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OM2-5220-9210

SystempaK Multi-P/I Converter Model : KUX121/128 User's Manual

Yamatake Corporation

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TABLE OF CONTENTS

1. SCOPE

This manual covers information required for operation, calibration and maintenance of Model KUX121 Multi-P/I Converter. Be sure to read this manual before handling the instrument.

2. DESCRIPTION

2.1 Outline

The Multi-P/I Converter is comprised of P/I converter modules and a file. 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/cm^2) into an electrical signal of 4 - 20 mADC (or 1 - 5 VDC), employing a diffused silicon semiconductor for the pressure to current conversion element. The file accommodates up to eight modules.

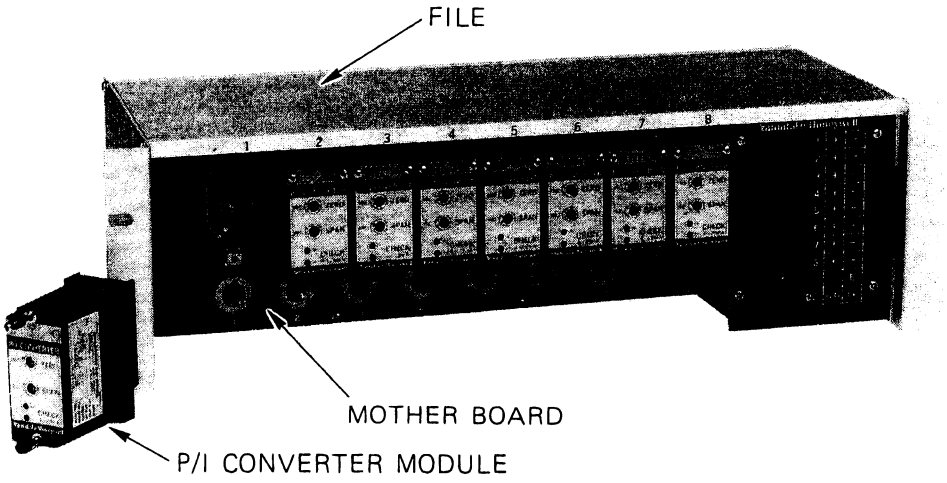


Fig. 1.1

2.2 Structures and Features

The module can be readily installed into or removed from the file, simply by fixing or removing two screws. The module can be removed without requiring to shut down the loop since the pneumatic signal circuit is automatically closed as you remove the module from the file. 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.

Files can be installed on a rack or a wall. On the JAST cabinet (a standard TDCS cabinet of Yamatake Corporation), up to eight files (four on the front and four on the rear) can be installed.

There are two types of files, namely, AC type and DC type. The AC type of files have an AC power supply for the P/I converter modules. The DC type of files have no AC power supply and call for external DC power sources.

The DC type of files are classified further into an individual power source type and a common power source type. The former type of files call for individual power sources for respective modules. The latter type of files can be served in common with a single power source.

The AC type of files are available only in the multiple power source type (a single power source used in common for multiple modules).

3. SPECIFICATIONS

3.1 Performance Specifications

Input Signal: 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 mADC (current limit at approx. 30 mA), 1 - 5 VDC (for common power source type only)

Power Source: DC type (both individual type and multiple type): 24 VDC +15%, -10%

AC type: 100/110/115 V ±10% 50/60 Hz ±2 Hz AC

Power Consumption: AC type: 19.2 VA (max.)

DC type: 3.84 W (max.)

External Load: DC type (both individual type and common type): 480 ohms

$$R = \frac{(V - 14.4)}{0.020}$$

R: External load (ohm)

V: Supply voltage (volt)

AC type: 480 ohms (max.), for ±10% deviation from nominal voltage

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 or 19-inch rack mount (EIA, RS-310-B)

Weight: DC type (individual power source type): 3.9 kg (max.)

DC type (common power source type): 4.3 kg (max.)

AC type: 5.1 kg (max.)

Option: Input air pressure check terminal

Zero Drift:	0.5% FS per 6 months (max.)
Installation:	Wall mount or 19-inch rack mount (EIA, RS-310-B)
Weight:	DC type (individual power source type): 3.9 kg (max.)
	DC type (common power source type): 4.3 kg (max.)
	AC type: 5.1 kg (max.)
Option:	Input air pressure check terminal

3.2 Model Number Tables

Basic model No.	Selections							Options	Description
	Power source	Input	Output	Air connection	Modules	Installation	Environments		
KUX121									Multi-P/I Converter
	-1								24 VDC, individual power source type
	-2								24 VDC, common power source type
	-3								100 VAC, 50/60 Hz, common power source type
	-4								110 VAC, 50/60 Hz, common power source type
	-5								115 VAC, 50/60 Hz, common power source type
		1							0.2 - 1.0 kgf/cm^2
		2							3 - 15 psi
		3							0.2 - 1.0 bar
		4							20 - 100 kPa
			1						4 - 20 mA
			2						1 - 5 VDC (Selectable only for power source specification 2 - 6)
				A					Rc1/4
				B					1/4NPT internal thread
					0				File only
					1				File + 1 converter module
					2				File + 2 converter modules
					3				File + 3 converter modules
					4				File + 4 converter modules
					5				File + 5 converter modules
					6				File + 6 converter modules
					7				File + 7 converter modules
					8				File + 8 converter modules
						C			19-inch rack mount
						S			Wall mount
							X		Standard
								-X	No options
								-P	With input air pressure check terminal

(2) P/I Converter Module Model Number

Basic model No.	Selections				Options	Description
	Power source	Input	Output	Environments		
KUX128						Module for Multi-P/I Converter (for KUX121)
	-1					24 DVC power source
		1				0.2 - 1.0 kgf/cm^2
		2				3 - 15 psi
		3				0.2 - 1.0 bar
		4				20 - 100 kPa
			1			4 - 20 mA
				X		Standard
					-X	No options

Notes: 1. The AC type of file rectifies the AC line voltage into a 24-VDC supply voltage.

2. The 1 - 5 VDC output is delivered by converting the 4 - 20 mAC signal into a 1 - 5 VDC signal within the file.

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.

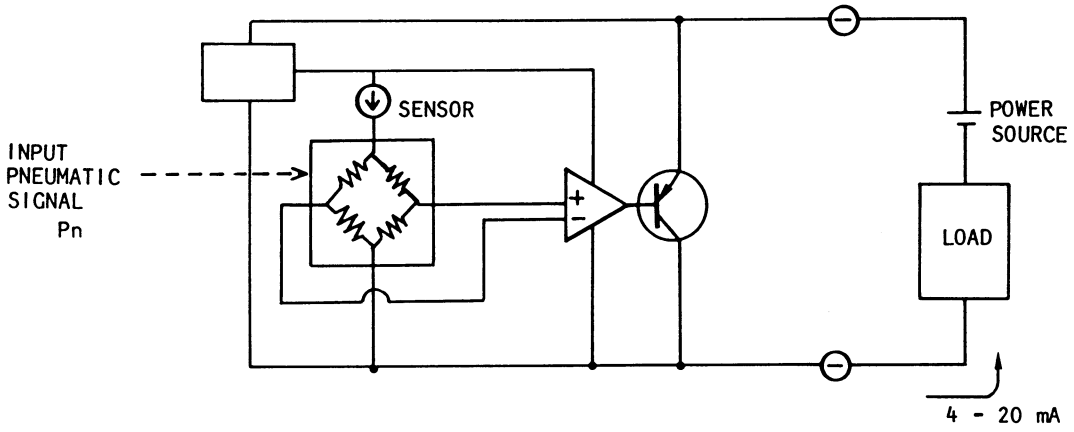


Fig. 4.1. Operating Principle

5. INSTALLATION

5.1 Mounting Dimensions

For the mounting dimensions refer to the overall dimension drawings at the end of this manual.

