International Business Department
Control Products Headquarters
Advanced Automation Company

No. 04-A-0120E

Date: March 19, 2005
To: Those listed
Issued by: I. Yuminaga, International Business Department
Subject: **RN748** Motor Driver

Purpose: To announce the sales release of the **RN748** motor driver for industrial applications

Background: The currently available **RN796A101** is an analog motor driver based on **R7600** series DialapaK design, but industrial market users have requested a digital indicating function and a mask design that harmonizes with co-mounted **SDC** series controllers.

We now release the **RN748** motor driver (mask size 48 × 96mm) for industrial applications, featuring an **SDC**-like front mask and reliable **SDC35** technology. By suggesting the **SDC** series for industrial applications in combination with the **ECM300** control motor and the **RN748**, we aim to receive orders for all devices in the user control loop.

Air conditioning applications such as cooling/heating changeover or temperature/humidity control account for 90% of **RN796A101** sales. Thus the **RN796A0000** motor driver (mask size 96 × 96mm, a product of Yamatake Corporation Building Systems Company) for air conditioning applications was separately released in October 2004.

Required actions:

(1) Suggest the **RN748** to control motor users.

To ensure safety, control motors in combustion equipment are normally activated by position proportional output type controllers, enabling direct input of the motor feedback signal to the controller. However, 4-20mA output controllers are sometimes used due to instrumentation restrictions.

Therefore, check user control motor inputs. If a 4-20mA signal is used, suggest the **RN748**.

(2) Introduce the features of the **RN748** to users using the attached presentation tool.

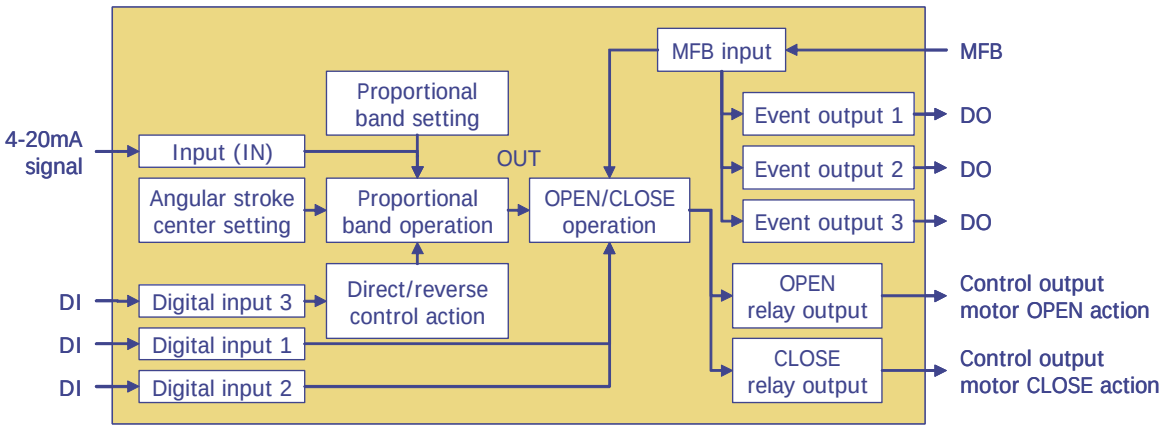
(3) Suggest the **SDC35** for the following specification requirements that the **RN748** does not support:

- PC Smart Loader (Loader jack on the front panel does not work.)
- UL conformity
- Auxiliary output

Product features:

The **RN748** is a signal converter that converts a 4-20mA controller output into a position proportional signal for a control motor with a built-in feedback potentiometer manipulating a valve or damper.

The manipulated variable (OUT) is calculated from input (IN) depending on direct/reverse control action, angular stroke center, and proportional band settings. Motor opening (MFB) calculated from motor feedback input is controlled to approach the manipulated variable (OUT) by ON/OFF control of the OPEN/CLOSE relay outputs.



