Converter

General

Model RYY792X series of converters offer compact, space-saving, easy installation with its plug-in structure. Each model is modularized for a particular function. Model RYY792X converters can be used for signal transmission between instruments, as a controller, for monitoring, and for various other applications.

Features

- Compact, space-saving, plug-in structure.
- Minimal mounting space.
- Wide variety of converter types.

Specifications

Items	Specifications
Power	85 V AC to 264 V AC, 50 Hz / 60 Hz
Insulation resistance	100 MΩ or over at 500 V DC (Between input/output and power supply)
Withstand voltage	2000 V AC for one minute (Between input/output and power supply)
Rated operating conditions	Temperature: -5 °C to 55 °C Humidity: 5 %RH to 90 %RH (Non-condensing) Altitude: 2,000m or lower Vibration: 4.9 m/s², 5 Hz to 100 Hz
Ambient storage & transportation conditions	Temperature: -10 °C to 60 °C Humidity: 5 %RH to 90 %RH (Non-condensing) Vibration: 9.8 m/s², 0 Hz to 60 Hz
Product specifications	Refer to **Product Specifications**.
Dimensions	Refer to Figs. 1 and 2.
Accessory	Socket (See Fig. 2.)
Auxiliary part	Socket: Part No. RYY-CS3700-11P (Though the socket is supplied with Model RYY792X, the socket can separately be ordered as an auxiliary part.)

Dimensions

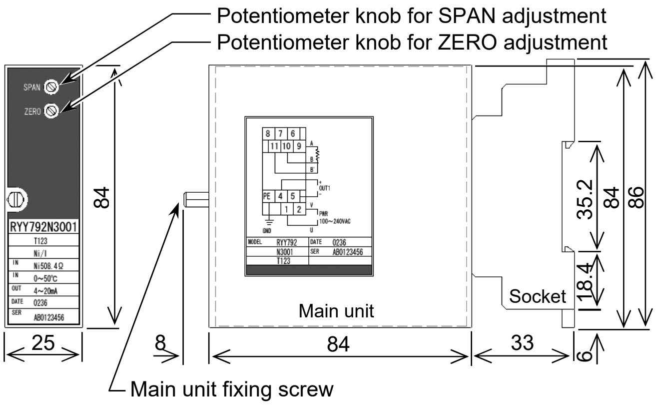


Figure 1. Dimensions (mm): With the socket assembled

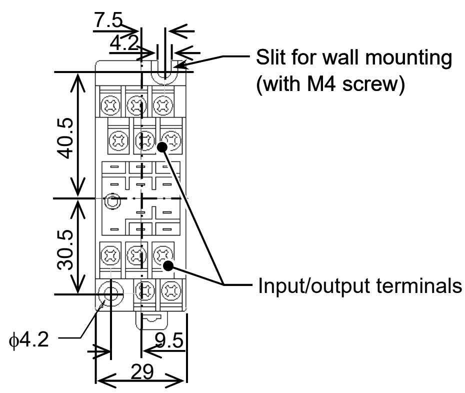


Figure 2. Dimensions (mm): Socket in front

Installation

Model RYY792X converters are mounted on panels. Install according to the following instructions:

Precautions for installation

- Do not use the product in an atmosphere containing excessive humidity, acidic gases, or corrosive substances.
- Use the product under the conditions specified in this document.
- Use dedicated sockets.

Installation procedure

1) Mount the socket on the panel with DIN rail or screws. For screw-mounting, mounting screws (M4 × 15 or longer) are additionally required. Mounting dimensions are shown in Figs. 1 and 2.
   Before mounting the socket, make sure that it is in upright position. (Do not mount it upside down.)
2) Connect the wires to the terminals according to **Wires Connection** section.
   Then, assemble the main unit with the socket by carefully inserting the main unit in the front of the socket. Improper insertion (e.g., with the main unit inclined/upside down) can damage the pins of the main unit or the socket.
   After insertion, finger-tighten the main unit fixing screw.

Safety Precautions

Please read instructions carefully and use the product as specified in this manual. Be sure to keep this manual nearby for quick reference.

Restrictions on Use

This product was developed, designed, and manufactured for general air conditioning use.