5.2 Place of Installation

The place of installation must be in an instrumentation room 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.

5.3 Customer Connections

(1) Input Air Connections

The input air connection [Rc1/4 (or 1/4NPT internal thread)] are provided at a lower section on the mother board and are numbered 1 - 8 for respective P/I converter modules. The connecting work can be made easier by removing the terminal cover and terminal block as shown in Fig. 5.1.

(2) Electrical Output Signal Connections

Connect the cables to the customer connection terminals as indicated on the terminal cover. The terminal screws are M3 x 6 mm.

For the individual power supply type of instrument, connect the signal lines only. For the common power supply type of instrument, connect the signal lines and power supply line.

For individual power supply type of instrument, electrical connections can be conveniently made by using DigitroniK Line Wiring Blocks (Model KMW 110-X-X).

5.4 Examples of Cabinet Piping and Wiring

Upto eight files (up to four files on each of the front and rear sides) can be installed on a JAST cabinet (a standard TDCS cabinet of Yamatake Corporation). Examples of piping and wiring are given in Fig. 5.2.

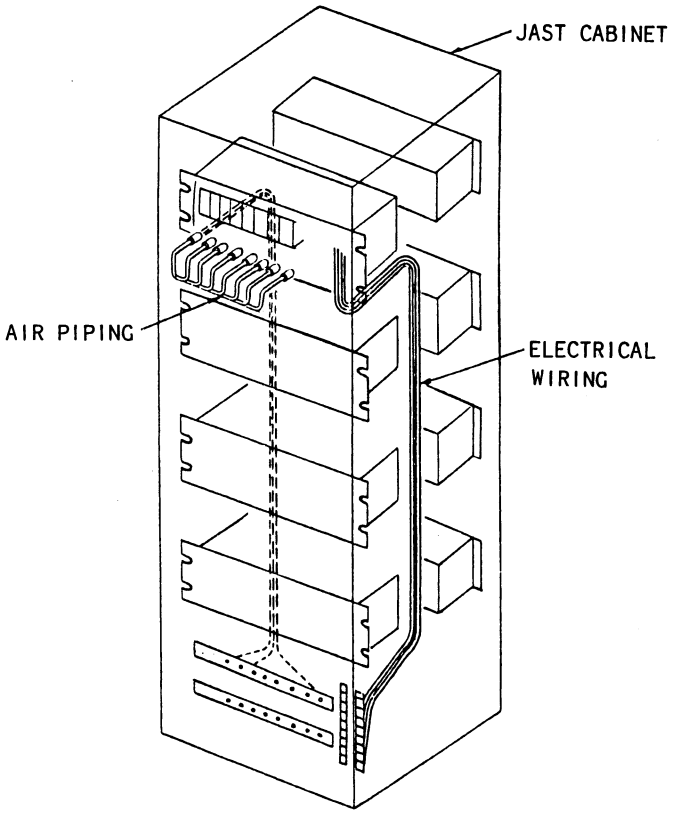


Fig. 5.2

5.5 Installing or Removing the Modules

(1) Removing Modules from File Mother Board

Loosen the two screws (top and bottom) of each module and remove the module from the board. As the module is removed, the input air circuit is closed automatically.

(2) Installing Modules on File Mother Board

Connect the air circuit by inserting the air pressure input port in the guide hole of the mother board and pushing the module toward the mother board. Keeping the module in this state with one hand, secure the two screws (top and bottom) of the module with the other hand.

PRECAUTION: Tightening torque of the screws should be approximately 0.2 N•m {2 kgf-cm}. Do not tighten them excessively – do not apply a tightening force of greater than 0.29 N•m {3 kgf-cm}.

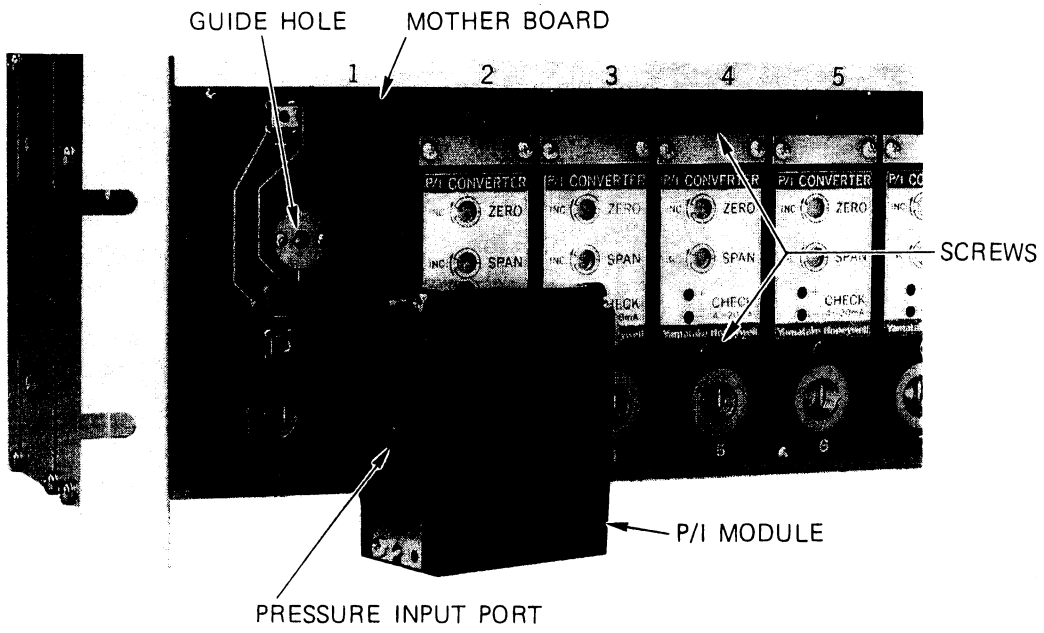


Fig. 5.3. Removing and Installing Modules

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. For the file of the common power source type, turn on the POWER switch at the right hand end of the file (refer to Fig. 5.1). To turn on/off the switch, move it up/down in a state that it is pulled.

