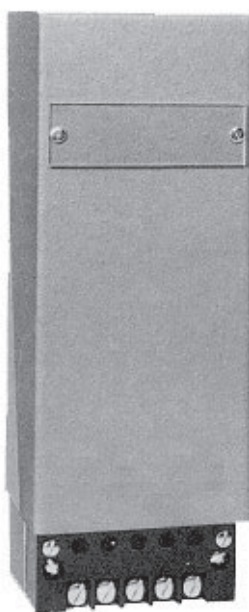


SystempaK Single-P/ I Converter

Model KUX122/127

User's Manual



Azbil Corporation

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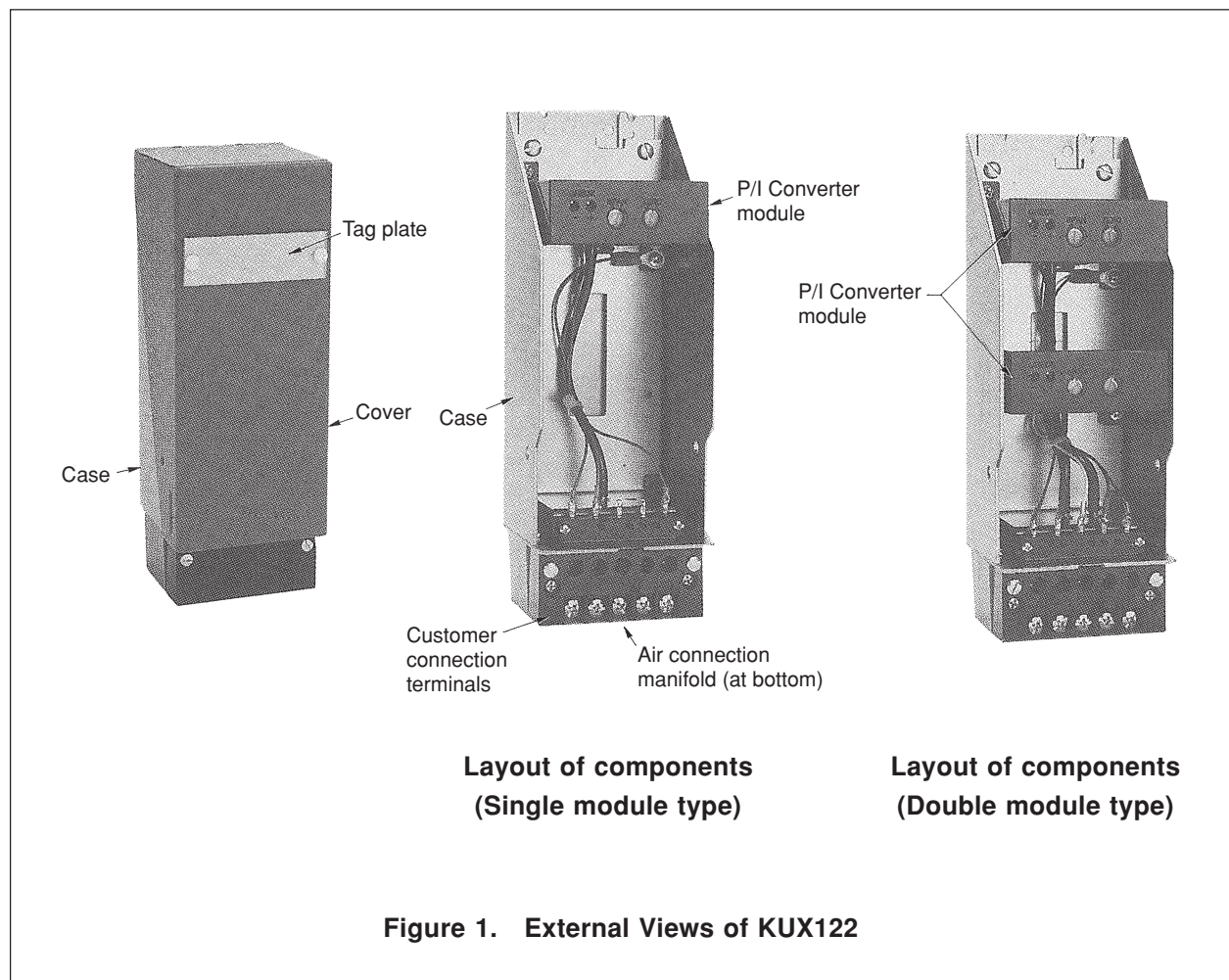
1. SCOPE

This manual covers information required for operation, calibration and maintenance of the model KUX122 Individual-Type P/I converter. Be sure to read this manual before handling the instrument.

2. DESCRIPTION

2.1 Outline

The Individual-Type P/I converter is comprised of P/I converter modules (up to two), a chassis assembly, a case, a cover, customer connection terminals, and an air connection manifold. Each of the P/I converter modules converts a pneumatic signal of 20 - 100 kPa (or 3 - 15 psi, 0.2 - 1.0 bar, or 0.2 - 1 kgf/cm²) into an electrical signal of 4 - 20 mA DC, employing a diffused silicon semiconductor for the pressure to current conversion element.



2.2 Structure and Features

Up to two P/I converter modules can be installed on the chassis assembly. The chassis assembly can be removed from the case by removing two chassis mounting-screws and five current junction terminal screws.