Do not use the product in a situation where human life may be at risk or for nuclear applications in radiation controlled areas. If you wish to use the product in a radiation controlled area, please contact Azbil Corporation.

Particularly when the product is used in the following applications where safety is required, implementation of fail-safe design, redundant design, regular maintenance, etc., should be considered in order to use the product safely and reliably.

・Safety devices for protecting the human body

・Start/stop control devices for transportation machines

・Aeronautical/aerospace machines

For system design, application design, instructions for use, or product applications, please contact Azbil Corporation.

Azbil Corporation bears no responsibility for any result, or lack of result, deriving from the customer's use of the product.

Recommended Design Life

It is recommended that this product be used within the recommended design life.

The recommended design life is the period during which you can use the product safely and reliably based on the design specifications.

If the product is used beyond this period, its failure ratio may increase due to time-related deterioration of parts, etc.

The recommended design life during which the product can operate reliably with the lowest failure ratio and least deterioration over time is estimated scientifically based on acceleration tests, endurance tests, etc., taking into consideration the operating environment, conditions, and frequency of use as basic parameters.

The recommended design life of this product is shown in the following table.

The recommended design life assumes that maintenance, such as replacement of the limited life parts, is carried out properly.Refer to the section on maintenance in this manual.

Product	Recommended design life
RYY792M	9 years
RYY792A, H, L, N, P, R, V, S	13 years
RYY792D, B, Y	14 years

Warnings and Cautions

⚠WARNING	Alerts users that improper handling may cause death or serious injury.
⚠CAUTION	Alerts users that improper handling may cause minor injury or material loss.

Signs

	Alerts users to possible hazardous conditions caused by erroneous operation or erroneous use. The symbol inside △ indicates the specific type of danger. (For example, the sign on the left warns of the risk of electric shock.)
	Notifies users that specific actions are prohibited to prevent possible danger. The symbol inside ⃠ graphically indicates the prohibited action. (For example, the sign on the left means that disassembly is prohibited.)
	Instructs users to carry out a specific obligatory action to prevent possible danger. The symbol inside ● graphically indicates the actual action to be carried out. (For example, the sign on the left indicates general instructions.)

⚠ WARNING	
	Before wiring, be sure to turn off the power to this product. Failure to do so may result in electric shock or device failure.

⚠ CAUTION	
	Use this product under the operating conditions (for temperature, humidity, power, vibration, shock, mounting direction, atmosphere, etc.) listed in the specifications. Failure to do so may cause fire or device failure.
	Installation and wiring must be performed by qualified personnel in accordance with all applicable safety standards.
	All wiring must comply with applicable codes and ordinances.
	Provide a circuit breaker for the power source of this product. The product does not have a power switch.
	Use crimp terminals with insulation for connections to the product terminals. Failure to do so may cause short circuit leading to fire or device failure.
	Firmly tighten the terminal screws. Insufficient tightening of the terminal screws may cause overheating or fire.
	Dispose of the product as industrial waste in accordance with your local regulations. Do not reuse all or any part of the device.

