User's
Manual

Model PTED
EMF- AND RTD-TO-PNEUMATIC CONVERTERS

IM 2N1B2-01E

YOKOGAWA ◆
Yokogawa Electric Corporation

IM 2N1B2-01E
6th Edition

Notices

■ Regarding This User's Manual

(1) This manual should be passed on the end user. Keep at least one extra copy of the manual in a safe place.

(2) Read this manual carefully and fully understand how to operate this product before you start operation.

(3) This manual is intended to describe the functions of this product. Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa) does not guarantee that the functions will suit a particular purpose of the user.

(4) Under absolutely no circumstances may the contents of this manual in part or in whole be transcribed or copied without permission.

(5) The contents of this manual are subject to change without prior notice.

(6) Every effort has been made to ensure accuracy in the preparation of this manual. Should any error or omissions come to your attention however, please contact your nearest Yokogawa representative or our sales office.

■ Regarding Protection, Safety, and Prohibition against Unauthorized Modification

(1) In order to protect the product and the system controlled by it against damage and ensure its safe use, make certain that all of the instructions and precautions relating to safety contained in this manual are strictly adhered to. Yokogawa does not guarantee safety if products are not handled according to these instructions.

(2) Be sure to use the spare parts approved by Yokogawa when replacing parts or consumables.

(3) Modification of the product is strictly prohibited.

(4) Reverse engineering such as the disassembly or decompilation of software is strictly prohibited.

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(2) Yokogawa assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.

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CONTENTS

1. INTRODUCTION.

1-1. Inspection.

This instrument was thoroughly tested at the factory before shipment. However, when you receive this instrument:

- Inspect for visible damage.
- Confirm that the model and suffix codes shown on shipping documents, and also on the nameplate on the front panel of the instrument, are the same as your order sheet. (See Figure 1-1.)
- Confirm that all accessories (See Section 2-4) are present.

If you have any questions about this instrument, please contact either your nearest Yokogawa Sales/Service Office or Yokogawa Electric Corporation, Tokyo, Japan.

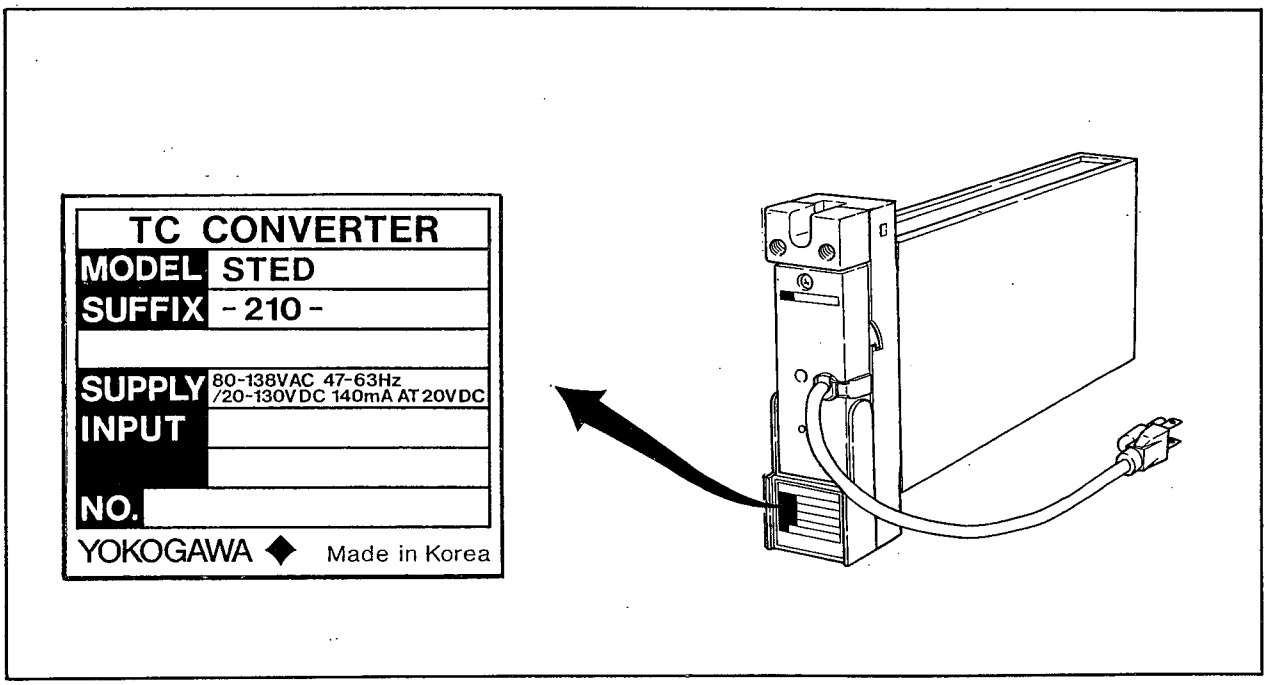


Figure 1-1. Nameplate — Thermocouple Input Version.

2. GENERAL.

The Model PTED converter receives a mV DC input, thermocouple input, RTD (resistance temperature detector) input or 1 to 5 V DC input and converts it to a pneumatic pressure signal of 0.2 to 1.0 kg/cm^2 or bar, 20 to 100 kPa, and 3 to 15 psi. For temperature measurements, linearizers are provided in all converters and burnout functions are equipped with all models – except 1 to 5 V DC input versions.

2-1. Standard Specifications.

Input Specifications: Refer to Table 2-1.
Output Signal: 0.2 to 1.0 kg/cm^2 or bar, 20 to 100 kPa, or 3 to 15 psi, whichever specified.
Conversion:
mV DC input: Proportional output.
Thermocouple, RTD inputs: Outputs are proportional to temperature (linearized).
Air connection: Tapped for PT1/8 (or 1/8 NPT (option)) female.
Wiring:
Signal wiring to/from the field: ISO M4 (4 mm) size on terminal block.
Power and Ground Wiring:
100 V version: JIS C 8303 two-pin plug with earthing contact. (IEC A5-15, UL498)
220 V version: CEE 7 VII (CENELEC standard) plug.
Cable Length: 300 mm.
Mounting: Installed in an indoor rack.

Normal Operating Conditions
Ambient Temperature: 0 to 50°C.
Ambient Humidity: 5 to 90% relative humidity (non-condensing).
Power Supply: Two versions, for "100 V" (standard) or "220 V" (option/A2ER). Both versions may use AC or DC, without change to the instrument:

Version	100 V	220 V
DC (polarity reversible)	20 to 130 V	120 to 340 V
AC (47 to 63 Hz)	80 to 138 V	138 to 264 V

Air Supply: 1.4 ±0.1 kg/cm^2 or bar, 140 ±10 kPa, 20 ±1.4 psi.
Maximum Air Consumption: 10 N ℓ/min.
Maximum Power Consumption:
24 V DC power version: 86mA.
100 V AC power version: 6.6 VA.
220V AC power version: 9.5VA
Allowable Tilt Angle: The converter can be tilted any direction within 15°.