Block diagram of **RN748** functions

Product advantages:

(1) Space saving

The 48 × 96mm mask size, which is half the size of the **RN796A101**, saves control panel area. The 65mm depth, which is the minimum size on the market, also saves control panel space.

(2) Uniform mask design

The front mask color harmonizes with the **SDC25** or **SDC35** when they are mounted together. The solid mask color differentiates the **RN748** from the **SDC25** or **SDC35** at a glance.

(3) Easy operation

Required motor driver functions can be performed with a minimum of keystrokes. Even if the user's equipment fails, the operator can operate the keys without confusion.

(4) Digital display

Digital display is selectable from 3 patterns: IN, IN+OUT or MFB. Checking these status values assists equipment failure cause investigation.

(5) The [a/m] key

For equipment test operations or failures, manual valve operation is required. Operating the [a/m] key switches the mode to MANUAL, and then the [＜], [∨], [∧] keys change the OUT value.

(6) MFB auto adjustment

The resistance of feedback potentiometer built into a control motor depends on the particular unit. Be sure to perform auto adjustment after connecting a control motor.

(7) Event output / estimated position proportional control in motor failure

In case of MFB failure (due to input connection break, motor potentiometer aging, etc.), event output is ON, and the **RN748** continues the motor control in estimated position proportional control mode.

(8) MFB upper/lower limit event

MFB upper and lower limit events can be set at any 2 points of motor opening. (Initial settings: upper limit = 95%, lower limit = 5%.)

(9) CE marking

The **RN748** is a CE-marked product.

Aim of introduction:

There are many cases in which an **SDC** user uses a competitor's control motor and motor driver. With the **RN748** and the **ECM3000** control motor, we aim to provide total solution for user equipment.

Available date:

From January 21, 2005

Selection guide:

Basic model No.	Option	Description
RN748A00		Mask size 48mm × 96mm 100 to 240Vac Motor drive relay outputs (with motor feedback input) 3 event outputs 3 digital inputs
	00	None
	D0	With test data
	Y0	With traceability certificate

Target markets:

(1) Combustion equipment

Combustion equipment is the main **RN748** target market.

If a user uses a Yamatake or competitor control motor, and a current-output type **SDC**, the user might be using a competitor's motor driver. Check the user's instrumentation and suggest the **RN748**.

In case of user equipment failure, an operator takes temporary measures by manual motor operation, independently of the controller signal. The **RN748**'s bare minimum functions make key operation user-friendly.

(2) Environmental testing equipment / food machinery

Motor drivers are used for split operation in cold and hot water flow control applications. Suggest easy split operation with the **RN748**.

(3) Plant OEM

Plant instrumentation uses a 4-20mA signal. For electric valve operation, a 4-20mA type control motor is used, or a 4-20mA signal is converted with a motor driver. Suggest operation monitoring with the **RN748** IN/OUT indication.

Competitor situation:

(1) YEC **AU10**

The **AU10** is used by plant OEM users. The **AU10** is an analog product, and has only a bar graph indicator, not a digital indicator. The body depth is 170mm, and the mass is 800g. Supported feedback resistance must be specified when ordering the **AU10**.

(2) CHINO **DU100**

Output load, contact input and digital indicator option must be specified when ordering the **DU100**. Annoying DIP switch operation is required in parameter settings (IN/OUT indication switchover, dead zone/zero span adjustment, etc.).

(3) RKC **REX-EP4**

The **REX-EP4** is used by combustion equipment OEM users with its advantage of digital indication, AUTO/MANUAL switchover function and low price. Supported feedback resistance must be specified when ordering. Models other than 135Ω are made-to-order and have long lead times.

(4) SHIMADEN **EM70**

The **EM70** is the most multi-functional product on the motor driver market. The **EM70** is a CE-marked product, and even has communications function and square-root extraction function options. Due to its multi-functionality, operation is too complicated for ordinary use.