Product Specifications

Application	Model number	Converter type	Input signal*1		Output signal*1		Accuracy*2	Power consumption (VA)	Weight (kg)	Remarks
			Range	Input resistance	Range	Load resistance				With insulation
Ni temperature detector (508.4 Ω/0 °C)/ Current conversion	RYY792N3001 RYY792N3002 RYY792N3003	Ni/I converter	Ni temperature detector 0 to 50 °C 0 to 100 °C -20 to 80 °C	—	4 to 20mA*3	750 Ω or lower	±0.15%FS	3.5	0.15	With insulation
Platinum (JPt) temperature detector (100 Ω/0 °C)/ Current conversion	RYY792P3011 RYY792P3012 RYY792P3013	JPt/I converter	JPt temperature detector 0 to 50 °C 0 to 100 °C -20 to 80 °C	—	4 to 20 mA*3	750 Ω or lower	±0.15%FS	3.5	0.15	With insulation
Platinum (Pt) temperature detector (100 Ω/0 °C)/ Current conversion	RYY792P3021 RYY792P3022 RYY792P3023	Pt/I converter	Pt temperature detector 0 to 50 °C 0 to 100 °C -20 to 80 °C	—	4 to 20 mA*3	750 Ω or lower	±0.15%FS	3.5	0.15	With insulation
Potentiometer/ Current conversion	RYY792R3061	POT/I converter	0-100 Ω to 10 kΩ	—	4 to 20 mA*3	750 Ω or lower	±0.2 %FS	3	0.15	With insulation Setting range ZERO side: 0 to 50 % SPAN side: 50 to 100 %
Voltage/current conversion	RYY792V3021 RYY792V3022 RYY792V3023 RYY792V3024	V/I converter	0 to 10 mV 0 to 100 mV 1 to 5 V 0 to 10 V	1 MΩ or higher	4 to 20 mA*3	750 Ω or lower	±0.1 %FS	3	0.15	With insulation
Current/ voltage conversion	RYY792A3077	I/V converter	4 to 20 mA	250 Ω	0 to 100 mV*3	100 kΩ or higher	±0.1 %FS	3	0.15	
Circuit insulation (isolator)	RYY792S3041	Isolator	4 to 20 mA	250 Ω	4 to 20 mA*3	750 Ω or lower	±0.1 %FS	3	0.15	With insulation
2-input high selector	RYY792H3091	High selector	4 to 20 mA	250 Ω	4 to 20 mA*3	750 Ω or lower	±0.1 %FS	3.5	0.15	With insulation
2-input low selector	RYY792L3092	Low selector	4 to 20 mA	250 Ω	4 to 20 mA*3	750 Ω or lower	±0.1 %FS	3.5	0.15	With insulation
Limiter	RYY792Y3051	Limiter	4 to 20 mA	250 Ω	4 to 20 mA	750 Ω or lower	±0.2 %FS	4	0.15	With insulation Setting range High limit: -10 to 105 % Low limit: -10 to 105 %
Ratio bias	RYY792B3081	Ratio bias (positive gradient, negative gradient)	4 to 20 mA	250 Ω	4 to 20 mA*3	750 Ω or lower	±0.2 %FS when Ratio K=1 Bias B=0	4	0.15	With insulation Equation and setting range Y = KX + B (positive) Io = KX + B + F (negative) K=10 to 400 % (positive) K=-10 to -400 % (negative) B = -100 to 100 % F = 100 %
Monitor switch	RYY792M3055	Monitor switch	4 to 20 mA	250 Ω	2 Potential free (NO/NC) contacts	Contact rating 250 V AC, 3 A 30 V DC, 5 A	±0.5 %FS (Setting accuracy)	3.5	0.15	Setting range 0 to 99 % (1 % step)
24 V DC power supply	RYY792D3001	24 V DC power supply	—	—	24 V DC	Max. 22 mA	24 to 28 V DC	5	0.15	Without insulation (Voltage range under no allowable load)
Reverser	RYY792A3100	Reverser	4 to 20 mA	250 Ω	4 to 20 mA*3	750 Ω or lower	± 0.1 %FS	3	0.15	With insulation

Notes:

*1. The voltage/current (V/A) input and output signals listed above are both indicated in direct current (DC).

*2. The Accuracy indicate differences between input and output under the rated operating conditions:
25 °C ± 5 °C room temperature, 100 V AC rated voltage, rated frequency ±1 Hz

*3. If the input signals are out of the specified range, the output signals will also be out of the specified range. Be sure to input values within the specified range.

Wire Connections

Wire Specifications

Select the appropriate size, length, and type of wires according to the following table.

Converter type		Input wiring	Output wiring	Power line
Converters (JPt/I, Pt/I)		5 Ω or lower per wire	3 Ω or lower per wire	3 Ω or lower per wire
Isolator, limiter, monitor switch, 24 V DC power supply, reverser, high selector, low selector, ratio bias, and converters (POT/I, I/V, Ni/I)		3 Ω or lower per wire		
V/I converter	1-5 V 0-10 V	3 Ω or lower per wire		
	0-10 mV	3 Ω or lower per wire (two-core shield wire)		
	0-100 mV	3 Ω or lower per wire		

Note: If noise sources cannot be avoided, use shield wires.

Precautions for connecting wires

Install wiring complying with the indoor wiring rules and the applicable laws and regulations.