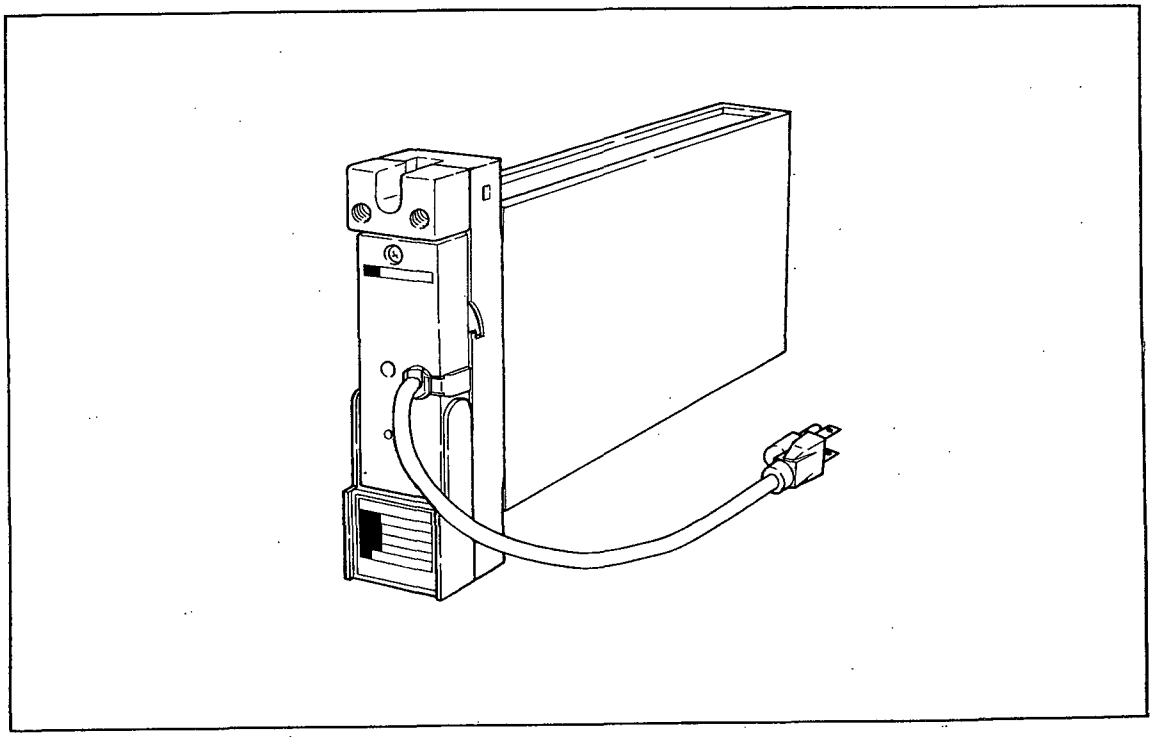


Figure 2-1. External View.

2-2. Model and Suffix Codes.

Model	Suffix Codes	Description
PTED	. . . . .	EMF- and RTD-to-Pneumatic Converters
Input Signal	-1	mV DC input
	-2	Thermocouple input
	-3	RTD input
	-5	1 to 5 V DC input
No. of Input	1	Single input (absolute value measurements)
	0	Always 0
Saffix Codes	-MV	mV DC input
	-TK	Type K
	-TT	Type T
	-TJ	Type J
	-TE	Type E
	-TB	Type B
	-TR	Type R
	-TS	Type S
	-PA	JIS Pt 100 Ω
	-SV	1 to 5 V DC
Style Code	*A	Style A
Option	/A2ER	220 V power supply
	/NPT	ANSI connection 1/8 NPT female

2-3. Option.

/NPT: ANSI Connection 1/8 NPT female.

2-4. Accessories.

1 A fuse. quantity one.

Note: The fuse (S9510VK) is the dedicated fuse, Do not use it for other products.

Table 2-1. Input Specifications.

Input Signal & Standard	mV DC Input	Thermocouple Input JIS, IEC, ANSI, BS Standards Types B, R, S, K, J, E & T.	RTD Input JIS 3-wire Pt 100Ω at 0°C Currrent at Least 2 mA	1 to 5 V DC Input
Minimum Span	3 mV	3 mV	10°C*1	—
Maximum Span	100 mV	62 mV	500°C	—
Elevation	Within 3 times of span or ±50 mV, whichever is smaller.	Within 3 times of span or ±25 mV, whichever is smaller.	Within 5 times of span.	—
Input Impedance	1 MΩ	1 MΩ	—	1 MΩ
External Input Impedance	500 Ω maximum	500 Ω maximum*2	No greater than input span (°C) × 0.4 Ω maximum 10 Ω/wire*2.	—

Notes: *1: Minimum span is 30°C for the converter used with BARD.

*2: This resistance value can be added to the BARD internal resistance when the converter is used with BARD.

3. INSTALLATION.

3-1. Construction of Rack-Mounted Instruments.

The Model PTED converter consists of an internal unit and rack case. They can be separated from each other. The internal unit is connected to the rack case with pneumatic and multipin connectors, so the internal unit can be withdrawn from the rack case without disconnecting these connectors. The terminal cover can be manually held when drawing out the internal unit from the rack case.

3-2. Rack Construction.

A strong steel angle should be used to mount instruments. Figure 3-1 also shows steel angles of 40 mm X 40 mm wide and 5 mm thick.

For ease of signal wiring and for safety, pass all cables through a synthetic resin cable duct.

For safety this converter employs a Two-pole plug with earthing contact conforming to IEC A5 – 15, UL498, JIS C 8303 for 125 V, 15 A. Therefore, suitable receptacles for this plug must be furnished by the user.

