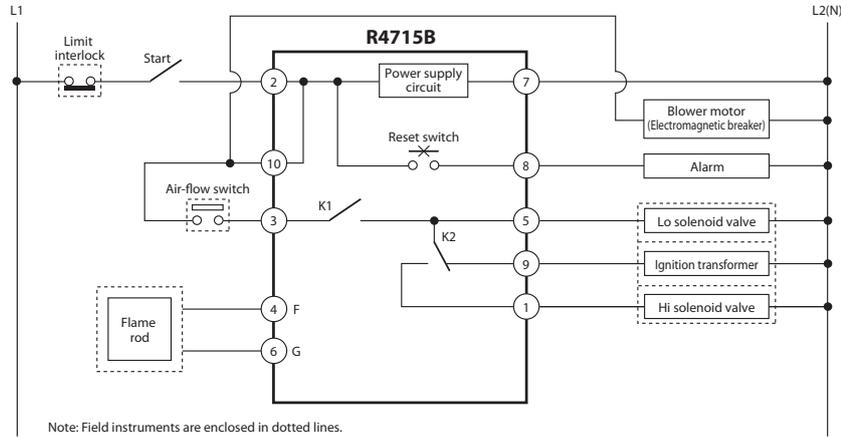
In the circuit below, instrumentation that configures the R4750C with an interrupted pilot using an external circuit is assumed.



* If POC (proof of closure) was not used in the existing circuit, disable POC. For details, see user's manuals for the BC-R25.

(4) Modified circuit when the R4715B is replaced with the BC-R25B

In the circuit below, 3-position control by a direct ignition model is assumed. For this reason, the R4715B pilot valve and main valve are referred to as Lo solenoid valve and Hi solenoid valve, respectively.



* If POC (proof of closure) was not used in the existing circuit, disable POC. For details, see user's manuals for the BC-R25.

Chapter 3. Sample Modifications of Existing Circuits

The table below shows the relation between existing models and the BC-R15. However, there may be differences in times or tolerances. For details, see the specification sheets.

Current/old model	Rated power supply	Pre-purge sequence	Operation at flame failure	BC-R15	Remark
R4424C104-A	100 V AC	Pre-purge	Recycling	BC-R15A7P0070 (BC-R15A7K0070) *	
R4424C204-A	200 V AC				
R4424D1001-A	100 V AC	Pre-ignition Pre-purge	Lockout	BC-R15A7L0040 (BC-R15A7G0040) *	
R4424D1019-A	200 V AC				
R4424D121-A	100 V AC	Pre-ignition Pre-purge	Recycling	BC-R15A7M0050 (BC-R15A7H0050) *	
R4424D221-A	200 V AC				
R4424E104-A	100 V AC	Pre-purge	Lockout	BC-R15A7N0020 (BC-R15A7J0020) *	
R4424E204-A	200 V AC				

* Note: Airflow switch monitoring is available for models in parentheses.

Chapter 3. Sample Modifications of Existing Circuits

The table below shows the relation between existing models and the BC-R15. However, there may be differences in times or tolerances. For details, see the specification sheets.

Current/old model	Rated power supply	Pre-purge sequence	Operation at flame failure	Fuel supplier	BC-R15	Remark
R4440H100-A	100 V AC	Pre-ignition Pre-purge	Recycling	Solenoid pump (SOP), half-wave rectifier	BC-R15A7M00030 (BC-R15A7H0070) *	Install a diode (externally to the BC-R).
R4440H200-A	200 V AC					
R4440H1006-A	100 V AC			Solenoid valve (AC type)		
R4440H1014-A	200 V AC					

* Note: Airflow switch monitoring is available for models in parentheses.