Connection to the terminals

- Resistance temperature detector

Model RYY792N3001
3002
3003
Model RYY792P3011
3012
3013
Model RYY792P3021
3022
3023

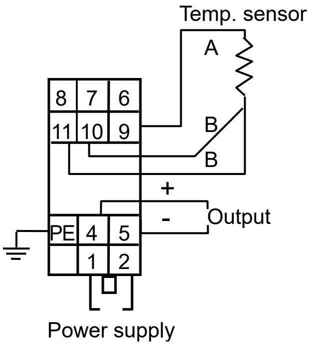


Figure 3-1. Connection diagram

<Example of wiring for using the 1 - 5 V DC check terminals>

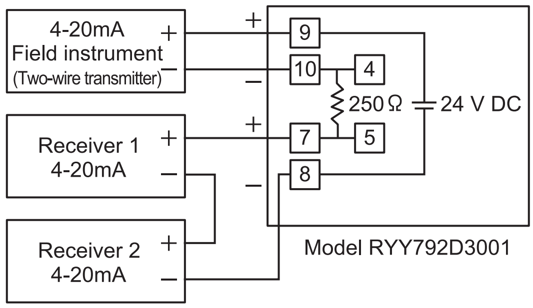


Figure 3-6. Connection diagram

Load resistance observed by field instrument
= 250 Ω + Input resistance of receiver 1 + Input resistance of receiver 2

- Potentiometer converter

Model RYY792R3061

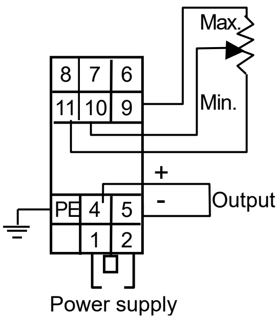


Figure 3-2.
Connection diagram

- 2-input high selector

Model RYY792H3091

- 2-input low selector

Model RYY792L 3092

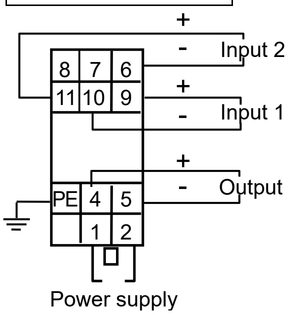


Figure 3-3.
Connection diagram

- V/I converter

Model RYY792V3021
3022
3023
3024

- Ratio bias

Model RYY792B3081

- Reverser

Model RYY792A3100

- Isolator

Model RYY792S3041

- Limiter

Model RYY792Y3051

- I/V converter

Model RYY792A3077

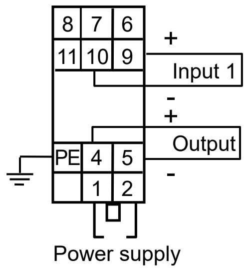


Figure 3-7.
Connection diagram

- 24 V DC power supply

Model RYY792D 3001

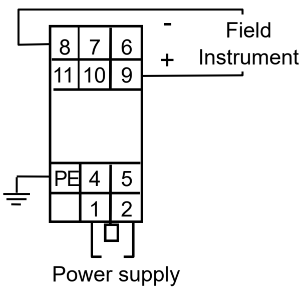


Figure 3-4.
Connection diagram

Wiring for using the 1 - 5 V DC check terminals*1

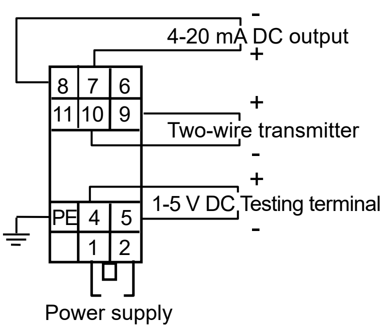


Figure 3-5. Connection diagram

- Monitor switch

Model RYY792M3055

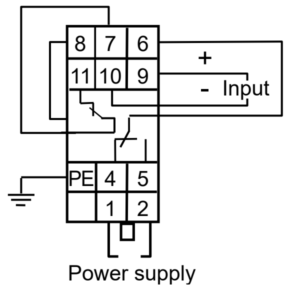


Figure 3-8. Connection diagram

*1 Signal (4-20 mA) of two-wire transmitters can be checked by the 1-5 V DC testing terminals.
However an internal resistance (250 Ω) will be added, so be aware that the total resistance should be within the two-wire transmitter's allowable load resistance (see Fig. 3-6).