The chassis can be removed without requiring to shut down the loop since the pneumatic signal circuit is automatically closed as you remove the chassis from the case. The module has CHECK terminals on its front panel, allowing you to check the output current signal simply by connecting a milliammeter to these terminals.

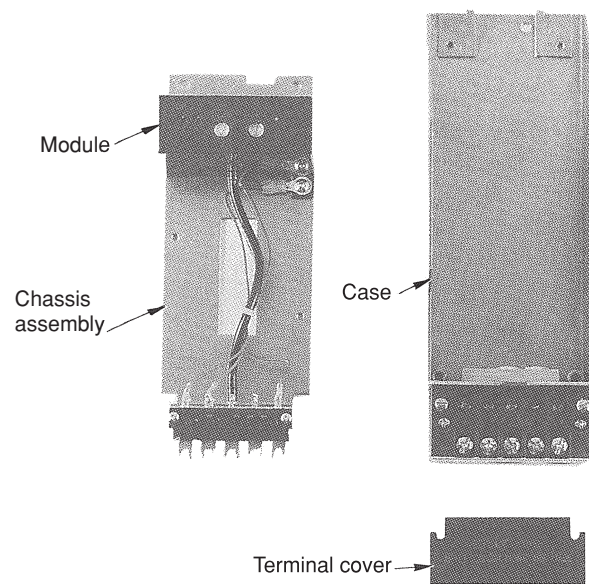


Figure 2. Chassis Assembly Detached from Case

3. SPECIFICATIONS

3.1 Performance specifications

Input signal :	19.6 - 98.1 kPa, 20 - 100 kPa, 3 - 15 psi, 0.2 - 1.0 bar, or 0.2 - 1.0 kgf/cm ² , (pressure rating 200 kPa)
Output Signal :	4 - 20 mA DC (current limit at approx. 30 mA)
Power Source :	24V DC (+15%, -10%)
Power Consumption :	0.48 W (max.) per P/I converter module
External Load :	480 ohms (or less) with 24V DC supply

Note) The maximum allowable external load resistance is calculated as follows:

$$R = \frac{V - 14.4}{0.02}$$

where, R : Load resistance (ohm)

V : Supply voltage (volt)

Air Connections :	Rc1/4, 1/4NPT internal thread
Ambient Temperature :	0 to 50 degrees C
Ambient Humidity :	10 to 90% RH
Accuracy:	+0.25% FS

Temperature Characteristics

Zero Shift :	0.6% FS per 25°C (max.)
Span Shift :	0.6% FS per 25°C (max.)
Zero Drift :	0.5% FS per 6 months (max.)
Installation :	Wall mount
Weight :	Approx. 1.2 kg
Finish :	Case Zn plated (chromate processed) Cover ... Dark beige (Munsell 10YR4.7 / 0.5)
Place of use :	Indoor

3.2 Model Number Table

1) Individual-Type P/I Converter

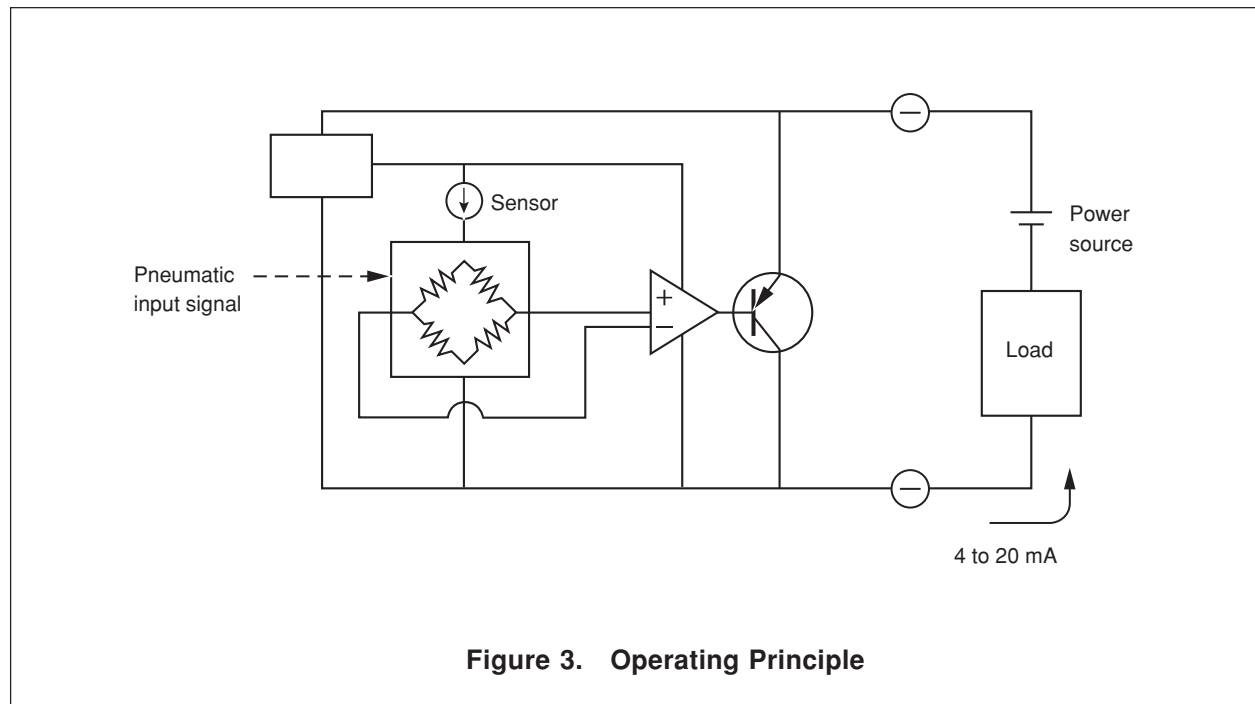
Basic Model No.	Selections						Options	Description
	Power Source	Input	Output	Air Piping Connections	Modules	Environment		
KUX122								Individual-Type P/I converter
	-1							24V DC
		1						0.2 - 1.0 kgf/cm ²
		2						3 - 15 psi
		3						0.2 - 1.0 bar
		4						20 - 100 kPa
		8						19.6 - 98.1 kPa
			1					4 - 20 mA DC
			3					20 - 4 mA DC (Specific order)
				A				Rc 1/4
				B				1/4 NPT internal thread
					1			1 point
					2			2 points
						X		Standard
						A		For tropical service (Specific order)
						B		Corrosive atmosphere resistant (Specific order)
							-X	No options