(5) M-System

11 models are available for the E-E positioner, and most of them are the DIN rail mounting type. Dead zone and zero-span settings are adjusted by volume, and they are not equipped with an indicator. Thus they are used as simple signal converters.

(6) NISSYO **N-680**

The **N-680** is used in combination with a NISSYO control motor by combustion equipment OEM users. The **N-680** is an analog product with a needle indicator.

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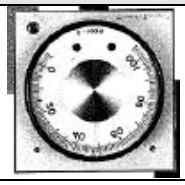
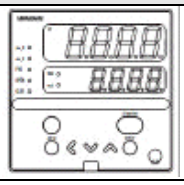
Competitor Guide

Maker		Yamatake	Yamatake	Yamatake
Name		Motor driver (Analog/position proportional signal converter)	Motor driver (Analog/position proportional signal converter)	Motor driver (Analog/position proportional signal converter)
Model No.		**RN748A0000**	**RN796A101**	**RN796A0000**
Appearance				
Input	Input signal	4-20mAdc	4-20mAdc	4-20mAdc
	Sampling cycle	100ms	—	100ms
Output	Control output	Relay contact	Relay contact	Relay contact
	Contact rating	250Vac, 8A (resistive load)	220Vac, 5A	250Vac, 8A (resistive load)
	Supported feedback resistance	100 to 2,500Ω	135Ω	100 to 2,500Ω
Indication	Indication accuracy	±0.1% FS	±1% FS	±0.1% FS
	Digital indication	○	—	○
	IN indication	○	—	○
	OUT indication	○	—	○
	MFB indication	○	—	○
	MFB failure indication	○	—	○
	Bar graph indication	○	—	○
	OPEN/CLOSE indication	○	—	○
Operation	AUTO/MANUAL switchover	○	—	—
	AUTO/MANUAL indication	○	—	—
	Zero-span auto adjustment	○	—	○
	Split operation	○	○	○
	Contact input	○ (forced OPEN/CLOSE)	—	○ (forced OPEN/CLOSE)
	Direct/reverse switchover	○	○	○
Event	Event output	3 outputs: MFB upper/lower limits (variable), MFB failure	—	3 inputs: MFB upper/lower limits (variable), MFB failure
	Event indication	○	—	○
General specifications	Mask size	48×96mm	96×96mm	96×96mm
	Body depth	65mm	110mm	65mm
	Panel cutout dimensions	44×92mm	92×92mm	92×92mm
	Shape	Vertical	—	—
	Mass	Approx. 250g	Approx. 700g	Approx. 300g
	Rated power voltage	100 to 240Vac	100/110/200/220Vac	100 to 240Vac
	Power consumption	12VA max.	5W max.	12VA max.
	Operating temperature	0 to 50℃	-10 to 50℃	0 to 50℃
	Operating humidity	10 to 90% RH	90% RH max. (40℃)	10 to 90% RH
	CE marking	○	—	○
	Note	—	—	—

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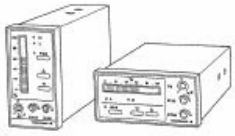
Competitor Guide