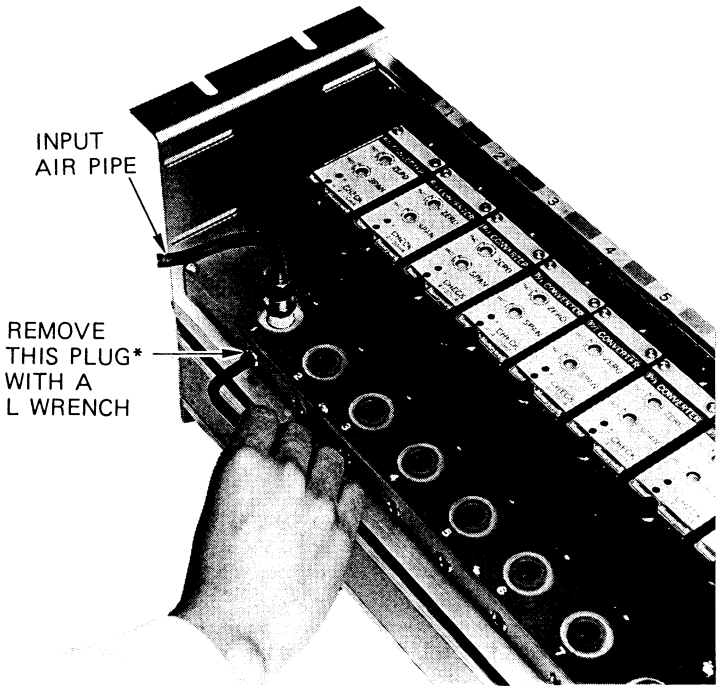
7. CALIBRATION AND ADJUSTMENTS

7.1 Setup

Set one of the module spaces (bases) of the file mother board to an unused state, by removing the module and disconnecting the piping. This space (base) may be used as a test stand.

Install the module to be tested on the test-stand base. Connect a variable air pressure source and a precision pressure gauge (or mercury column) to the air piping and connect a digital voltmeter to the corresponding voltage output terminal. For a 4 - 20 mADC output, connect a 250-ohm precision resistor and a digital voltmeter (DVM) in parallel, to the output circuit of the test-stand base.

Note: The 4 - 20 mADC current output can be measured more accurately by connecting a 250-ohm precision resistor in series to develop a voltage drop of 1 - 5 VDC 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.



* OPTION

Fig.7.1.1

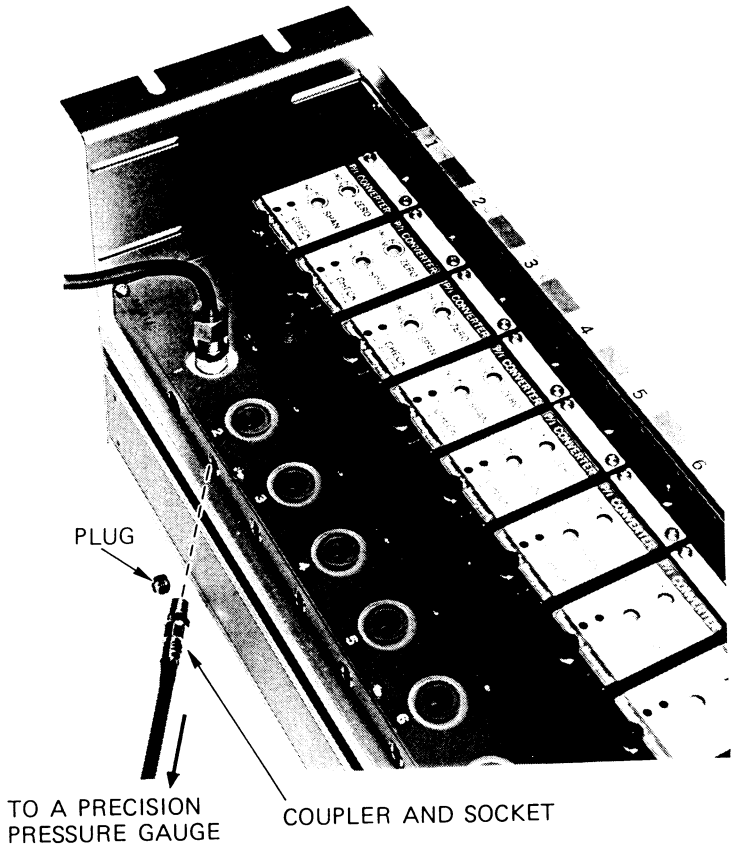


Fig. 7.1.2

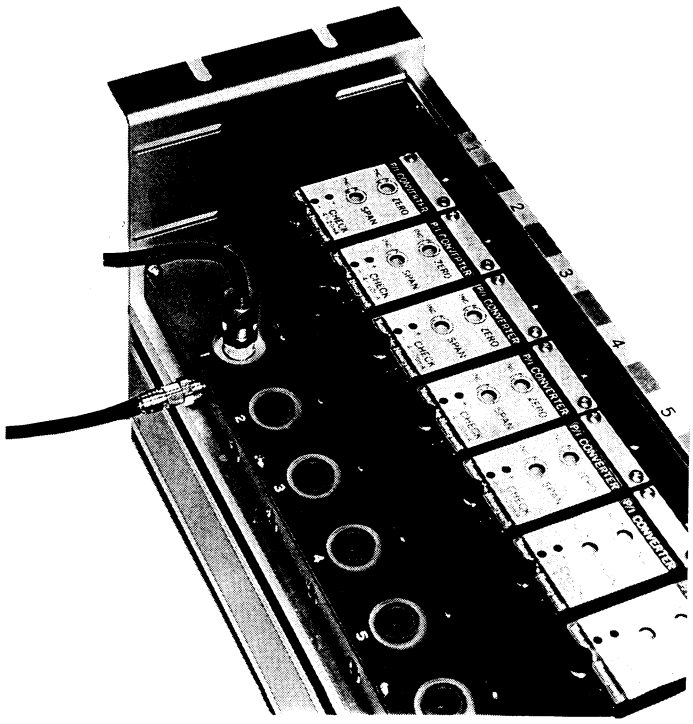


Fig. 7.1.3

7.2 Calibration

Adjustment of inputs and outputs are completed at the factory before shipment. Check the accuracies referring to the below table and made adjustments if the accuracies are not met within the required tolerance (± 0.25% FS).

Input					Output	
%	kgf/cm^2	psi	bar	kpa	mA DC	V DC
0	0.2	3	0.2	20	4	1
25	0.4	6	0.4	40	8	2
50	0.6	9	0.6	60	12	3
75	0.8	12	0.8	80	16	4
100	1.0	15	1.0	100	20	5

7.3 Adjustment

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

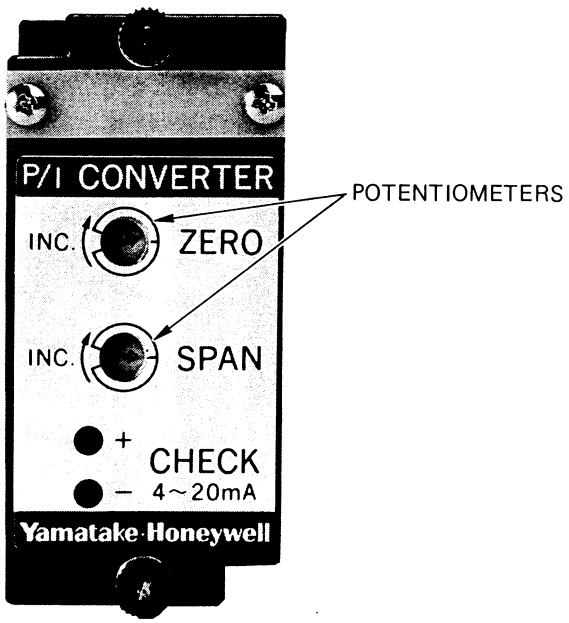


Fig. 7.2

(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.