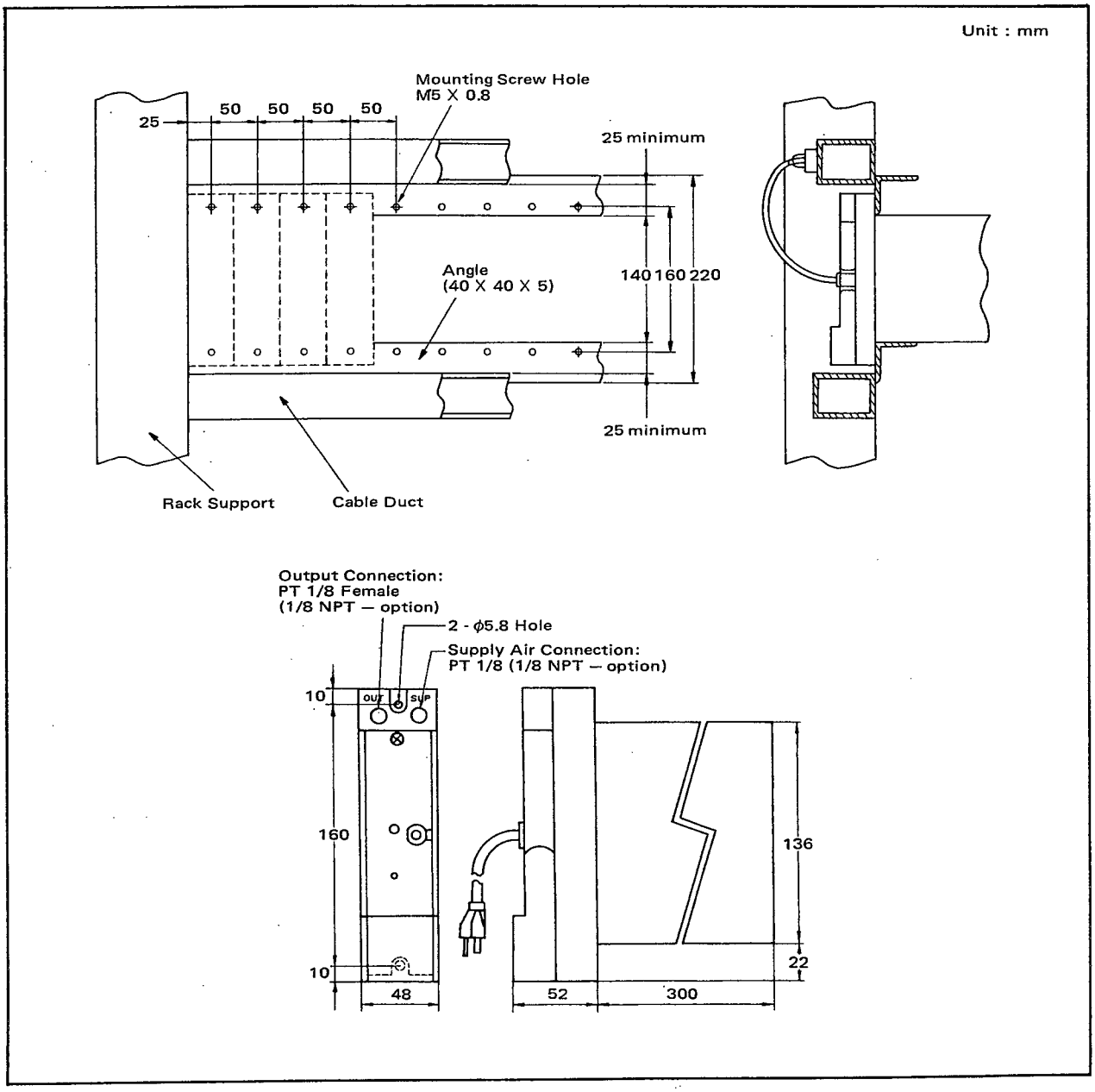


Figure 3-1. Rack Construction.

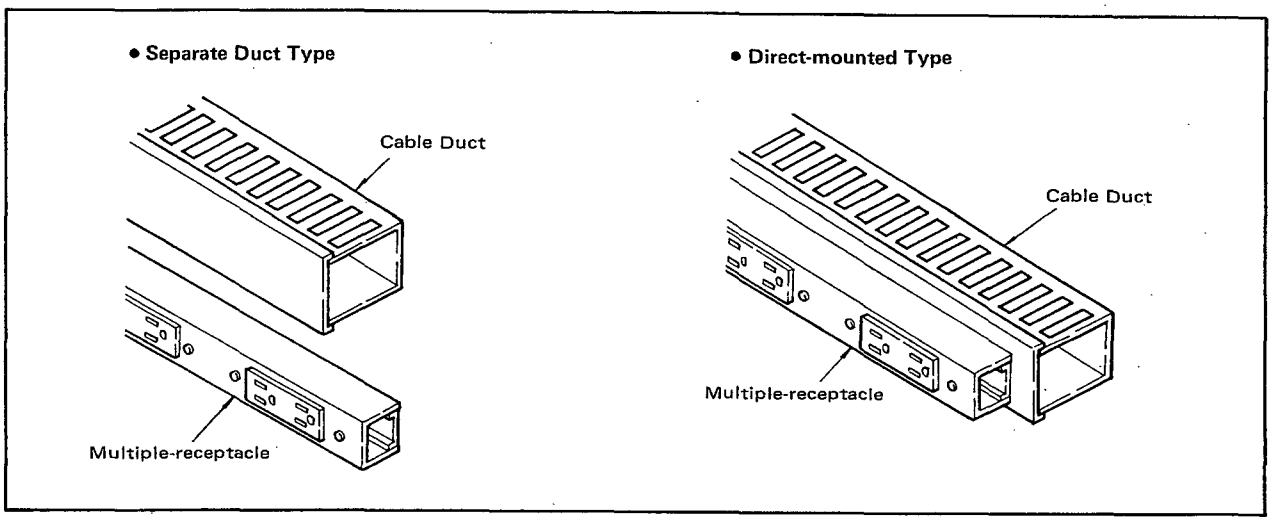


Figure 3-2. Typical Installation of Receptacle Units.

3-3. Installation.

Although wiring and piping can be accomplished with internal units installed, it is recommended that all internal units be removed from the rack case before performing them.

(1) Insert the rack case into the rack with the air connections above. Match the two mounting holes (upper and lower portions of the case) to the rack mounting holes on the support angle. Secure the case with setscrews of 5 mm X 0.8 (M5 X 0.8). See Figure 3-3.

(2) Pass the signal cables through the lower cable duct (see Figure 3-4). For terminal wiring details, refer to section 3-4.

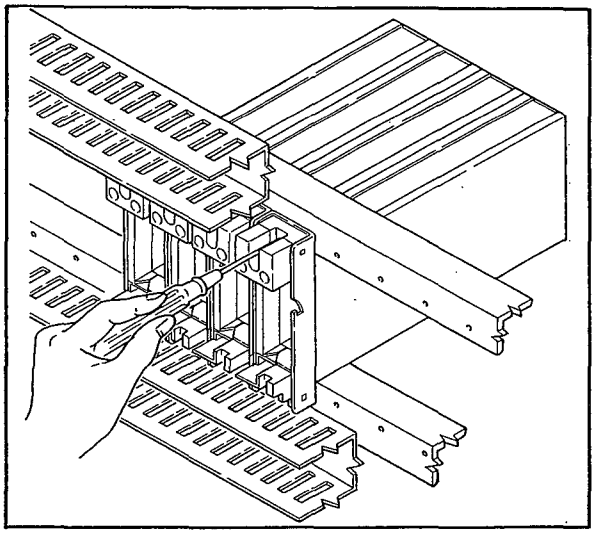


Figure 3-3. Installing the Rack Case.