Maker		RKC	YEC	CHINO
Name		Digital E-E positioner	E-E positioner	ON/OFF servo unit
Model No.		**REX-EP4**	**AU10**	**DU100**
Appearance				
Input	Input signal	0-20mAdc, 4-20mAdc (specified by model)	4-20mAdc, 1-5Vdc (specified by model)	4-20mAdc
	Sampling cycle	200ms	—	Unknown
Output	Control output	Relay contact	Relay contact	Relay contact, open collector (option)
	Contact rating	250Vac, 3A (resistive load)	240Vac, 3A (resistive load)	Large/medium/small load current models
	Supported feedback resistance	135Ω standard (other resistance: made-to-order)	100 to 2,000Ω (specified by model)	100 to 2,000Ω
Indication	Indication accuracy	±0.5% FS	±2% FS	—
	Digital indication	○	—	○ (Digital indication model)
	IN indication	○	—	○ (Selected with DIP switch)
	OUT indication	○	○ (bar graph)	○ (Selected with DIP switch)
	MFB indication	○	—	○
	MFB failure indication	—	—	—
	Bar graph indication	○	○	○
	OPEN/CLOSE indication	○	—	○
Operation	AUTO/MANUAL switchover	○ (Option)	○	○
	AUTO/MANUAL indication	○ (Option)	○	○
	Zero-span auto adjustment	○	—	○ (Start with DIP switch)
	Split operation	○	△ (possible with zero-span volume)	△ (possible with ENG switch + zero-span adjustment)
	Contact input	—	—	○ (AUTO/MANUAL changeover, option)
	Direct/reverse switchover	—	△ (specified by model)	○ (DIP switch)
Event	Event output	2 outputs (specified by model)	—	—
	Event indication	○	—	—
General specifications	Mask size	48×96mm	48×96mm	48×96mm
	Body depth	100mm	170mm	100mm
	Panel cutout dimensions	45×92mm	45×92mm	45×92mm
	Shape	Horizontal	Vertical, horizontal	Vertical, horizontal, with/without digital indication
	Mass	Approx. 280g	Approx. 800g	Approx. 300g
	Rated power voltage	90 to 264Vac	100/200Vac	85 to 264Vac
	Power consumption	13VA max.	6VA	Approx. 8VA
	Operating temperature	0 to 50℃	0 to 50℃	-10 to 50℃
	Operating humidity	45 to 85% RH	45 to 85% RH	90% RH max.
	CE marking	—	—	—
	Note	—	—	—

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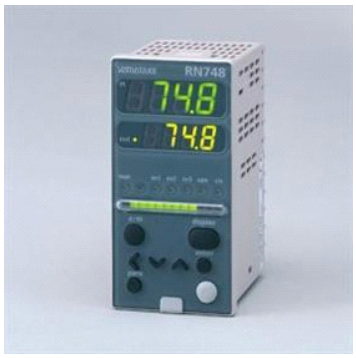
Competitor Guide

Maker		SHIMADEN	M-System	NISSYO INSTRUMENT
Name		Servo controller	E-E positioner	E-E positioner
Model No.		**EM70**	**MP**	**N-680**
Appearance				
Input	Input signal	4-20mAdc, 0-20mAdc, 1-5Vdc, 0-5Vdc, 0-10Vdc (specified by model)	4-20mAdc, 4-12mAdc, 12-20mAdc (specified by model)	4-20mAdc, 1-5Vdc
	Sampling cycle	200ms	Unknown	—
Output	Control output	Relay contact	Relay contact	Relay contact
	Contact rating	240Vac, 2A (resistive load)	24Vac, 1A max.	Unknown
	Supported feedback resistance	100 to 2,000Ω	100 to 10,000Ω	135Ω, 2,000Ω (specified by model)
Indication	Indication accuracy	±0.5% FS	±0.3%	—
	Digital indication	○	—	—
	IN indication	○	—	—
	OUT indication	○	—	—
	MFB indication	○	—	—
	MFB failure indication	○	—	—
	Bar graph indication	○	—	—
	OPEN/CLOSE indication	○	—	—
Operation	AUTO/MANUAL switchover	○	—	○
	AUTO/MANUAL indication	○	—	○ (lever position)
	Zero-span auto adjustment	○	—	—
	Split operation	○	△ (specified by model)	—
	Contact input	○	—	—
	Direct/reverse switchover	○	○ (switchover function specified by model)	Unknown
Event	Event output	3 outputs: MFB upper/lower limits (variable) and other 9 event types selectable	—	—
	Event indication	○	—	—
General specifications	Mask size	96×96mm	—	48×96mm
	Body depth	100mm	136mm	130mm
	Panel cutout dimensions	92×92mm	50×80mm	45×90mm
	Shape	—	Vertical, DIN rail mounting	Vertical, horizontal
	Mass	Approx. 460g	Approx. 300g	Unknown
	Rated power voltage	90 to 264Vac	100 to 240Vac (specified by model)	Unknown
	Power consumption	13VA	—	Unknown
	Operating temperature	-10 to 50℃	-5 to 60℃	Unknown
	Operating humidity	90% RH max.	30 to 90% RH	Unknown
	CE marking	○	—	—
	Note	Communications, square-root extraction, DI	—	—