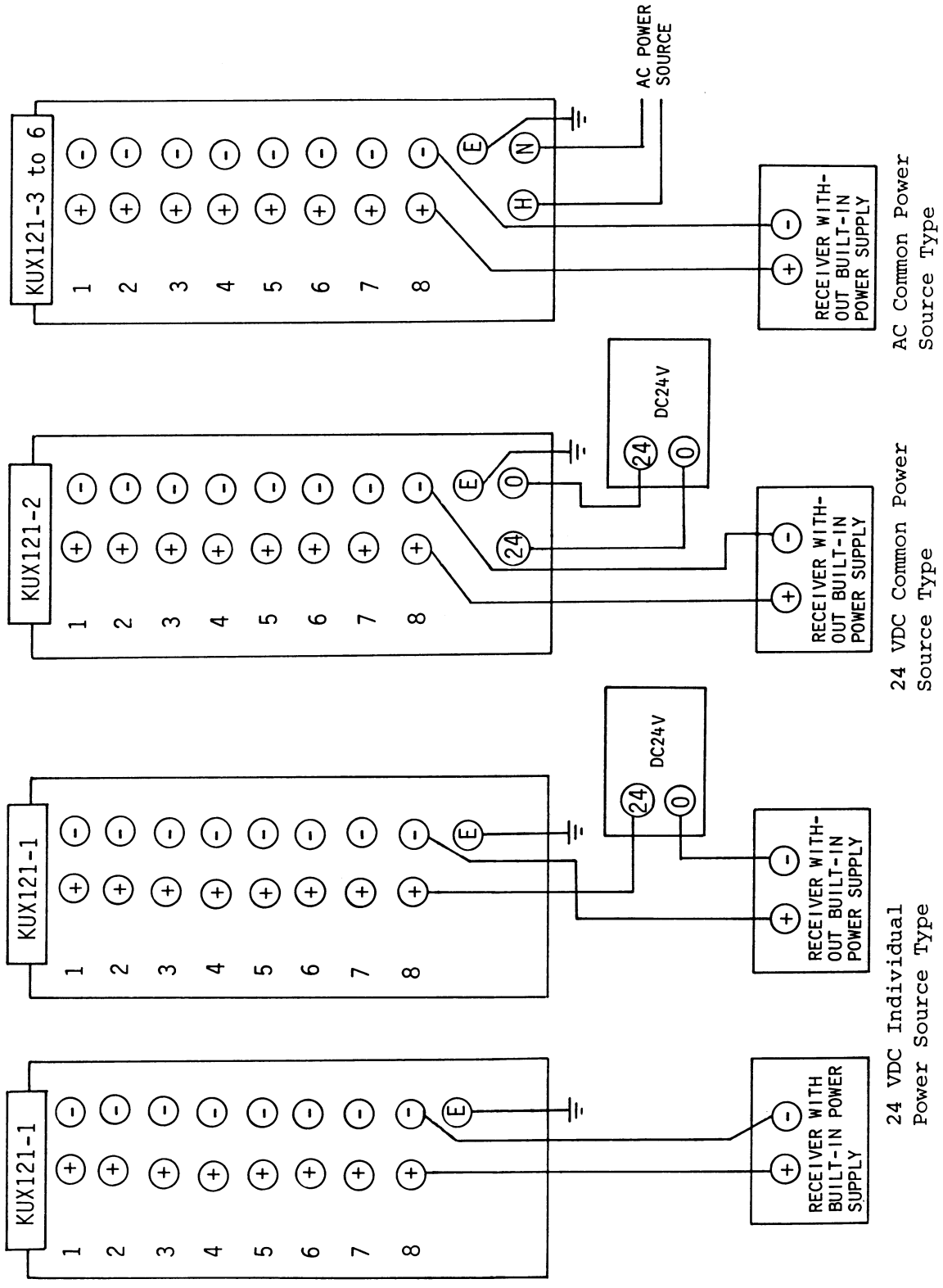
8. INSTALLING THE COUPLER (OPTION)

If the instrument is with model number "P" (option), a coupler (a socket and a plug) and an allen wrench accompanies the instrument. Install the coupler as shown in Fig. 7.1.2.

(1) Remove the blind plug which has a hex hole.

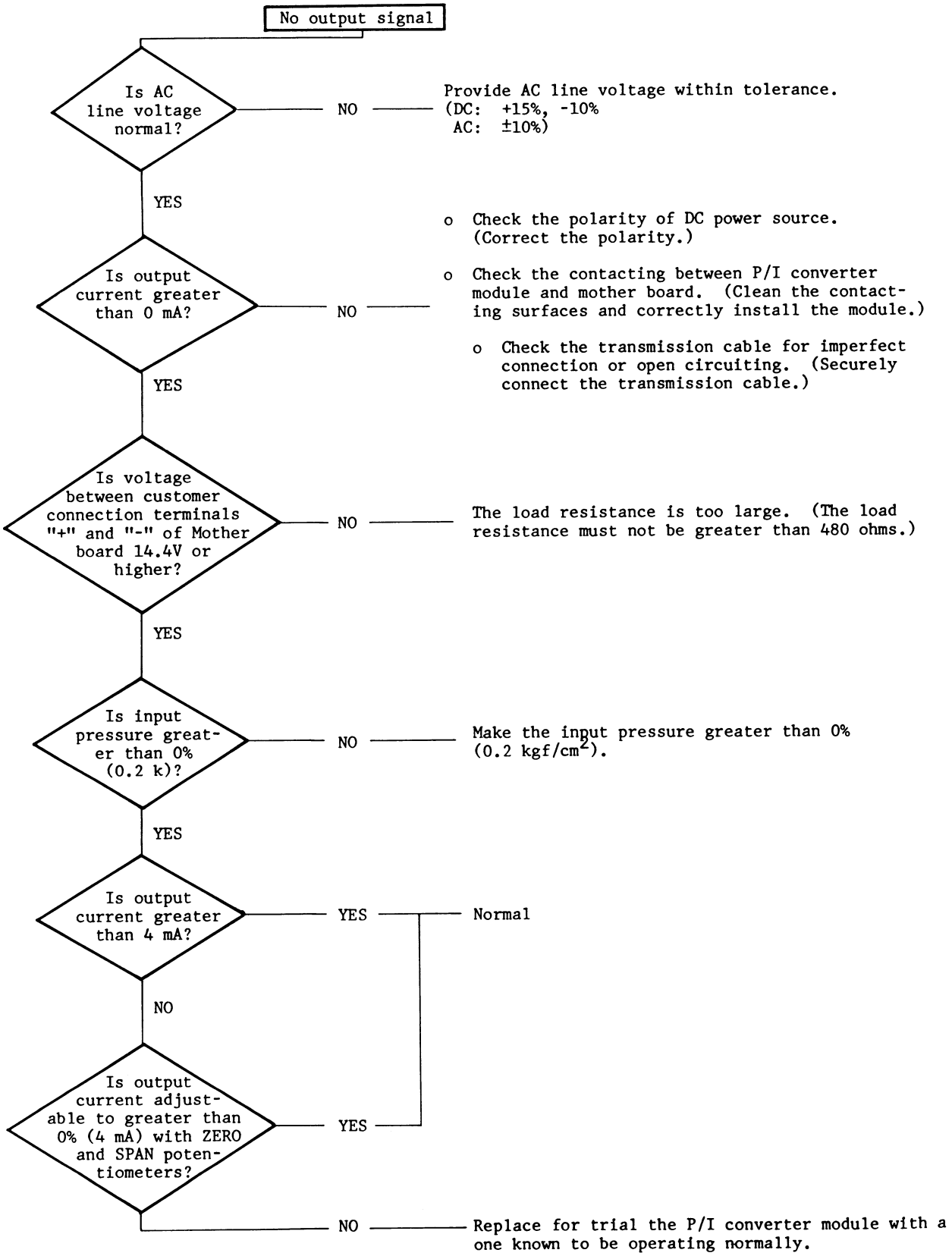
(2) Mount the socket.