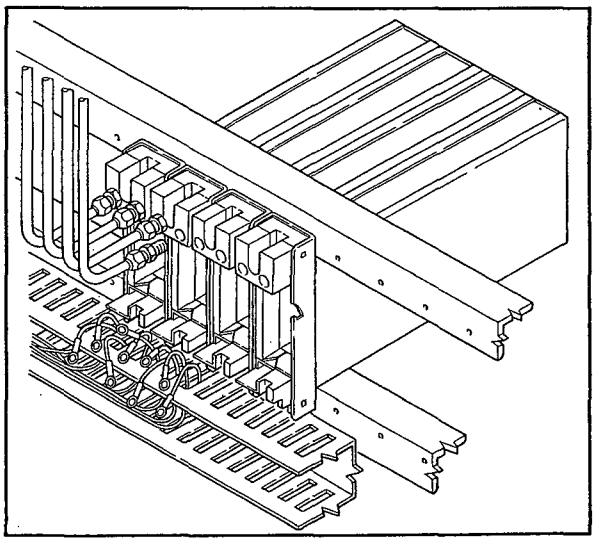


Figure 3-4. Routing the Wire.

3-4. Wiring.

(1) Use solderless crimp-on lugs (for 4 mm screw) with insulation sleeves for leadwire ends.

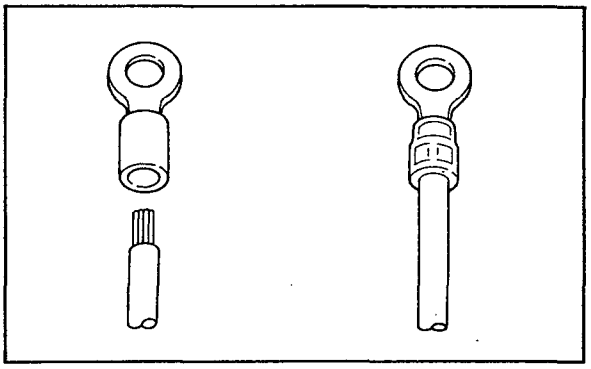


Figure 3-5. Solderless Crimp-on Lugs.

(2) When the internal unit is contained in the rack case, open the terminal cover by pulling it down and connect wires.
(3) For wiring to each terminal, refer to the wiring diagram below.

Terminal Designation	mV DC, Thermocouple, 1 to 5 V DC Inputs	RTD Input
1	+ Input	A
2	– Input	B Input
3		B
4		
5		
6		

(4) Secure the reference junction block to terminal screw 5.
(5) After completing the wiring, replace the terminal cover.

3-5. Wires and Wire End Finish.

Use flexible stranded wires and furnish the wire end with solderless crimp-on (for 4 mm screw) lugs. Wires to be used are specified depending on the applications.

(1) Signal cables.
Nominal cross sectional area of conductor: 0.5 to 0.75 mm^2.
Examples of wires:
PVC insulated stranded wire cord (VSF) (JIS C 3306) for electric appliances.
Heat-resistant PVC insulated wire (UL 1007).

(2) Power supply and ground wires.
Conductor cross sectional area: 20 mm^2 *.
Examples of proper wires:
600 V PVC stranded wire (IV) (JIS C 3307).
PVC insulated stranded wire (KIL) (JIS C 3316) for electrical equipment.

* Power supply cables should be selected depending on the instrument current consumption. Generally, the conductor cross sectional area 1.25 mm^2 is used.

3-6. Piping.

Pipes should be connected so there is no air leakage from the connector assembly, Use PT 1/8 or 1/8 NPT male joint screws. For the air supply system, refer to Instruction Manual IM 2A0A1-E.

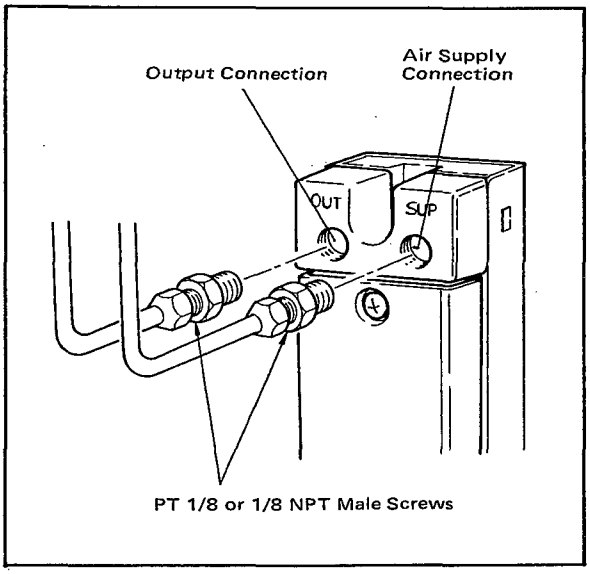


Figure 3-6. Piping.

AIR SUPPLY SYSTEM

1. General.

To successfully operate pneumatic instruments, proper air supply systems are vital. These systems provide after-coolers, filters, air-dryers to remove water, oil, dirt, etc. from the compressor output air.

2. Air supply system for panel-mounted instruments.

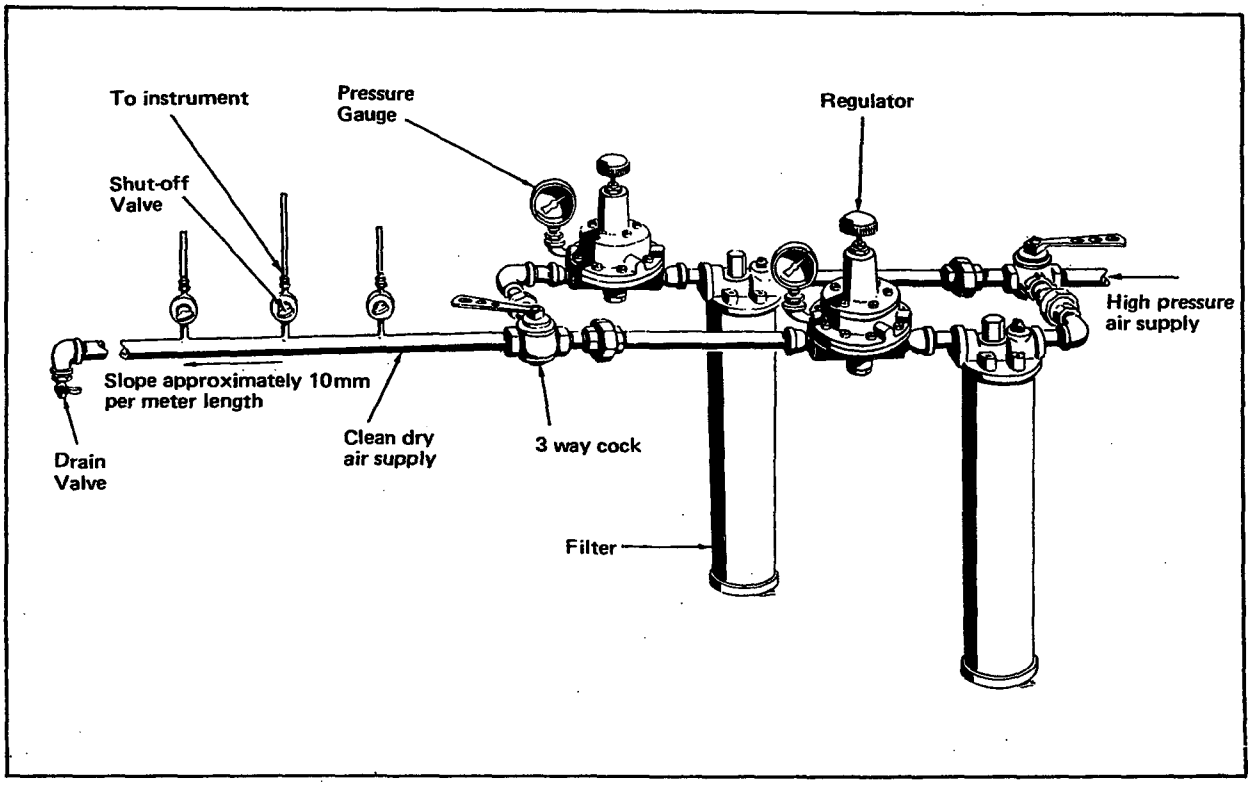


Figure 1.