RN748 Motor Driver

Analog/Position Proportional Signal Converter



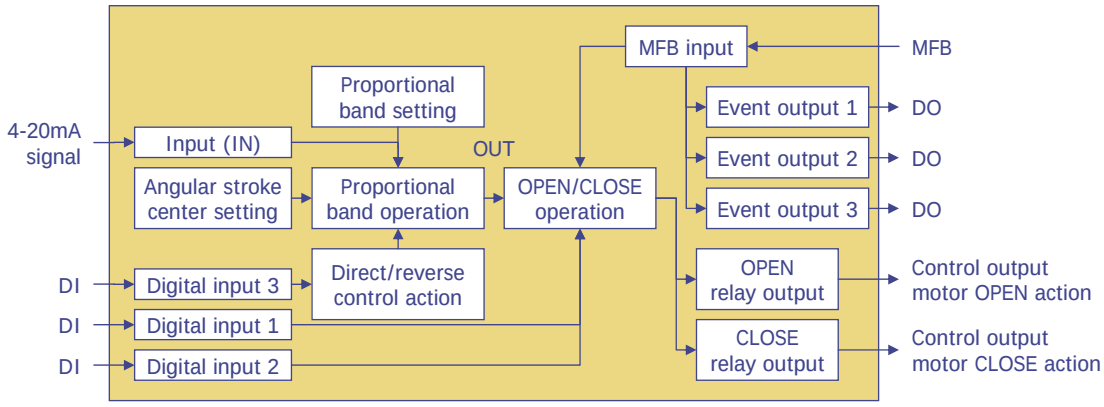
Product Outline

- A signal converter that converts a 4-20mA controller output into a position proportional signal for a control motor with a built-in feedback potentiometer.

Product Concept

- Easy operation
  - For equipment test operations or emergency use, the [a/m] key operation switches the operation mode to MANUAL.
  - In case of motor failure, event output turns ON, and control switches to estimated position proportional control mode.
- Space saving
  - Body depth 65mm
- Digital displays
  - 3 display patterns helpful to equipment operation monitoring and failure cause investigation:
    - Input (IN)
    - Input (IN) + manipulated variable (OUT)
    - Motor opening (MFB)

Block Diagram of Functions



The manipulated variable (OUT) is calculated from input (IN) depending on direct/reverse control action, angular stroke center, and proportional band settings. Motor opening (MFB) calculated from motor feedback input is controlled to approach the manipulated variable (OUT) by ON/OFF control of the OPEN/CLOSE relay outputs.

Part Names and Functions

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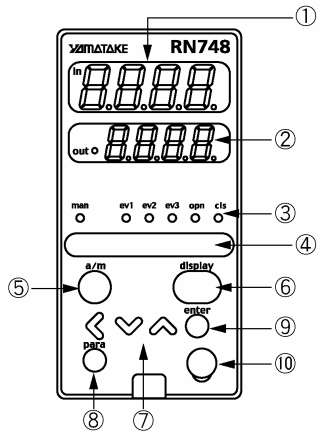
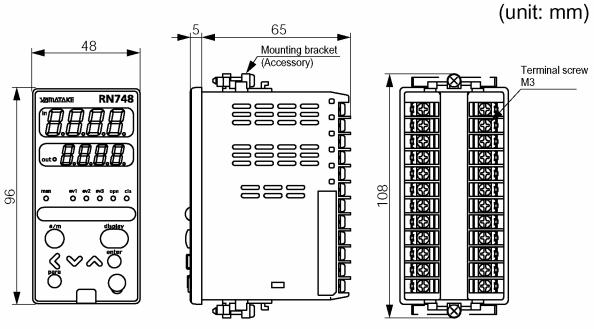