9. ELECTRICAL CONNECTIONS

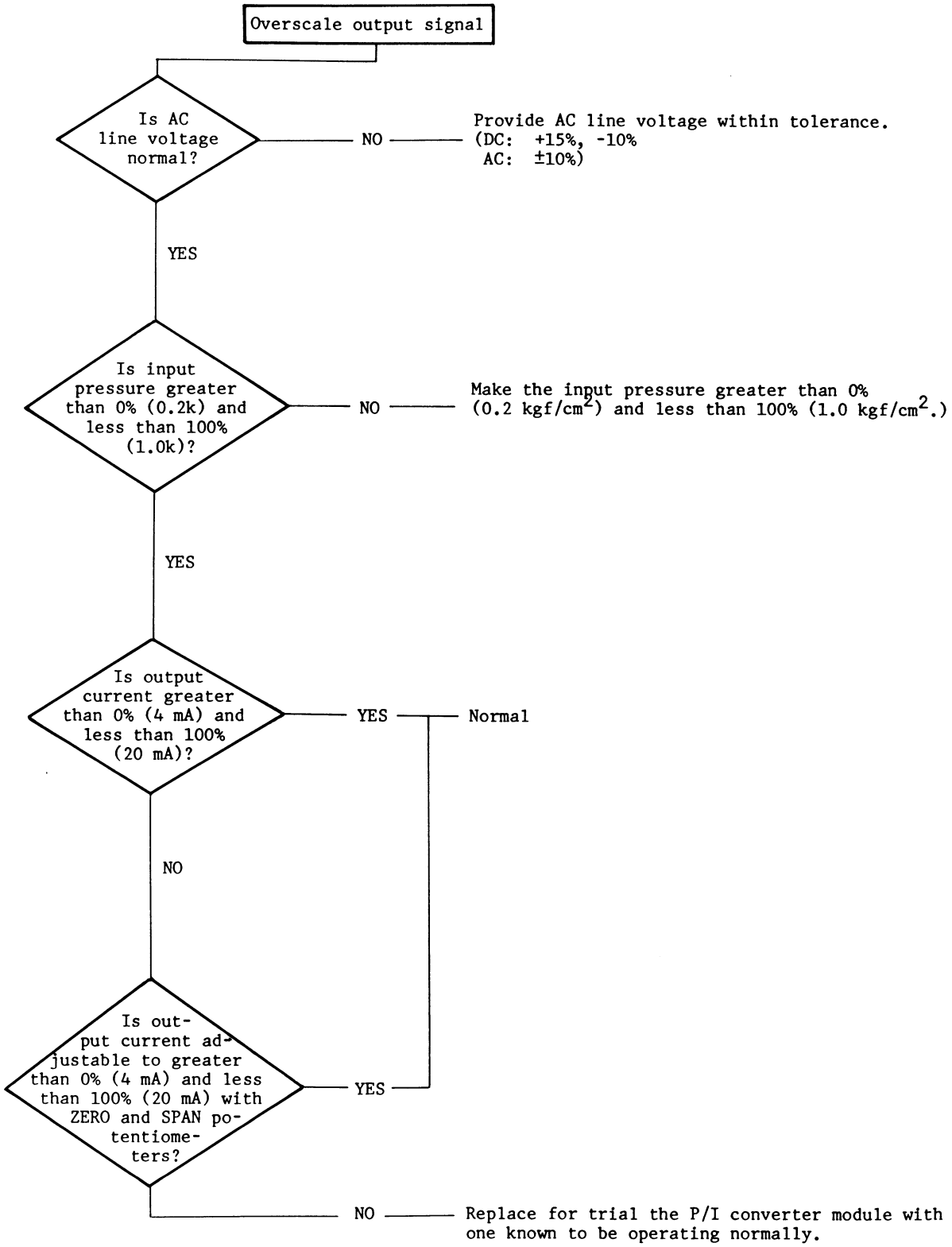


10. TROUBLESHOOTING

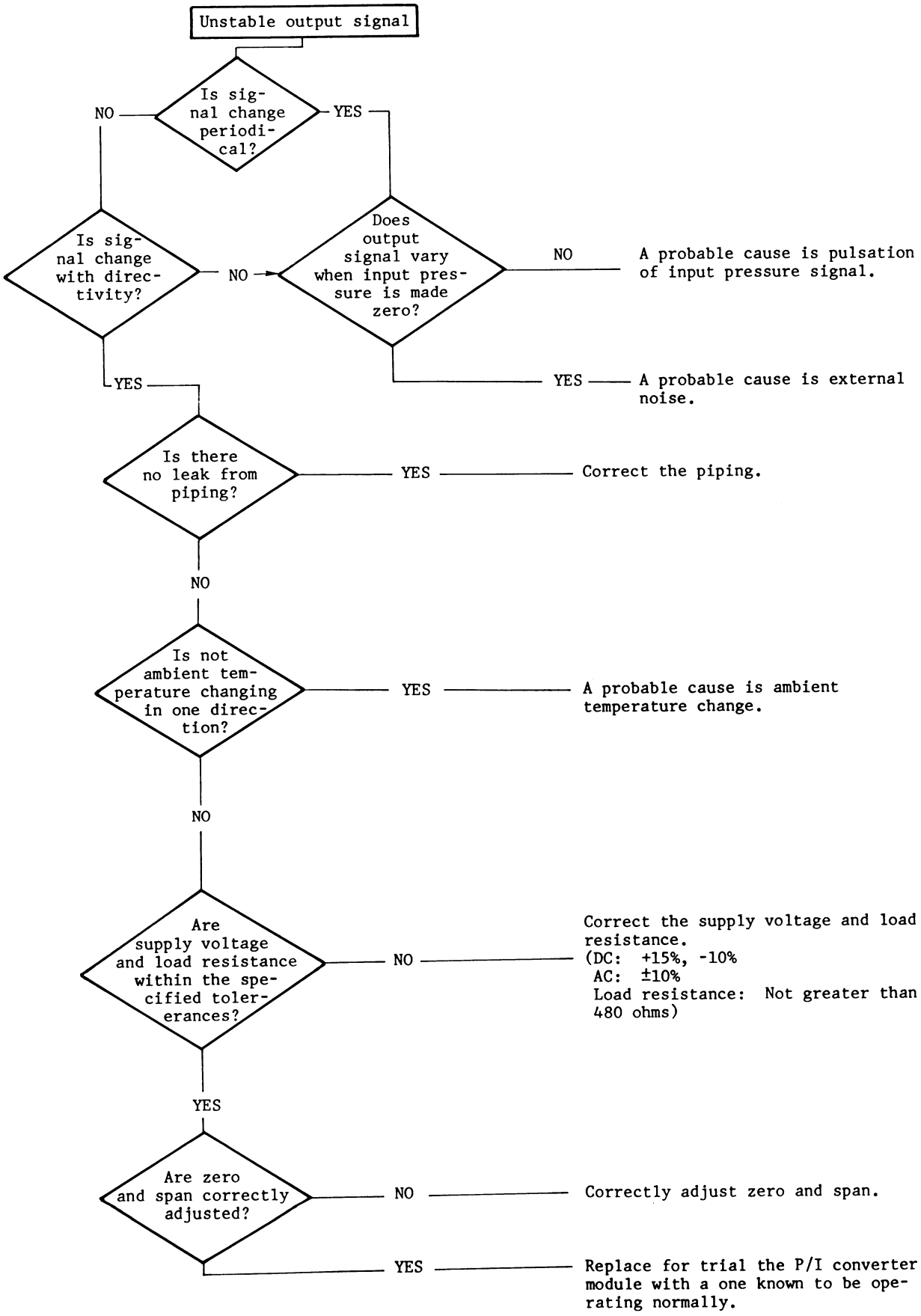
(1) No output signal is delivered.