2) P/I Converter Module

Basic Model No.	Selections				Options	Description
	Power Source	Input	Output	Environment		
KUX127						Single-P/I Converter Module
	-1					24V DC
		1				0.2 - 1.0 kgf/cm ²
		2				3 - 15 psi
		3				0.2 - 1.0 bar
		4				20 - 100 kPa
		8				19.6 - 98.1 kPa
			1			4 - 20 mA DC
			3			20 - 4 mA DC (Specific order)
				X		Standard
				A		For tropical service (Specific order)
				B		Corrosive atmosphere resistant (Specific order)
					-X	No options

4. OPERATING PRINCIPLES

The input pressure signal which represents a process variable is fed to a silicon sensor, which is a resistance bridge with a piezoresistance effect, and converts the pressure signal into a resistance signal. A constant current is fed to the resistance bridge and its resistance change is detected into a voltage signal. The voltage signal is amplified by an amplifier and then it is converted into a current signal by a voltage-to-current converter.



5. INSTALLATION

5.1 Installation Method

The Single-P/I Converter can be directly installed on a wall. Remove the cover and fix the converter with the three M4 mounting-screw (supplied).

5.2 Place of Installation

The instrument should be installed in a place where ambient temperature is within 0 to 50°C and with less temperature change and where atmosphere is not highly humid. The place must be reasonably free from mechanical vibration.

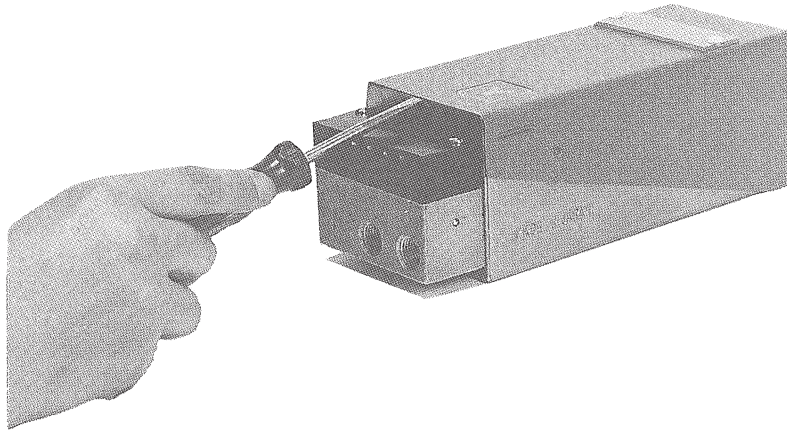


Figure 4. Removing the Cover

5.3 Customer Connections

(1) Input Air Connections

The ports [Rc1/4 (or 1/4NPT internal thread)] located underneath the air connection manifold are the connectors for the input air signals. As viewed from the instrument front, the left hand one is for #1 and the right hand one is for #2.

(2) Electrical Output Signal Connections

Connect the cables to the customer connection terminals as indicated on the terminal cover. The terminal screws are M3.5, 5 mm long.

No fuse is provided inside of the instrument. As required, provide a fuse externally.

Electrical connections can be conveniently made by using Digitronik Line Wiring Block (Model KMW110-X-X).

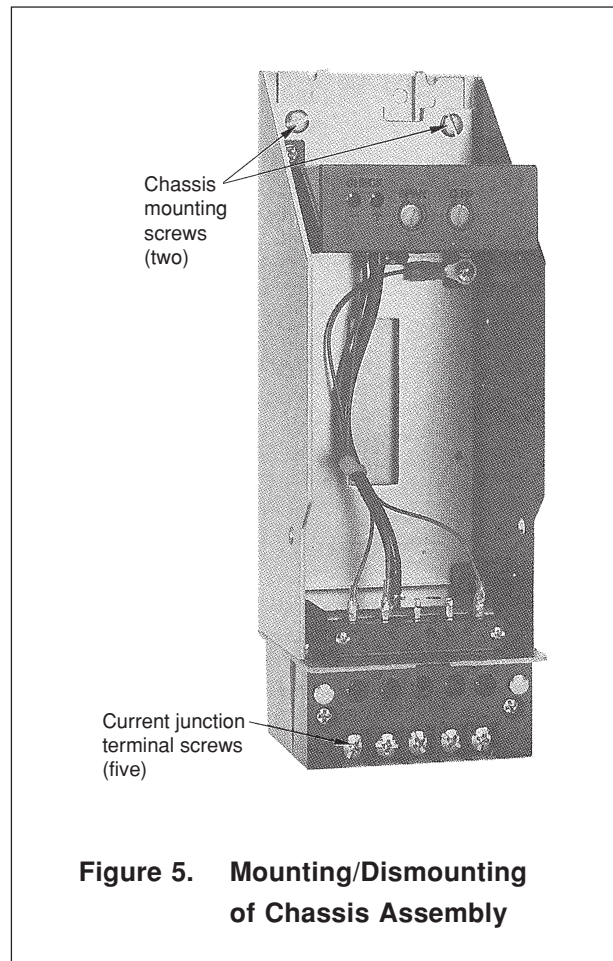
5.5 Removing or Installing the Chassis Assembly