When air is to be supplied to multiple instruments, it is recommended that two regulators and filters be used in parallel as shown in Figure 1. In this arrangement a temporary stoppage in one of the regulators will not disrupt all the instruments on the panel. The 3-way cocks shown make it possible to isolate either regulator-filter system for servicing, or operate both systems in parallel. Normally, the systems are operated in parallel.

3. Air supply system for field-mounted instruments.

Figure 2 shows a typical air supply system for field-mounted instruments. The air filter and supply pressure regulator, where necessary, should be installed in the supply piping immediately adjacent to the instrument, and should be firmly supported. (This instruction does not apply to the instruments which have built-in air filters and regulators.)

4. Instructions for constructing air supply systems.

- **Supply air**
  Supply air must be clean and dry. Therefore, an after-cooler, an air filter, and a dryer should be provided in the air supply system at the compressor output.

- **Supply header**
  A supply header furnishing air to a series of instruments should be sloped at least 10 mm (1/8") per meter, a 1/100 slope, and should have a drain cock at its lowest point. This will make it easy to drain any moisture or oil that gets into the header.

- **Supply piping**
  To prevent moisture in the header from entering instruments, put supply piping connections at the top of the header as shown in Figure 2. The connections may be made at the side of the header, but never at the bottom. It is advisable to install a shut-off valve in the supply piping for each instrument, so that instruments can be removed without shutting off the entire air supply system.

- **Filter**
  The air filter in the supply header catches moisture, oil or dirt not removed by other air purification equipment. At least once each day the petcock at the filter bottom should be opened to blow out the sumps. Under severe conditions of liquid-laden air this should be done more frequently. Never allow more than 0.5 liter (1 pint) of liquid to accumulate in the sump. This is extermely important; carefully following these recommendations will eliminate the most common cause of instrument trouble.

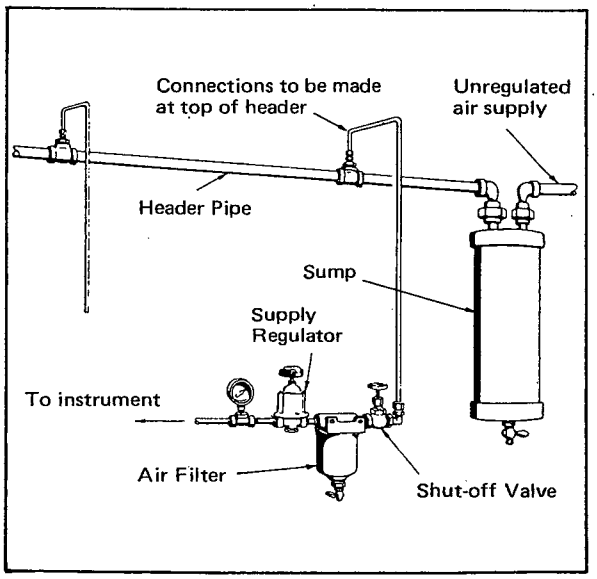


Figure 2.

NOTE

The recommendations contained in this sheet are not intended to exclude other arrangements which are perfectly satisfactory and may be quite common. This sheet is a guide for customers who are not familiar with pneumatic instrument installation.

4. PRINCIPLE OF OPERATION.

4-1. mV DC Input Version.

The mV DC input signal is amplified by input amplifier A1, and converted to a pneumatic output pressure through a voltage-to-current converter and current-to-pneumatic converter. For the voltage-to-current converter, refer to section 4-4 and for the current-to-pneumatic converter, refer to section 4-5.

4-2. Thermocouple Input Version.

A thermal emf (electromotive force) from a thermocouple wire is compensated by a transistor thermo-sensor installed in the terminal block and the reference junction compensation circuit, and enters input amplifier A1. In circuit A1, the input is amplified and linearized. The linearized signal is converted to pneumatic output pressure through the voltage-to-current converter and current-to-pneumatic converter and current-to-pneumatic converter. The linearizer incorporates a highly accurate polynominal approximation function. For the principle of operation of the voltage-to-current converter, refer to section 4-4 and for the current-to-pneumatic converter, refer to section 4-5.

4-3. RTD (Resistance Temperature Detector) Input Version.

The voltage generated by current I_t passing through the RTD is amplified by input amplifier A1, and converted to output pneumatic pressure via the voltage-to-current converter and current-to-pneumatic converter. The current I_t passing through the RTD varies with the temperature to be measured and is simultaneously linearized by the feedback circuit. The principle of operation of the voltage-to-current converter is the same as that described in section 4-4. For the current-to-pneumatic converter, refer to section 4-5.

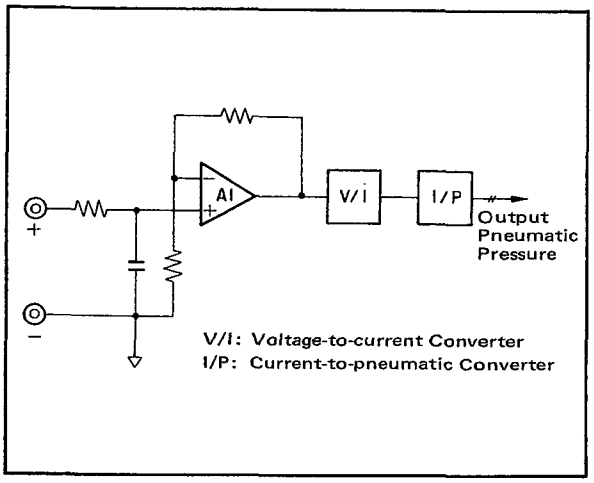


Figure 4-1. PTED mV Input Converter — Block Diagram.