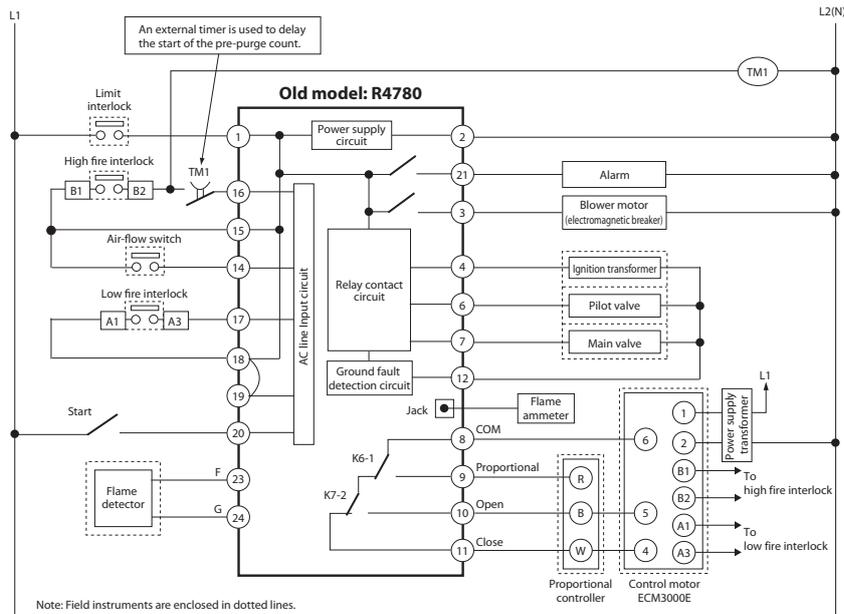
3 - 3 Sample Modifications of Other Existing Systems

(1) If the pre-purge time is extended by a general-purpose timer

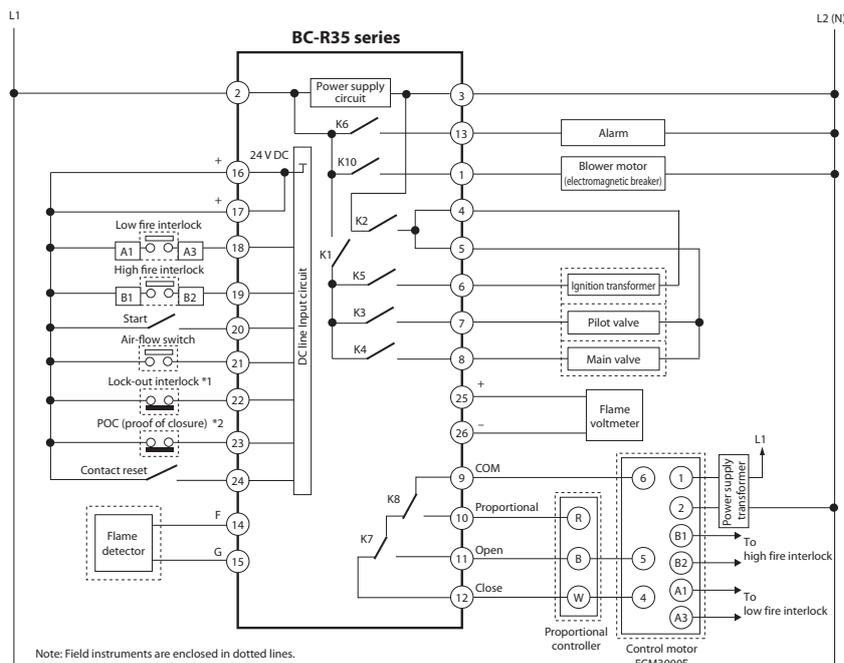
Some systems use an external timer or the like to delay the high fire interlock input or airflow switch input so that the pre-purge time is extended. The pre-purge time is critical for combustion safety. With regard to operation if a circuit or component fails, regardless of replacement of the existing system, conduct a full assessment and evaluation of the risks of timer failure.

If the BC-R15/25/35 is applied to the same type of circuit, if there is no input for three minutes or more, lockout will occur.

■ In the case of R4780



Three-minute pre-purge timer models are available for the BC-R35. So, unlike the R4780, the BC-R35 does not need an external timer.