(2) The output signal deflects overscale.



(3) The output signal is unstable.



11. NOTES FOR REPLACEMENT OF KUX120

Model KUX129 P/I Converter Modules of KUX120 can be replaced with Model KUX128 P/I Converter Modules of KUX121. For replacement, note the following:

(1) KUX120 of DC power source type

Pay attention to be 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 24 VDC is permissible. For details, refer to Section 3 "SPECIFICATIONS."

When the load resistance is greater than 360 ohms, Model NAX50□ CurrentpaK Impedance Converter should be used.

(2) KUX120 of AC power source 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 ±10% from the nominal voltage is permissible.

(3) The KUX128 (for KUX121) is higher than the KUX129 (for KUX120) by approximately 30 mm.

12. DRAWING

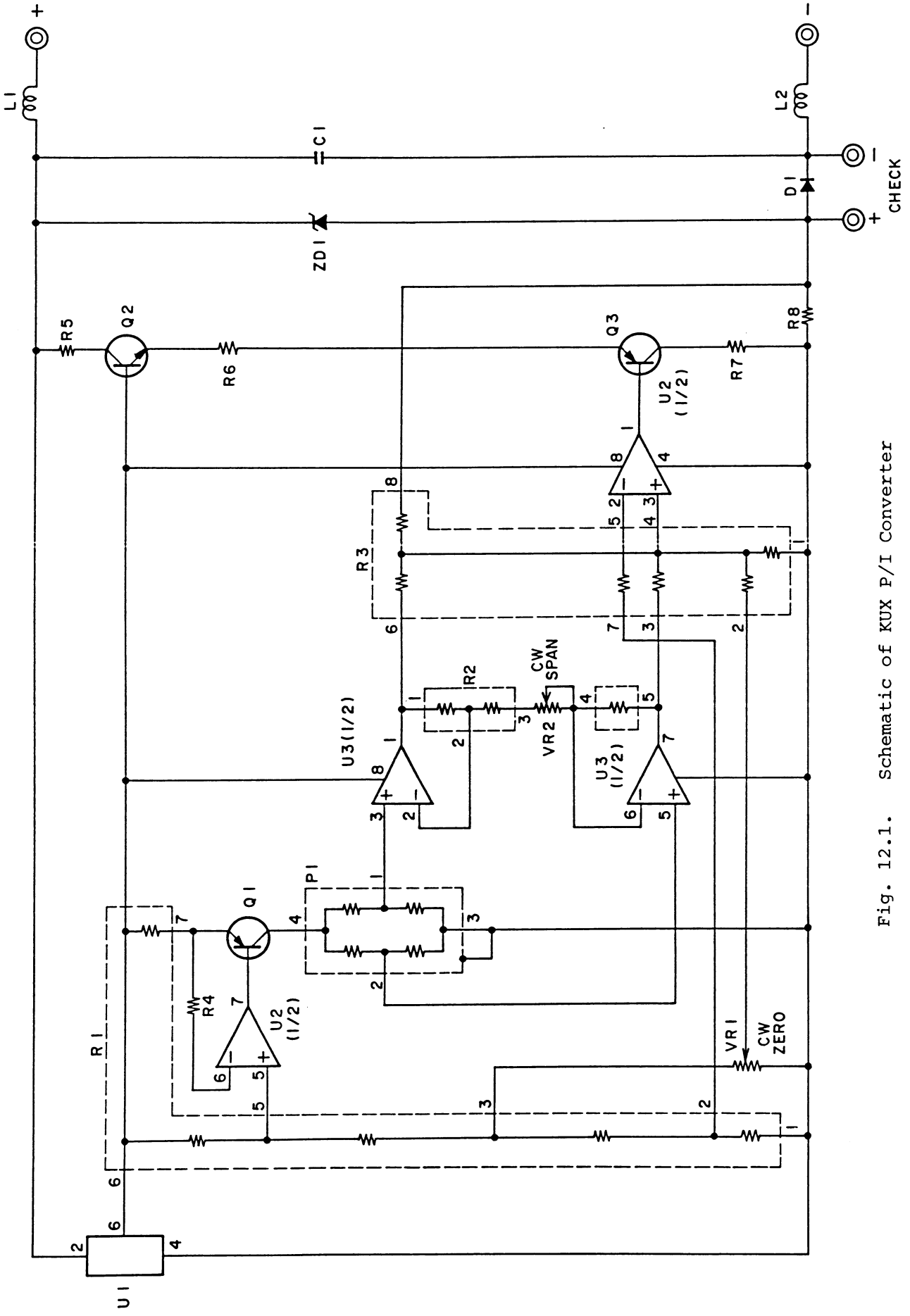


Fig. 12.1. Schematic of KUX P/I Converter

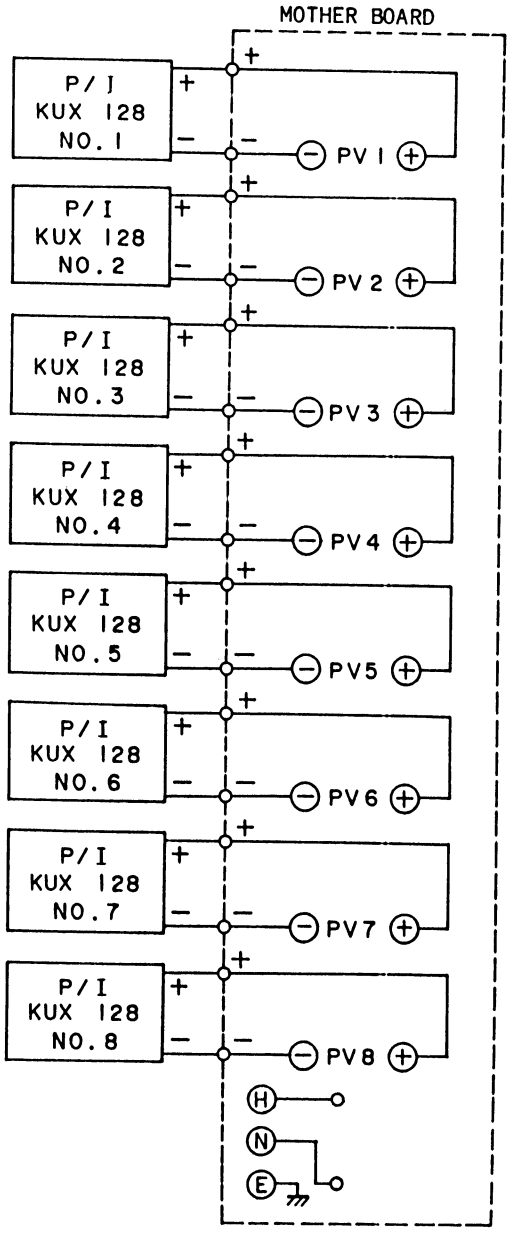


Fig. 12.2. Wiring Diagram of KUX121 (For DC 24 V Individual Power Source)

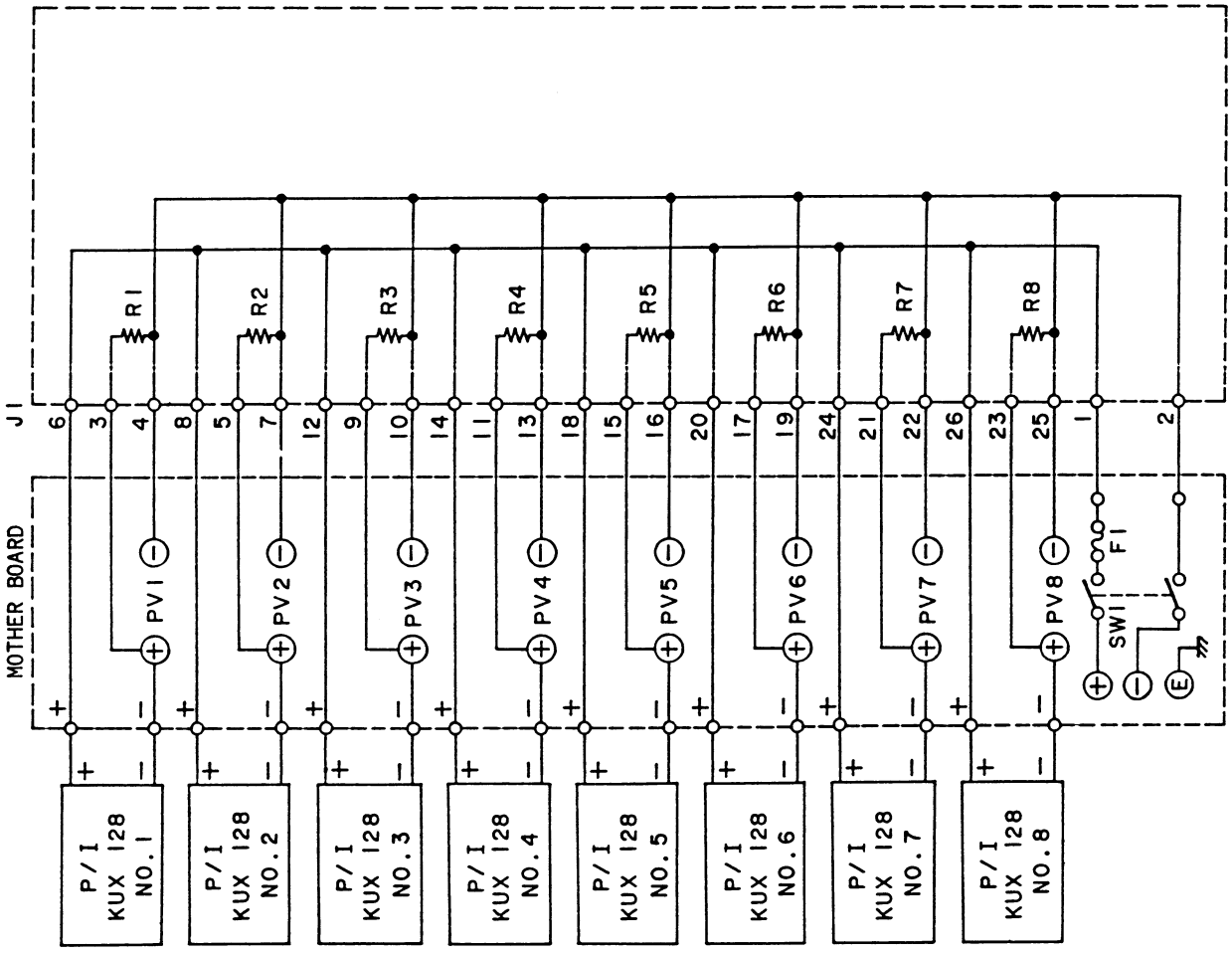


Fig. 12.3. Wiring Diagram of KUX121 (For DC 24 V Common Power Source)