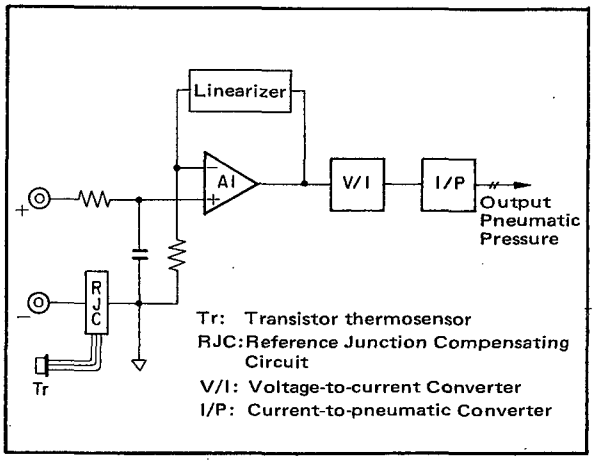


Figure 4-2. PTED Thermocouple Input Converter — Block Diagram.

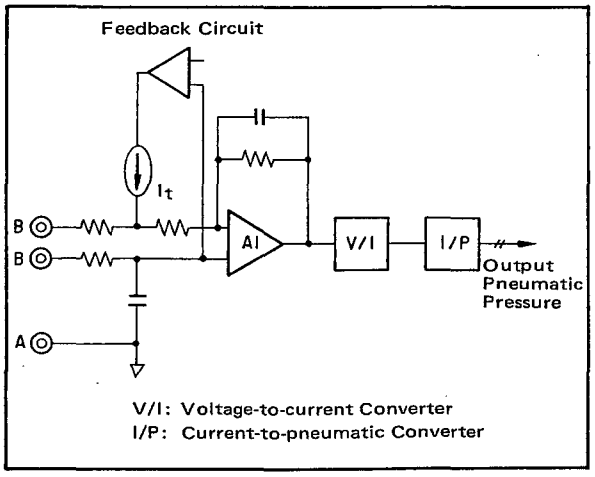


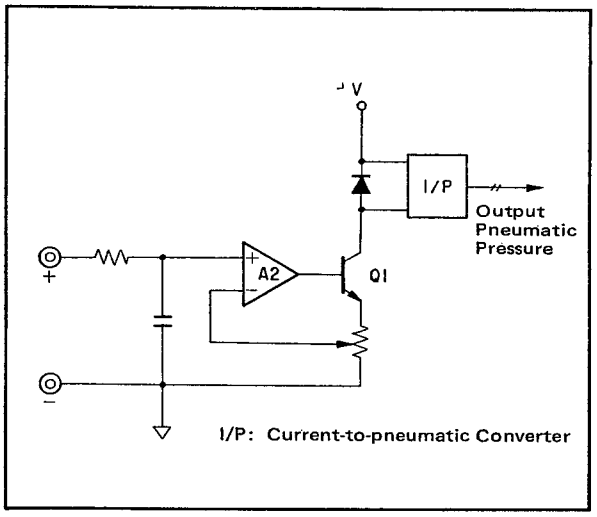
Figure 4-3. PTED RTD Input Converter.

4-4. 1 to 5 V DC Input Version.

An input voltage signal is converted to a current signal by the circuit consisting of input amplifier A2 and transistor Q1. This current signal is converted to an output pneumatic pressure through the current-to-pneumatic converter. The current-to-pneumatic converter is described in the following section.

4-5. Current-to-Pneumatic Converter.

When an input current is fed to a force motor, an upward force is generated on the moving coil. As a result, the gap created between the flapper and nozzle is reduced by means of a flexure fulcrum and the nozzle back pressure is increased. This nozzle back pressure is amplified by a pneumatic amplifier and converted to an output air pressure. At the same time, this pressure is fedback to the bellow until the flexure force and force motor are balanced.



Figrue 4-4. PTED 1 to 5 V DC Input Converter — Block Diagram.

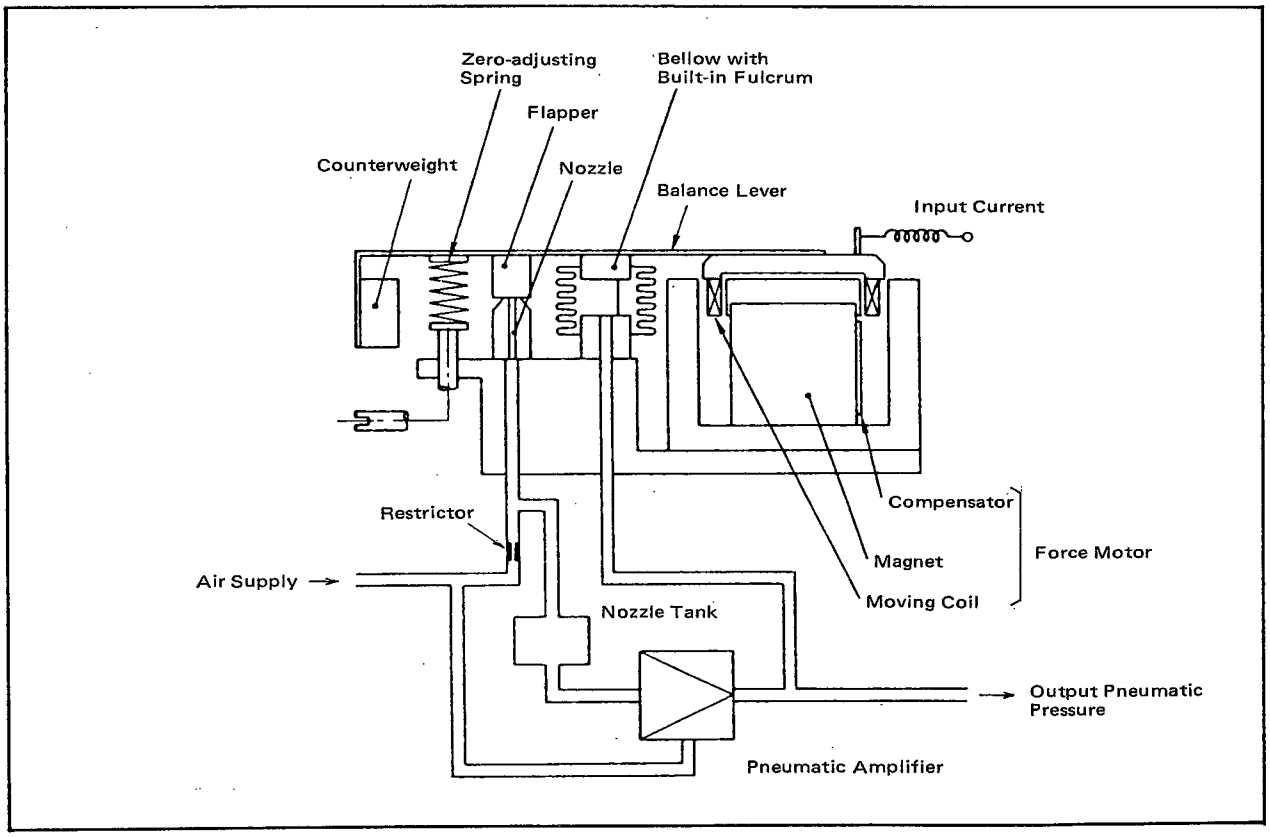


Figure 4-5. Current-to-Pneumatic Converter — Block Diagram.