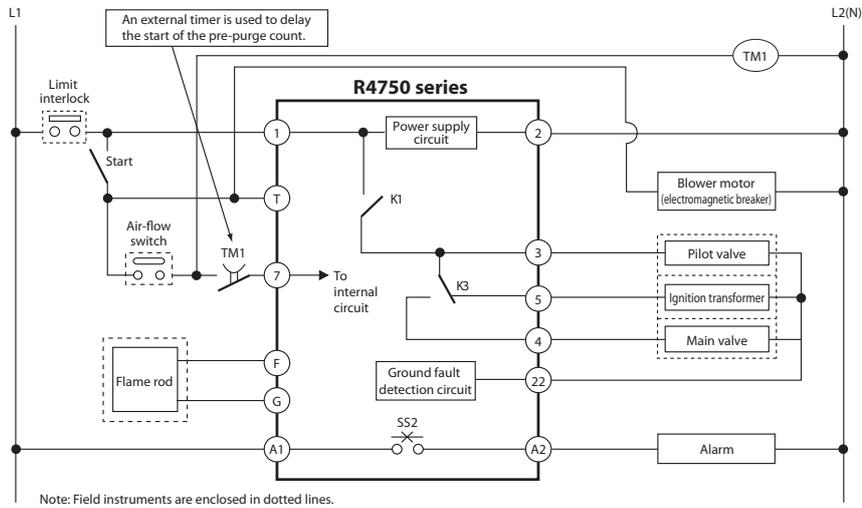


*1 : Gas pressure switch, etc.

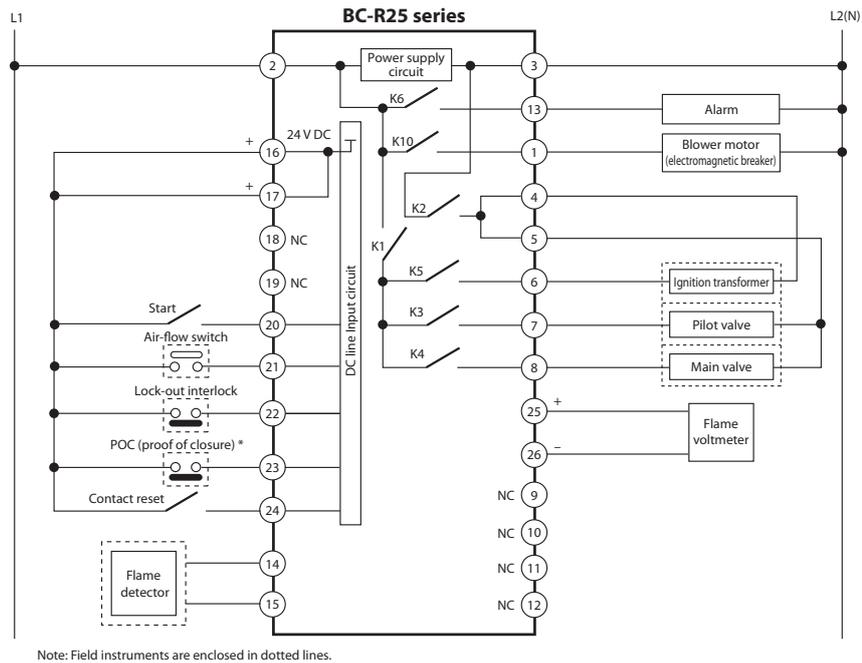
*2 : If POC (proof of closure) was not used for the existing circuit, disable POC.

For details, see user's manuals for the BC-R15/25/35.

■ In the case of R4750



Three-minute pre-purge timer models are available for the BC-R25. So, unlike the R4750B, the BC-R25 does not need an external timer.



* If POC (proof of closure) was not used in the existing circuit, disable POC. For details, see user's manuals for the BC-R15/25/35.