Adjustment

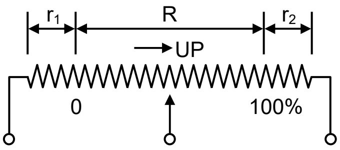
Precautions for making adjustment

IMPORTANT:

- After power on, allow minimum 30 min warm-up operation before starting normal operation.
- This product is adjusted before shipment. Do not turn the potentiometer knobs with paint locks.
- When adjusting the potentiometer knobs on the front of the unit, use the appropriate size driver. Do not turn the potentiometer knobs beyond their limits.
- Use standard lead wires to be connected to the monitor terminal.
- Do not touch components other than the potentiometer knobs and the setting switches when making adjustments.

Adjusting the POT/I converter

Set the effective sliding range of the potentiometer as:

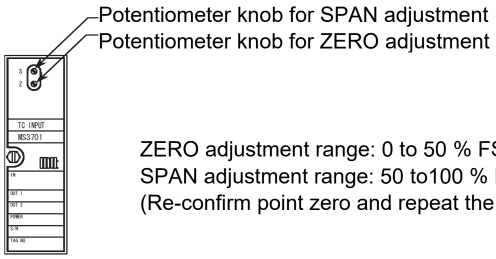


R: Effective sliding range
r_1: Residual resistance at 0 % side
r_2: Residual resistance at 100% side

As the left figure shows, set the 0 % and 100 % points to make the residual resistances of the potentiometer be $r_1 = r_2$.

Zero adjustment:
Set the potentiometer sliding position at the 0 % point as shown in the figure above, and connect to the converter. Then, turn the **ZERO** potentiometer adjustment knob until the output is set to 4 mA.

Span adjustment:
Similarly, shift the potentiometer sliding position to the 100 % point as shown in the figure above. Under this condition, turn the **SPAN** potentiometer adjustment knob until the output is set to 20 mA.

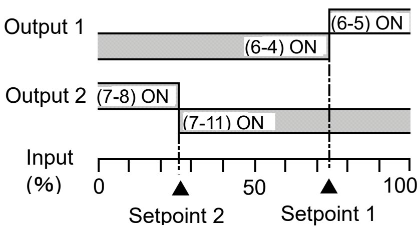


ZERO adjustment range: 0 to 50 % FS
SPAN adjustment range: 50 to100 % FS
(Re-confirm point zero and repeat the procedure 1 and 2 to ensure the converter's accuracy.)

Figure 4. Front panel of the POT/I converter

Monitor switch setup

Monitor switch is set by turning the front thumbwheel switches with a driver. Output 1 is for high alarm and Output 2 is for low alarm. Monitor LED turns on when the relay coil is excited.
Output 1 is excited when Input > Setpoint, and Output 2 is excited when Input < Setpoint.



Operation during power failure:
(6-4)
(7-11) ON

Figure 5. Alarm trip operation

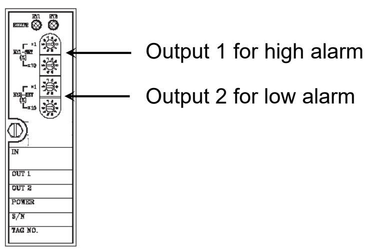


Figure 6. Front panel of the monitor switch

Limiter setup

How to set high limit:
Switch the high/low limit selector to the upper side. The high/low limit display shows the high limit (-10 to +105 %). Press UP/DOWN control for the value setup. The polarity indicator LED glows RED when the set value is in positive range, and glows GREEN in negative range.

How to set low limit:
Switch the high/low limit selector to the downside. The high/low limit display shows the low limit (-10.0 to +105 %). Press UP/DOWN control for the value setup. The polarity indicator LED glows RED when the set value is in positive range, and glows GREEN in negative range.

The factory preset setting values for high limit is 100 %, and low limit is 0 %.