5. OPERATINON.

After completing the installation, wiring and piping, this converter can be operated with electric and pneumatic supplies. Although this converter does not require any key operation, check the instrument in accordane with section 5-2.

5-1. Names of Components.

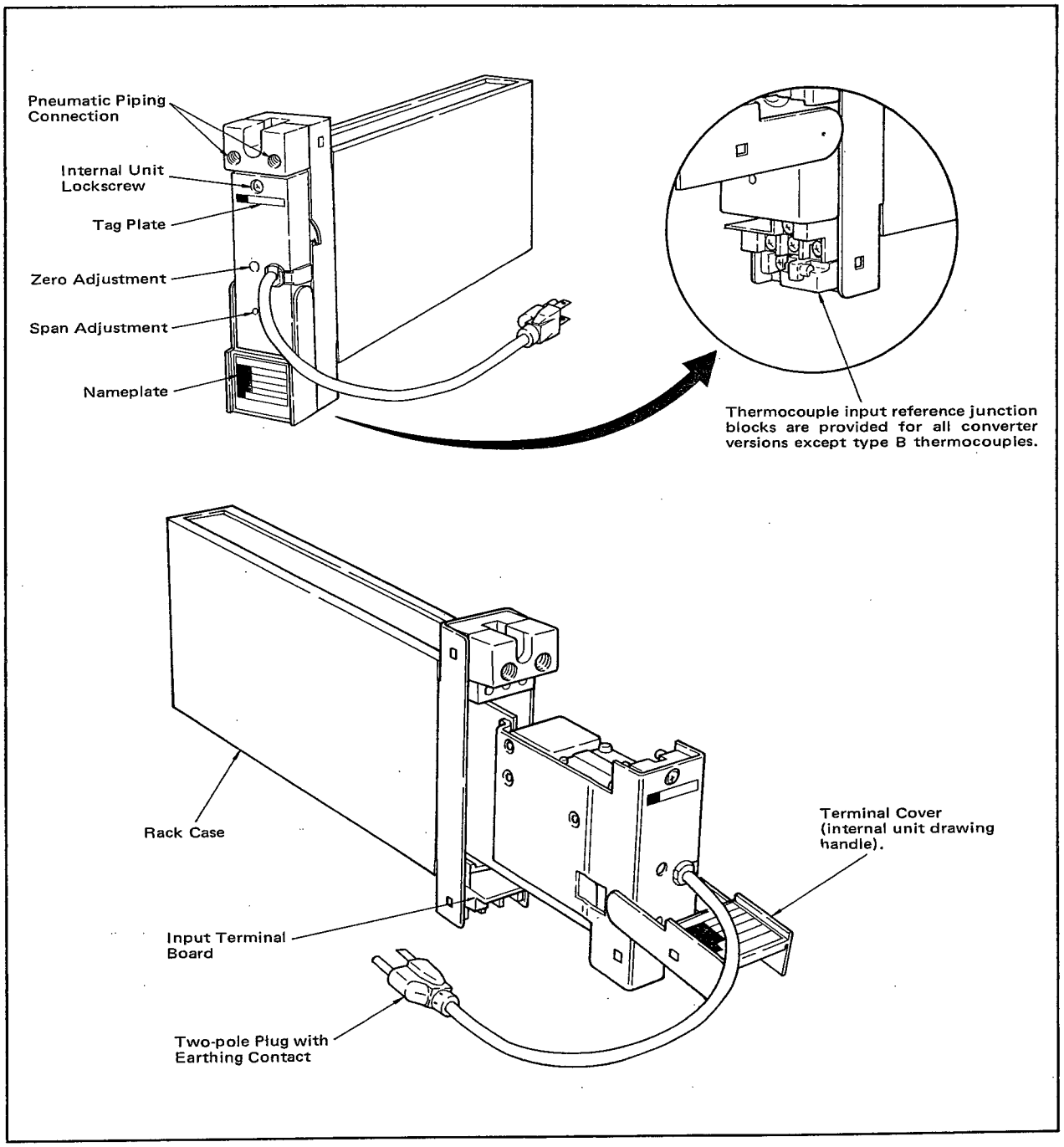


Figure 5-1. Names of Components.

5-2. Checks Before Operation.

Prior to normal operation, inspect and check the following points:

(1) Disconnect the power cord plug from the receptacle and loosen the internal unit lockscrew at the front of the instrument. Loosen the RJC setscres to remove the internal unit (thermocouple input type except type B), and check that a correct rating fuse is installed in the fuseholder on the rear of the internal unit.

(2) Check that the burnout selector switches on the range card in the internal unit are set to the desired position. If they are set to the wrong position, correct the position (see Figure 5-2). 1 to 5 V DC input version converters do not provide burnout protections.

(3) When inserting the internal unit in the rack case, loosen the internal unit lockscrew at the front of the instrument so the wiring and piping can be connected securely.

(4) Check that the two-pole plug with earthing contact is properly connected to the receptacle.

(5) Check that the external wires are connected to the input terminals properly. For the thermocouple input version except type B, install the reference junction block to the bottom front of the instrument.

(6) Check that the external piping is connected securely and properly.