① Upper display:	Displays IN value or setting items.	
② Lower display:	Displays OUT, MFB and other parameter values. When the lower display shows the OUT value, the “out” LED is ON.	
③ Mode indicators:	man:	ON in MANUAL mode
	ev1, ev2, ev3:	ON when the event relay is ON
	opn, cls:	ON when OPEN/CLOSE control output is ON
④ Multi-status indicator:	Displays OUT level, forced OPEN/CLOSE output and alarm status.	
⑤ The [a/m] key:	Switches AUTO/MANUAL modes when pressed for 1s or more.	
⑥ The [display] key:	Changes the operation display patterns.	
⑦ The [＜], [∨], [∧] keys:	Used for numeric value increment/decrement and digit select.	
⑧ The [para] key:	Changes the setting display items.	
⑨ The [enter] key:	Used for transition to setting mode and for saving setup values.	
⑩ Loader connector:	Unusable	

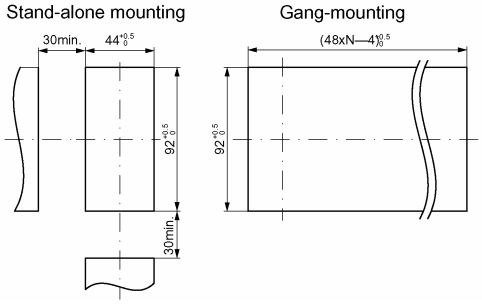
Dimensions

- External dimensions

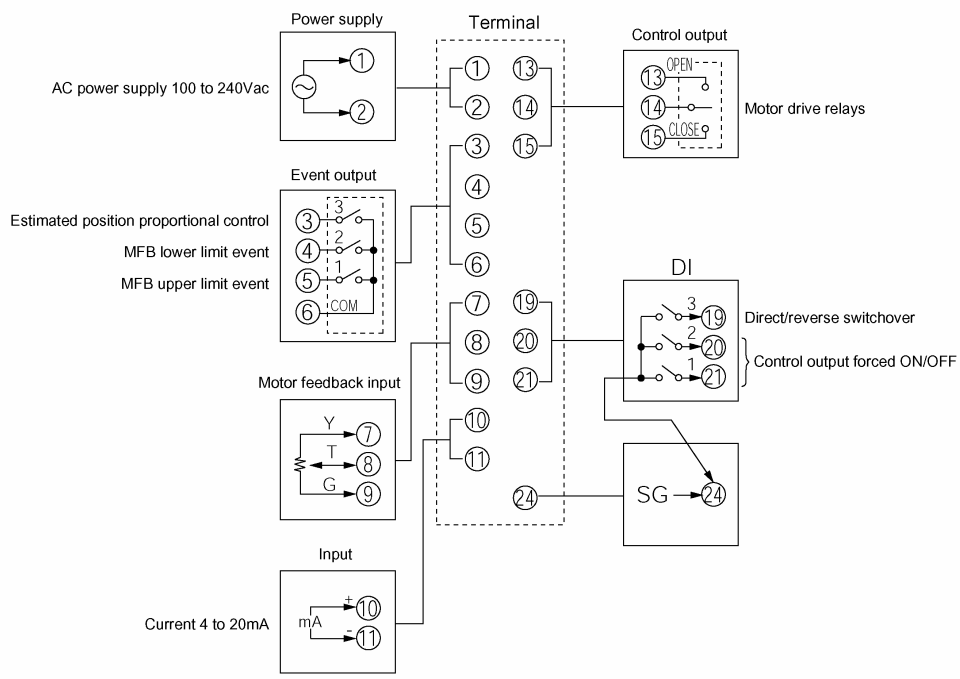
(unit: mm)