(1) Removing the Chassis Assembly

Remove the chassis assembly by undoing the two chassis mounting-screws and five current junction terminal screws.

(2) Installing the Chassis Assembly

Insert the air connection pins (at underside of the chassis) and current junction terminals into the guide of the case side and, pressing down the chassis, fix the chassis mounting-screws and current junction terminal screws.



6. OPERATING PROCEDURE

When air piping and electrical wiring are complete and pneumatic input signal and power supply are turned on, the instrument is ready to operated.

7. CALIBRATION AND ADJUSTMENTS

7.1 Setup

Connect a variable air pressure source and a precision pressure gauge (or a mercury column) to the air connection port of the P/I converter module to be calibrated, and connect a 250-ohm precision resistor and a digital voltmeter in parallel to the corresponding terminals.

NOTE : The 4 - 20 mA DC current output can be measured more accurately by connecting a 250-ohm precision resistor in series to develop a voltage drop of 1 - 5V DC across the resistor and measuring this voltage with a digital voltmeter than by measuring the current signal directly with a milliammeter although it may be used simply to monitor the output current.

7.2 Calibration

Adjustment of inputs and outputs are completed at the factory before shipment. Check the accuracies referring to the below table and make adjustments if the accuracies are not met within the required tolerances ($\pm 0.25\%$ FS).

%	Input	
	bar	kPa
0	0.2	20
25	0.4	40
50	0.6	60
75	0.8	80
100	1.0	100

%	Output	
	mA DC	mA DC
0	4	20
25	8	16
50	12	12
75	16	8
100	20	4

As measuring made at reference temperature 20°C.

7.3 Adjustment

To adjust the zero and span, turn respective potentiometers using a fine screwdriver from the front of the P/I Converter module in the procedure mentioned below. The potentiometers are clockwise.

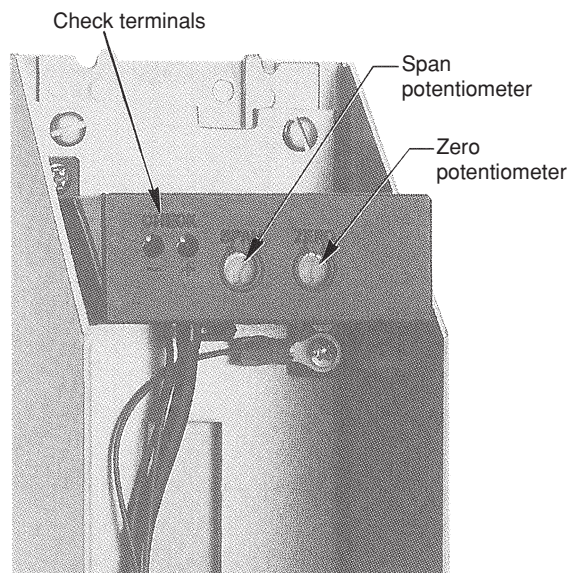
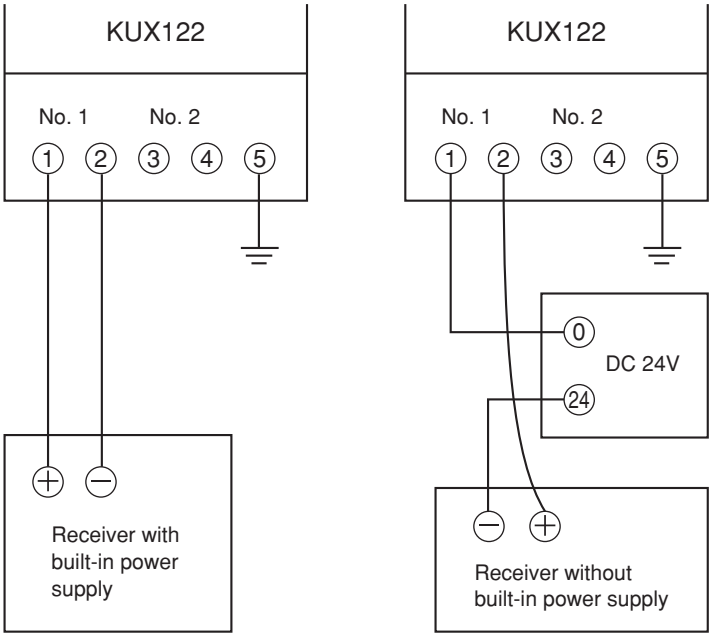


Figure 6. Locations of Check Terminals and Adjustment Potentiometers

- (1) Set the ZERO and SPAN potentiometers in the mid-position (horizontal position).
- (2) Set the input at 0% and note the output “a” volts.
- (3) Set the input at 100% and note the output “b” volts.
- (4) Calculate $b1 (V) = 5 + (5a - b)/4$.
- (5) With the input remaining at 100%, adjust the output to “b1” volts with the SPAN potentiometer.
- (6) Set the input at 0% and adjust the output to 1 volt with the ZERO potentiometer.
- (7) Set the input at 100% and check that the output is 5 volts.