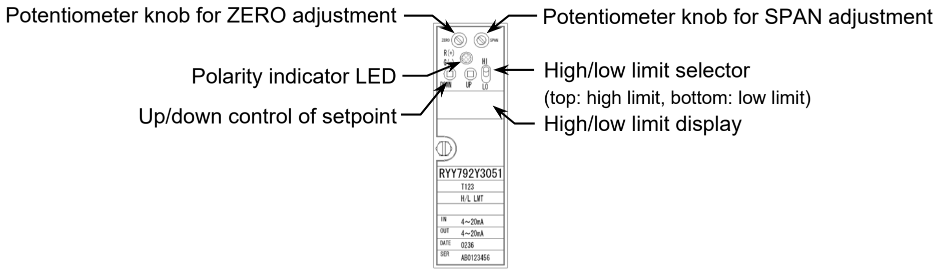


Figure 7. Front panel of the limiter

Ratio bias setup

How to set the ratio:
Switch the ratio/bias selector to the "RATIO" side. The ratio/bias display shows the ratio (0.10 to 4.00). Press UP/DOWN control for the value setup.
The polarity indicator LED glows RED when the set value is in the positive gradient characteristic, and glows GREEN in the negative gradient characteristic.

How to set the bias:
Switch the ratio/bias selector to the "BIAS" side.
The ratio/bias display shows the bias (0 to100 %). Press UP/DOWN control for the value setup. The polarity indicator LED glows RED when the set value is positive, and glows GREEN when negative.

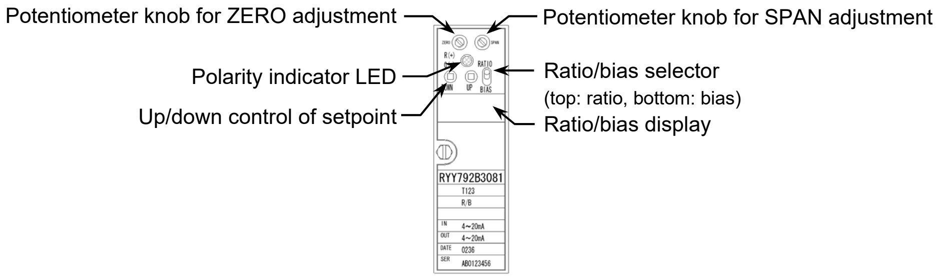


Figure 8. Front panel of the ratio bias

Equation:
Y = KX + B (positive gradient characteristic)
Y = KX +B + F (negative gradient characteristic)
where Y = Output signal (%)
K = Ratio (Linear characteristics, positive gradient: 0.1 to 4.00 / negative gradient: -0.1 to -4.00)
X = Input signal (approx.-10 to +120 %)
B = Bias (-100 to +100 %)
F = 100%

Fine adjustment:
Follow the procedure below for fine adjustment.

1) Under the equation: Xo = KX + B (positive gradient) or Xo = KX + B + F (negative gradient), shift the input signal value Xi to zero point side and adjust the output Y to the result with ZERO adjustment.
2) Shift the input signal value X to the span point side and adjust the output Y to the result with SPAN adjustment.
3) Shift again the input signal value X to zero point side and check the output Y on the zero point side.
4) If the output Y is changed, repeat the procedure 1 through 3 again for adjustment.

The unit is set and calibrated for shipment as: Ratio (K)=1, Bias (B)=0%

Handling Precautions

IMPORTANT:
- This is a precision device. Ensure careful handling. Any mishandling or accidental dropping will damage the product.
- As the product utilizes electronic components, do not place in wet or humid locations.
- The plastic housing may be deformed if being exposed to high heating temperature.
- This is a precision device with high performance and high reliability. Do not disassemble or remodel.

Inspection and Maintenance

Inspect each setting every 2 years.

Install this product in a panel cabinet. Additionally, always keep the panel cabinet accessible only to people with sufficient knowledge concerning electrical equipment.

This product complies with the following harmonised standards of the Electromagnetic Compatibility Directive (EMCD) and the Low Voltage Directive (LVD).

EMCD: EN 61326-1 Class A, Table 2 (for use in an industrial electromagnetic environment)

LVD: EN 61010-1 Overvoltage category II
Pollution degree 2

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