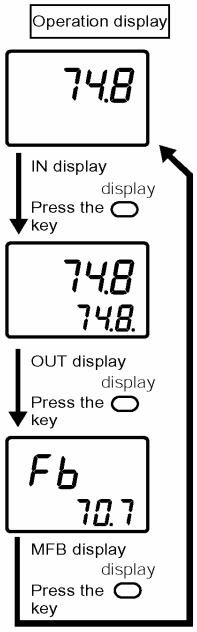
- Panel cutout dimensions



Wiring



Operation Display

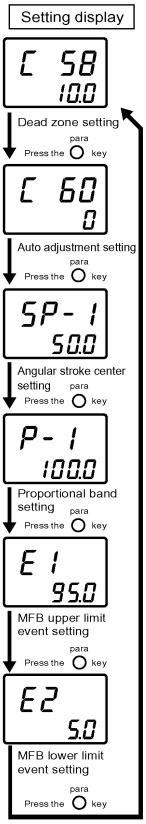


- IN display
- OUT display: “out ” LED is ON.
  - Upper display: displays IN value
  - Lower display: displays OUT value
- MFB display:
  - Upper display: displays “Fb”
  - Lower display: displays MFB value

Setting Items

Set by the [para] key on the front panel.

1. Dead zone setting
2. Auto adjustment setting
3. Angular stroke center setting
4. Proportional band setting
5. MFB upper limit event setting
6. MFB lower limit event setting



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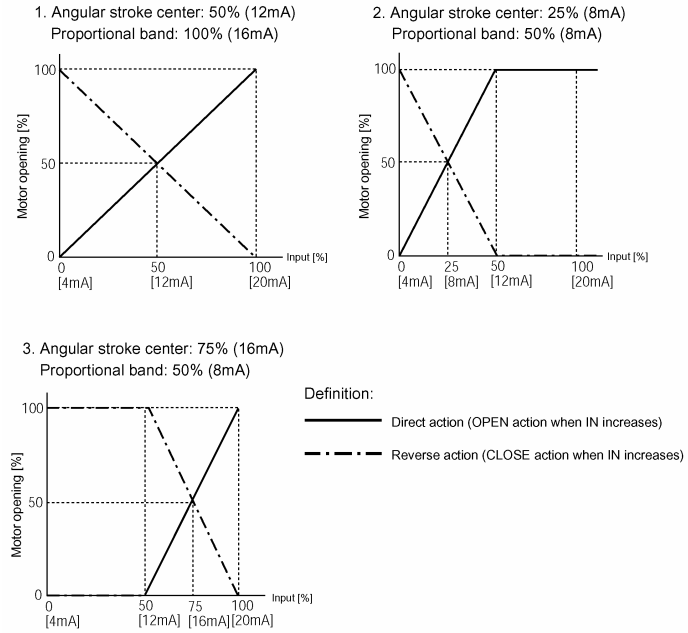
Configuration Example

Angular Stroke Center and Proportional Band



Split operation

Direct and reverse manipulators are simultaneously controlled by single output signal.

Example:

Control of cold and hot water flows

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DI/DO Specifications

Digital input

DI1 ON:	Forced OPEN action
DI2 ON:	Forced CLOSE action
DI1 & DI2 ON:	Motor stoppage at status MFB
DI3:	Direct/reverse control action changeover

Event output

E1:	MFB upper limit event
E2:	MFB lower limit event
E3:	MFB failure (due to input connection break, motor potentiometer aging, etc., the control switches to estimated position proportional control mode)

Selection Guide

Basic model No.	Option	Description
RN748A00		Mask size 48mm × 96mm 100 to 240Vac Motor drive relay outputs (with motor feedback input) 3 event outputs 3 digital inputs
	00	None
	D0	With test data
	Y0	With traceability certificate