8. ELECTRICAL CONNECTIONS

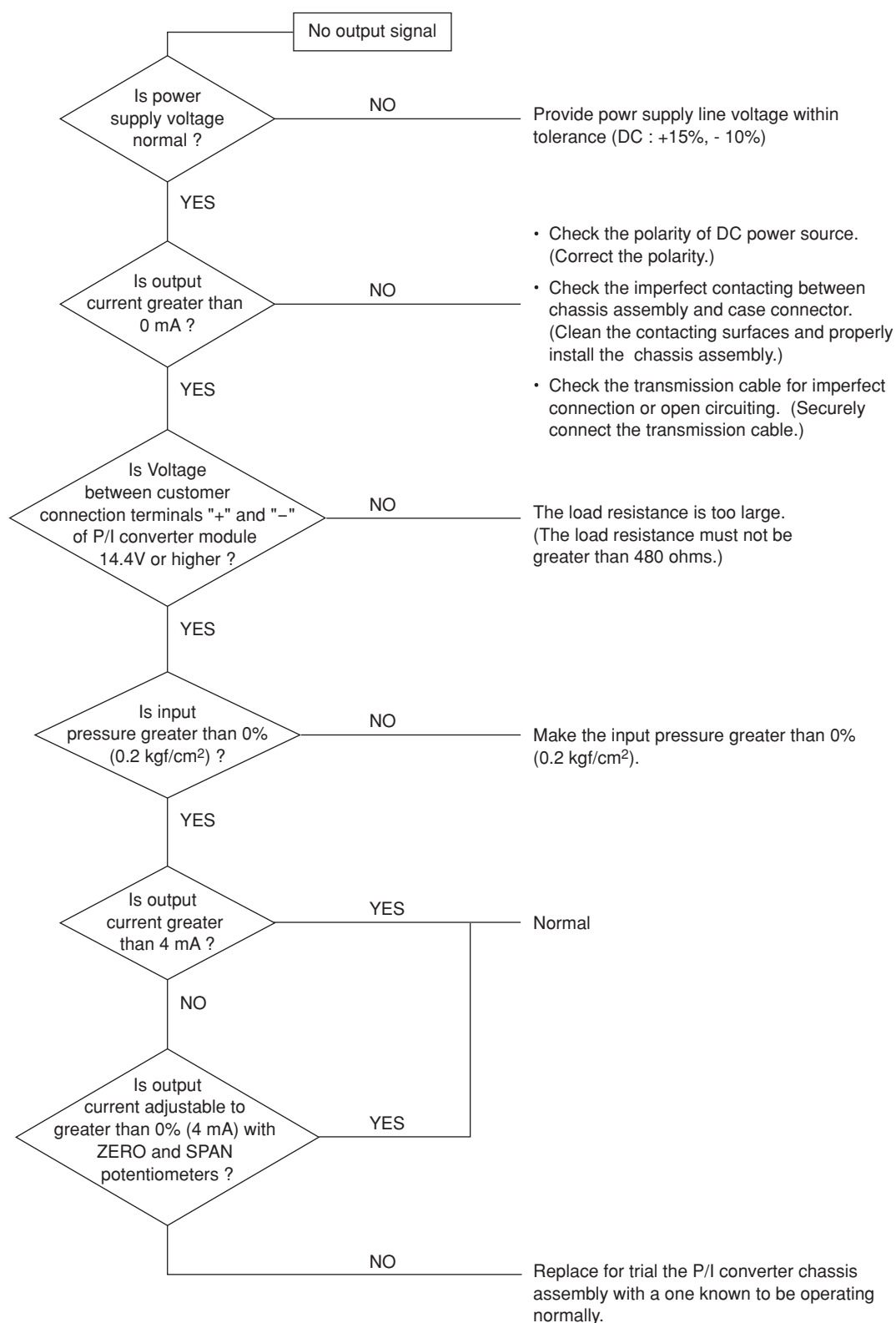


4 - 20 mA DC output

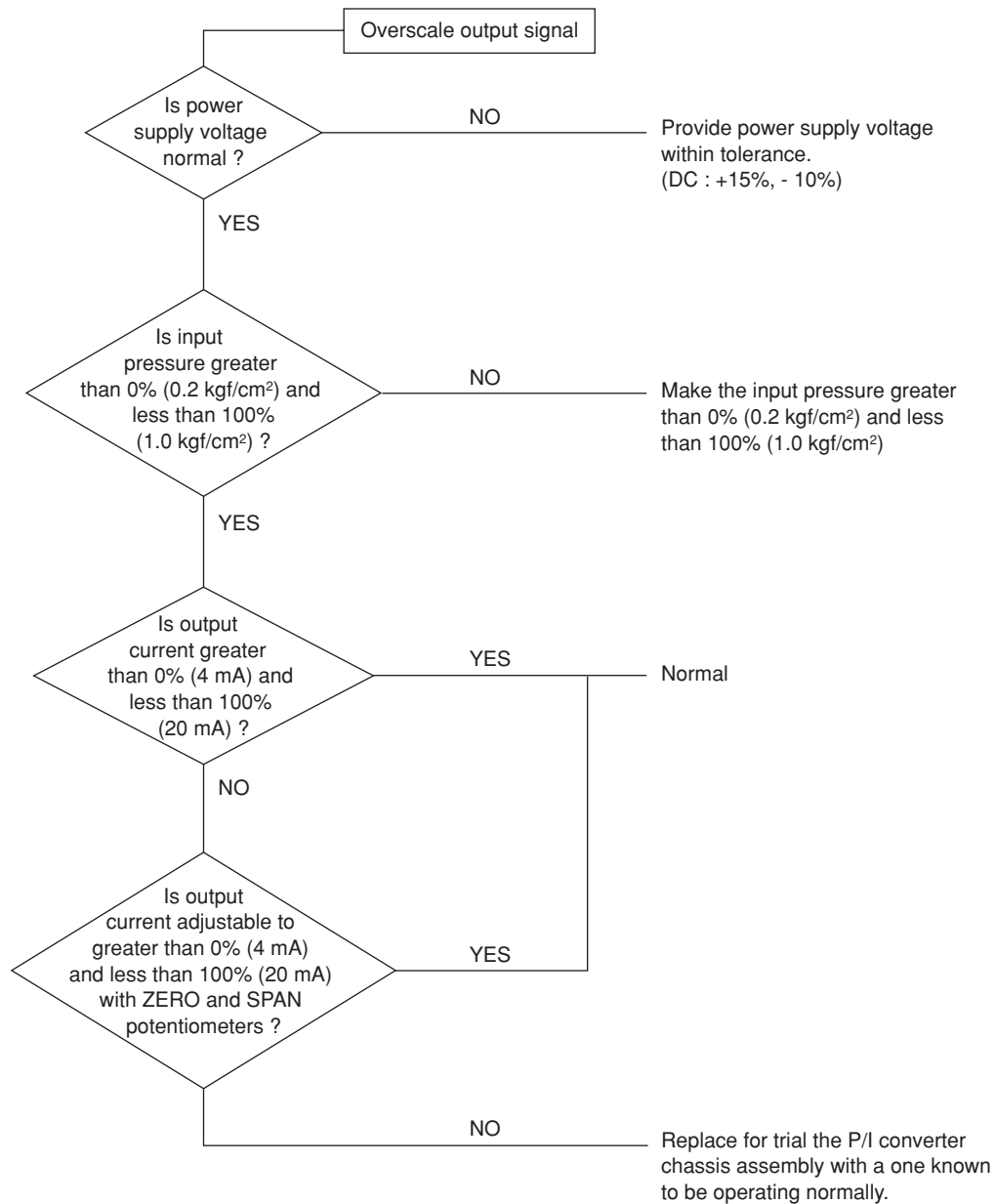