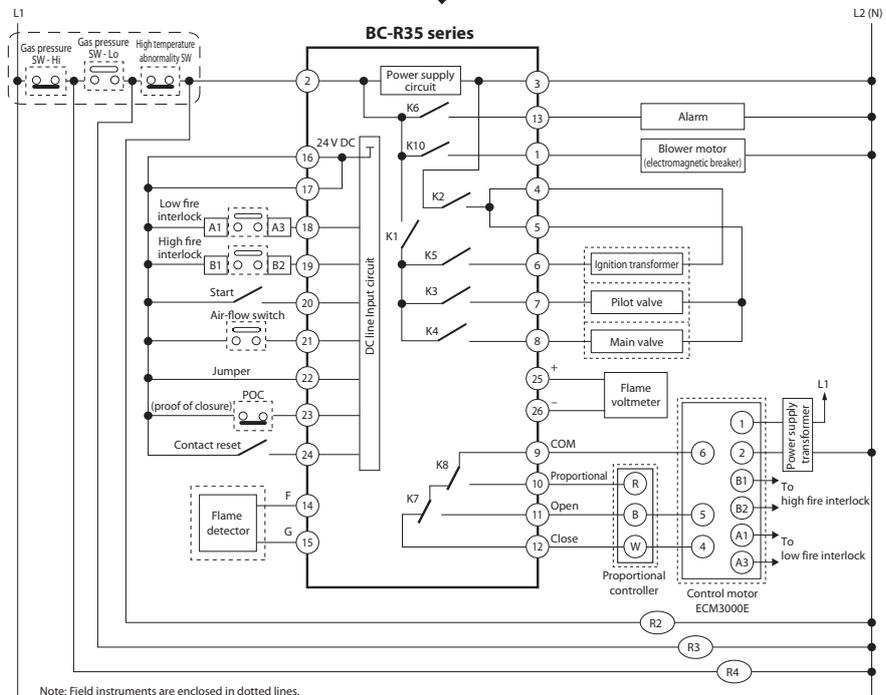
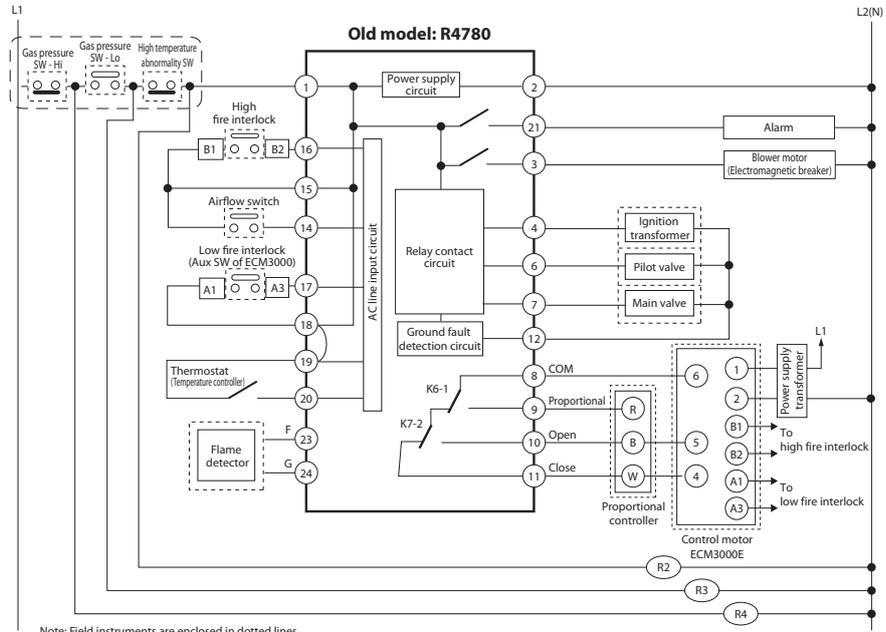
⚠ WARNING



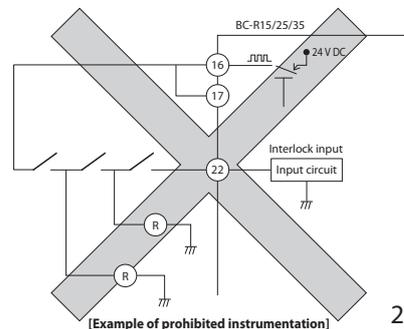
When an external timer is used in combination with the burner controller, if a timer failure causes insufficient ventilation, in the worst case a serious accident could occur. Before applying an external timer, the equipment manufacturer and the equipment user should do a risk assessment on the circuit to make a decision about use. The purge timer of the burner controller is designed to ensure safety even if a timer failure occurs.

(2) When the circuit identifies individual interlocks

With this instrumentation, individual interlock is applied to a relay, and which interlock is activated can be checked on the panel display or PLC. If the BC-R15/25/35 is used as a replacement, use the same circuit for the BC-R power line.