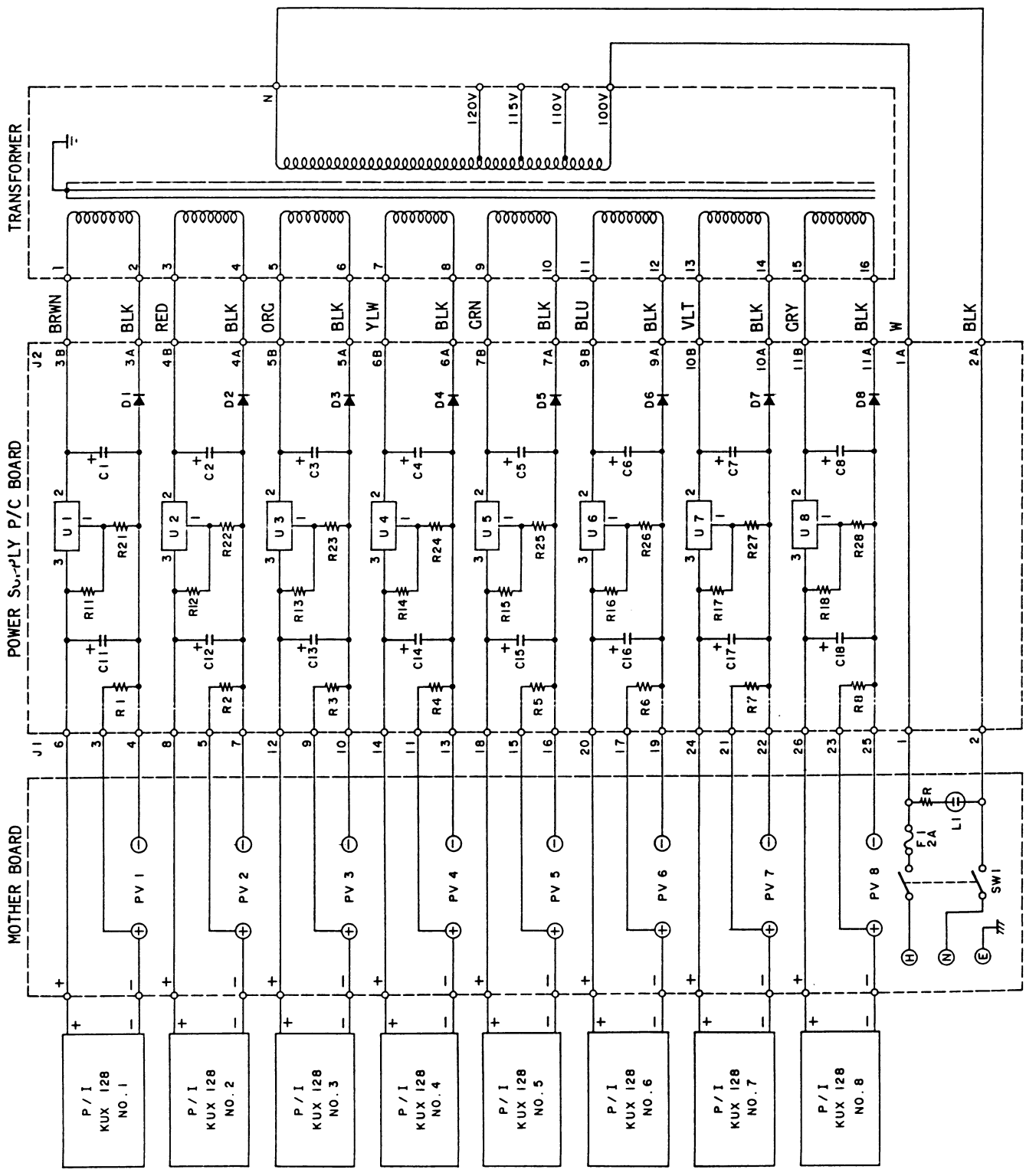
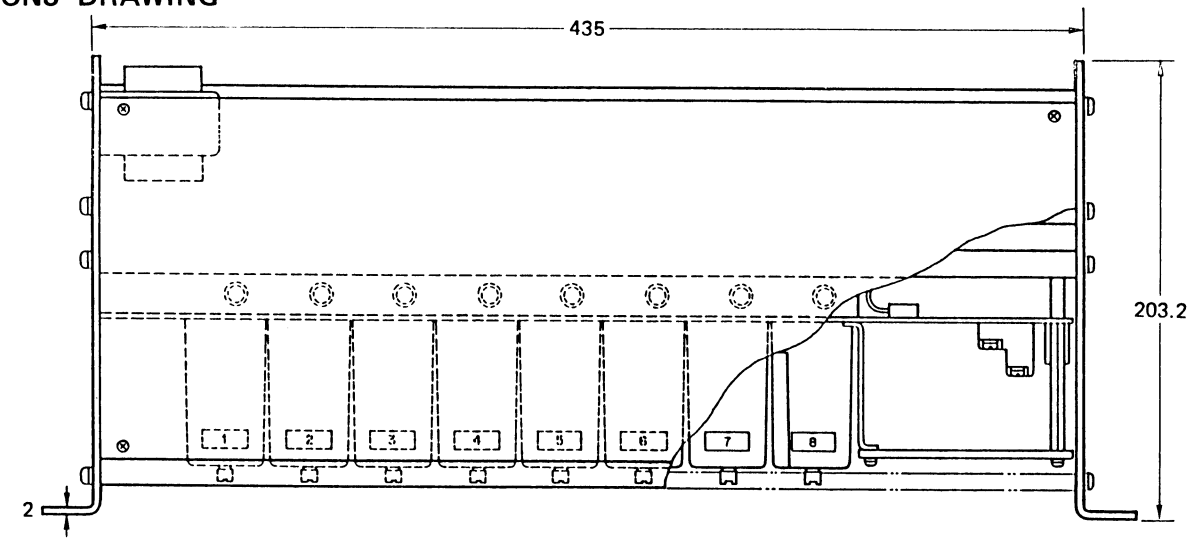
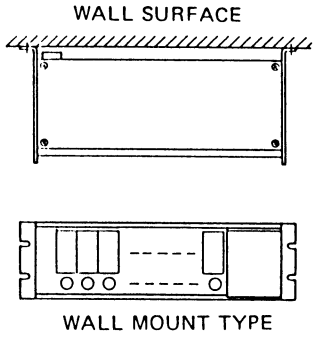


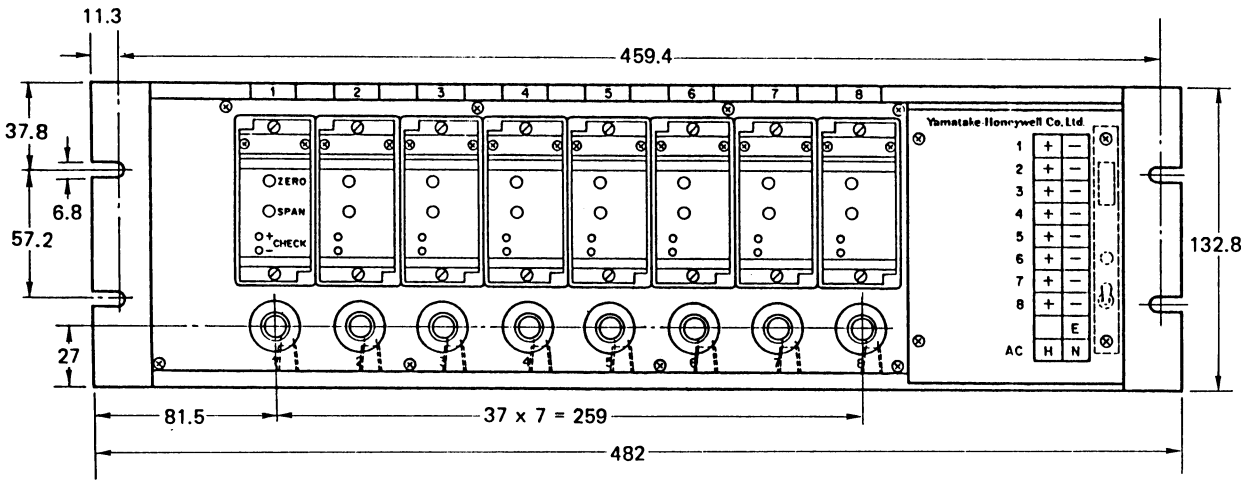
Fig. 12.4. Wiring Diagram of KUX121 (For AC 100 V Power Source)

DIMENSIONS DRAWING





RACK MOUNT TYPE



Unit: mm

Fig. 12.5 Dimension Drawing

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