Figure 7. Electrical Connections

9. TROUBLESHOOTING

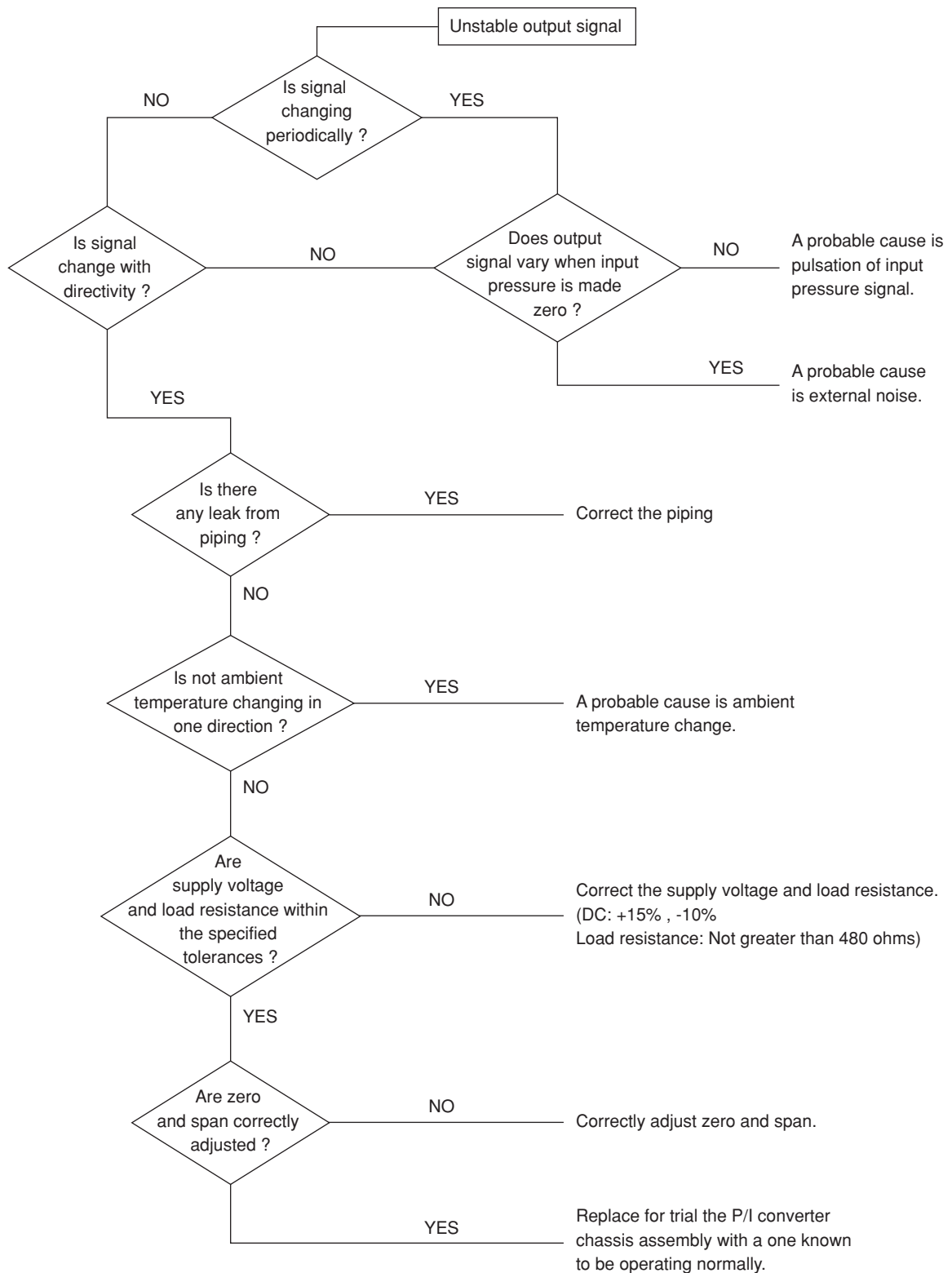
(1) No output signal is delivered.