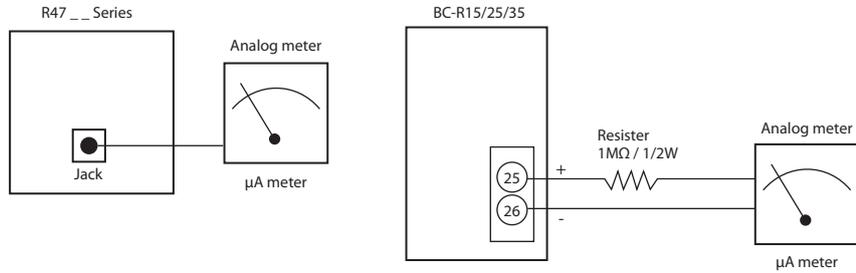


Since the interlock input of the BC-R15/25/35 detects failures using pulse signals, if relays are directly connected to the input, it will not work.



(3) When the flame level of the BC-R is displayed with a micro ammeter

If a micro ammeter was connected to extract the flame current through the jack of the R4750C or R4780, after replacement with the BC-R15/25/35, if a 1 M Ω resistor is installed, the ammeter can be used.

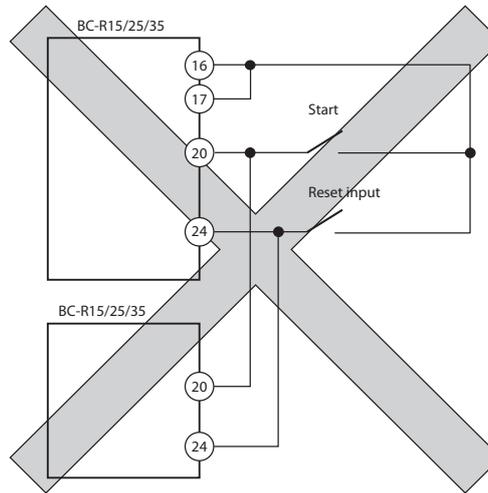


Chapter 4. Important Notes for Instrumentation

4 - 1 Examples of Prohibited Instrumentation

(1) Sharing of reset input and start input with other burner controllers

Since the interlock input of the BC-R15/25/35 detects failures using pulse signals, it cannot be shared with multiple burner controllers. Sharing could result in BC-R15/25/35 failure or malfunction.



[Example of prohibited instrumentation]

Revision History of CP-SP-1372E

Printed	Edn.	Revised pages	Description
Feb. 2015	1		
May 2015	2	3	The top diagram was changed.
Jan. 2018	3	2 to 4, 6, 7	“BC-R series” was changed to “BC-R15/25/35.” Note on loader jack was deleted. Note for connecting an inductive load to the monitor output was added.

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products. You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place.

Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

- (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
- (2) Failure caused for other reasons than Azbil Corporation's product;
- (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
- (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
- (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
- (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down.
You are required to provide your Equipment with safety design such as fool-proof design, *1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance, *3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.

*2. A design that is safe even if the device fails.

*3. Avoidance of device failure by using highly reliable components, etc.

*4. The use of redundancy.

3. Precautions and restrictions on application

Azbil Corporation's products other than those explicitly specified as applicable (e.g. azbil Limit Switch For Nuclear Energy) shall not be used in a nuclear energy controlled area (radiation controlled area).

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product.

However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

In addition,

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below.

Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

- (1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
- (2) For use of specific purposes, such as:
 - * Nuclear energy/radiation related facilities
[For use outside nuclear energy controlled areas] [For use of Azbil Corporation's Limit Switch For Nuclear Energy]
 - * Machinery or equipment for space/sea bottom
 - * Transportation equipment
[Railway, aircraft, vessels, vehicle equipment, etc.]
 - * Antidisaster/crime-prevention equipment

- * Burning appliances
 - * Electrothermal equipment
 - * Amusement facilities
 - * Facilities/applications associated directly with billing
- (3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
 - (4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
 - (5) Machinery or equipment that may affect human lives, human bodies or properties
 - (6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety
4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.
 5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations. In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.
 6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.
 7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.
 8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.
 9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

 - (1) Installation, adjustment, guidance, and attendance at a test run
 - (2) Maintenance, inspection, adjustment, and repair
 - (3) Technical guidance and technical education
 - (4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.



Specifications are subject to change without notice. (09)

Azbil Corporation
Advanced Automation Company

1-12-2 Kawana, Fujisawa
Kanagawa 251-8522 Japan

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

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