(2) The output signal deflects overscale.



(3) The Output Signal is Unstable.



10. NOTES FOR REPLACEMENT OF NOX120S

The instruments are interchangeable on the chassis assembly basis. That is, model KUX127 P/I converter module of KUX122 Individual-Type P/I Converter can be installed in the NOX120-S converter provided that the NOX120-S is of the 24V DC supply voltage type and of the 1-point type.

Pay attention to the external load. If the load resistance is less than 360 ohms for each P/I converter module, supply voltage change of +15% and -10% from 24V DC is allowable. For details, refer to Section 3 "SPECIFICATIONS."

When the local resistance is greater than 360 ohms, model NAX520/522 CurrentpaK Impedance Converter should be used.

11. DRAWINGS

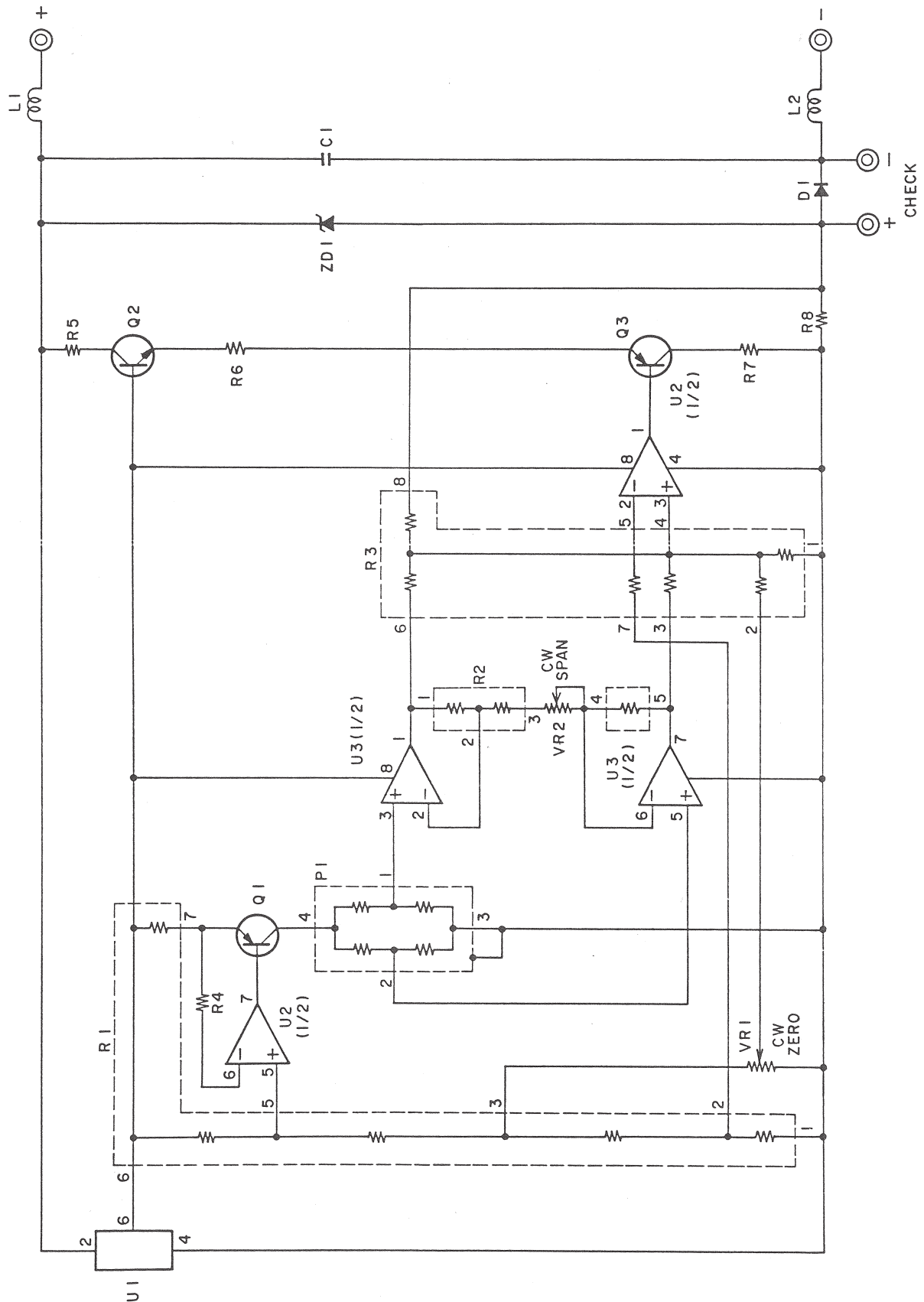
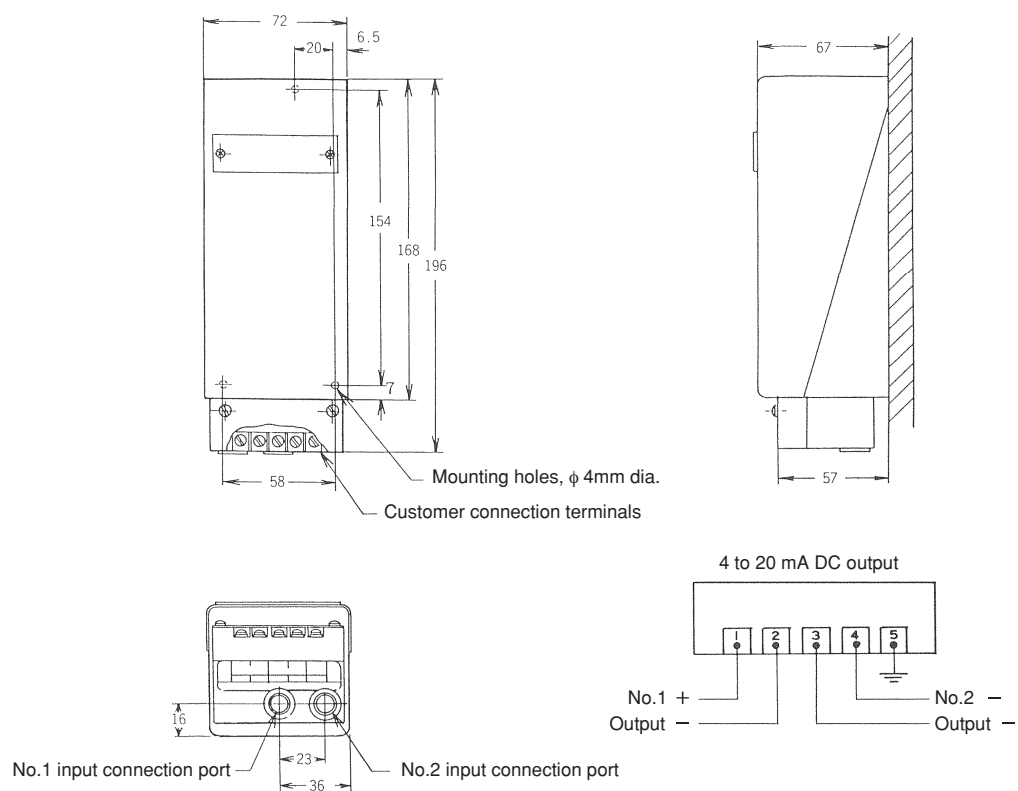


Figure 8. Schematic Diagram of KUX P/I Converter

1) Individual Type P/I Converter (KUX 122)



2) P/I Converter Module (KUX 127)

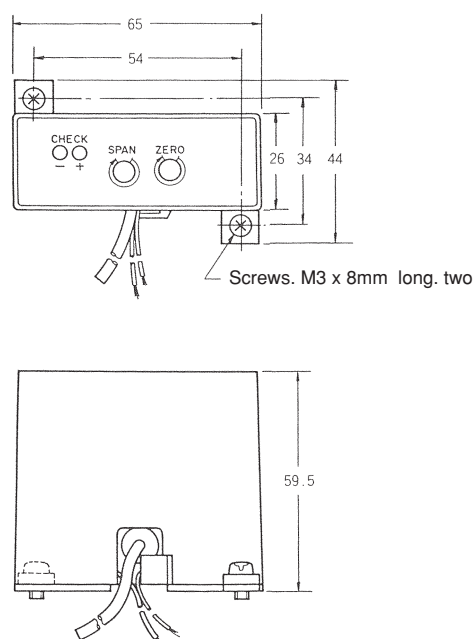


Figure 9. Dimensions and Connections

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

3.1 Restrictions on application

Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

*5. Nuclear power quality: compliance with JEAG 4121 required

*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes," etc.

*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

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.

3.2 Precautions on application

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
[When used outside a radiation controlled area and where nuclear power quality is not required]
[When the limit switch for nuclear power is used]
 - * 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 inquiries 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. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

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.

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