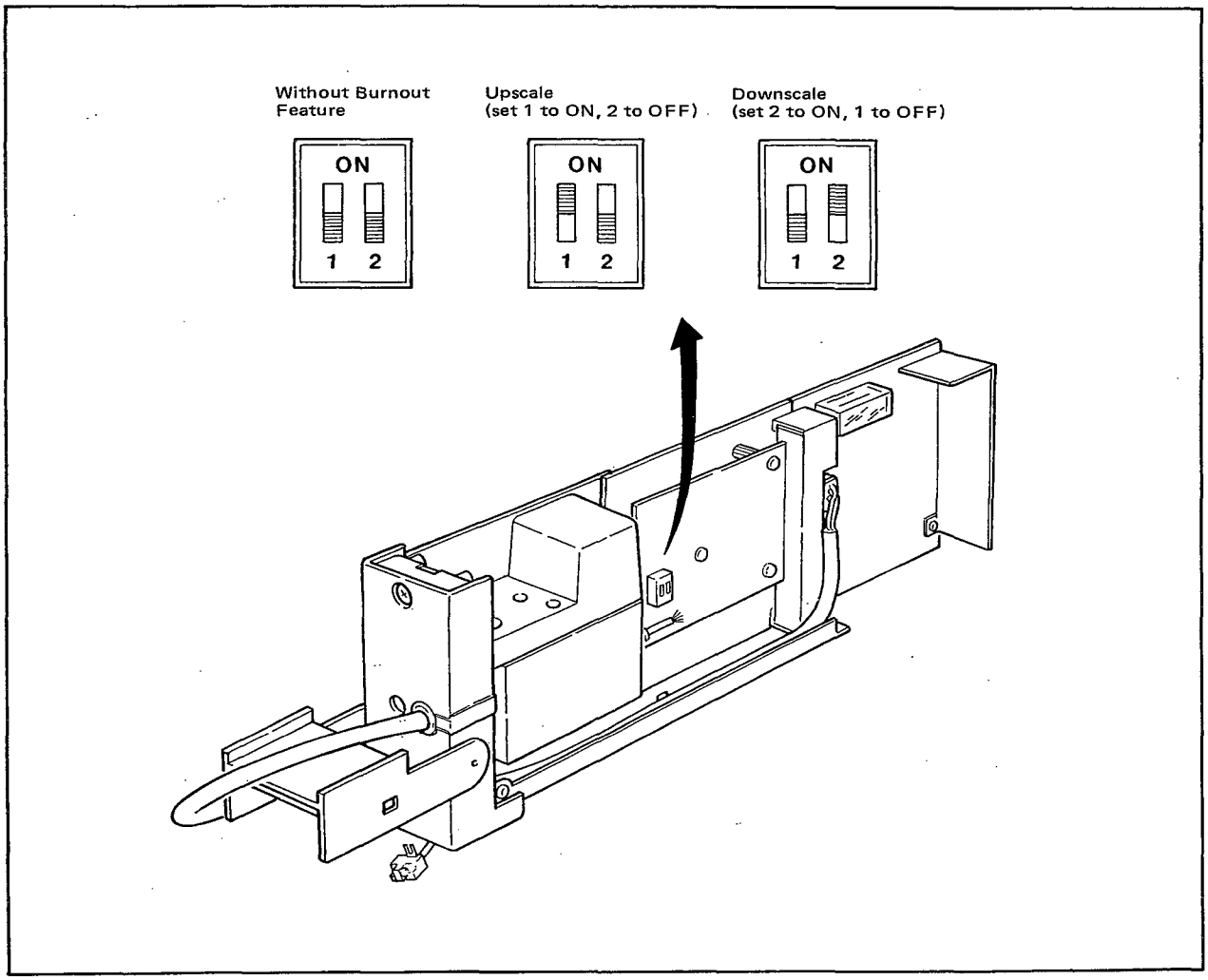


Figure 5-2. Setting the Burnout Selector Switches.

6. MAINTENANCE.

Calibrate the instrument at least once a year together with meaintance service and also in the following events:

- When the converter is received.
- When the pneumatic amplifier is reassembled.
- When the pneumatic amplifier is replaced.
- When the printed-circuit board is changed.

This chapter describes a simple calibration and parts replacement to be performed in the instrument room or service shop.

6-1. Testing Instrument.

For maintenance, it is recommended that the following test instruments be used.

- Voltage/Current Standard: YEW Model 2554. (Required for MV DC, thermocouple and 1 to 5 V DC inputs.)
- Decade resistance box: YEW Model 2793-01. (Required for RTD input type.)
- Digital Manometer: YEW Model 2654.
- Reference Junction Compensator: YEW Model T-MJ. (Supplied as necessary.)

6-2. Input Reference Table of Temperature/ Voltage Converter.

This converter has been calibrated in accordance with JIS thermo-electromotive force (emf) table and resistance table revised in 1981. For thermocouple input signals to adjust the instruments, refer to JIS C 1602-1981 for the thermocouple version and to JIS C 1604-1981 for the platinum resistance temperature detector input version.

6-3. Reference Junction of Temperature Compensation.

The input terminal of the Model PTED thermocouple temperature converter is used at the room temperature, and the circuit itself designed so that its temperature becomes 0°C equivalently. In this converter, the actual reference junction temperature is compensated by the transistorized temperature sensor together and the compensating circuit. Therefore, when the input terminal is short-circuited (at which the detector end temperature is equivalent to 0°C according to the reference temperature in the thermo emf table), the output is the room temperature value at the terminal.

In calibration, it is generally necessary to input the calibration value from which the above-mentioned compensating value is subtracted, but this procedure can be omitted in case the 1-7 terminal on this converter are used. This calibration procedure is shown in Figure 6-3. The calibration method with the reference temperature of 0°C is also used. Therefore, this method is shown in Figure 6-4.

6-4. Calibration and Adjustments.

(1) Check that the burnout selector switch on the range card is set to the normal operating position (except 1 to 5 V DC input version).

(2) Connect the test equipment as illustrated in Figure 6-1 through 6-4, and turn the power switch ON and warm up the converter for at least five minutes.

Cautions for use of intrinsically safe converter.

When thermocouple input and RTD input converters are used with Model BARD-200 or BARD-300 Saftey Barrier, perform adjustments together with this barrier to compensate for the internal resistance of the unit.

- When calibrating a mV DC input converter, RTD input converter or 1 to 5 V DC input converter, allow the instrument about 5 minutes of warm up period before calibration.
- When calibrating a thermocouple input converter using terminals 1 and 3, allow a warm-up period of 5 minutes.
- When calibrating a thermocouple input converter using a reference junction compensator, install a reference junction block and set the terminal cover. Warm up the converter for at least 15 minutes. Do not leave the terminal cover open during calibration. The cover maintains the terminal block temperature constant when it is closed.

For a Type B thermocouple, the reference junction block is not required. Wiring connection for calibration is illustrated in Figure 6-4.

(3) Apply an input equivalent to 0% of span and read the output with a digital manometer to check that it falls within the range of 0.2 ±0.004 kg/cm^2 (bar, 20 ±0.4 kPa, 3 ±0.06 psi). If the error is significant, turn ZERO adjustment on the front of the instrument until the manometer reads the output within this tolerance.

(4) Apply an output equivalent to 100% of span and read the output with the digital manometer to check that it falls within the range of 1.0 ±0.004 kg/cm^2 (bar, 100 ±0.4 kPa, 15 ±0.06 psi). If the error is significant, turn the SPAN adjustment on the front of the instrument until the manometer reads the output within this tolerance.

(5) Since ZERO and SPAN adjustments interfare with each other, repeat steps (3) and (4) until the specified values are obtained.

(6) As necessary, apply inputs equivalent to 25%, 50% and 75% of span and check that the output error at each point falls within the tolerance.

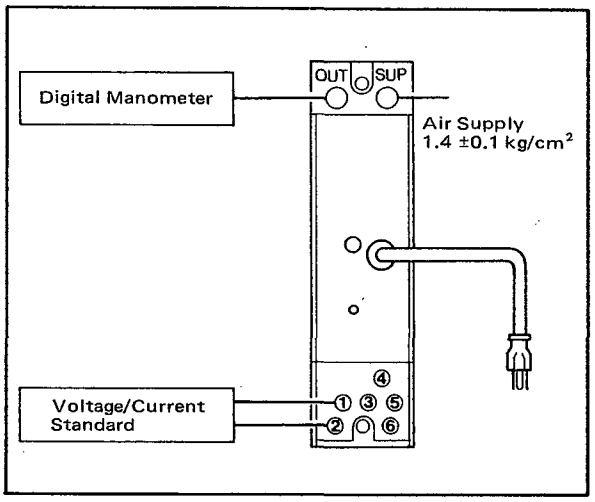


Figure 6-1. Calibration of mV DC and 1 to 5 V DC Input Converter.

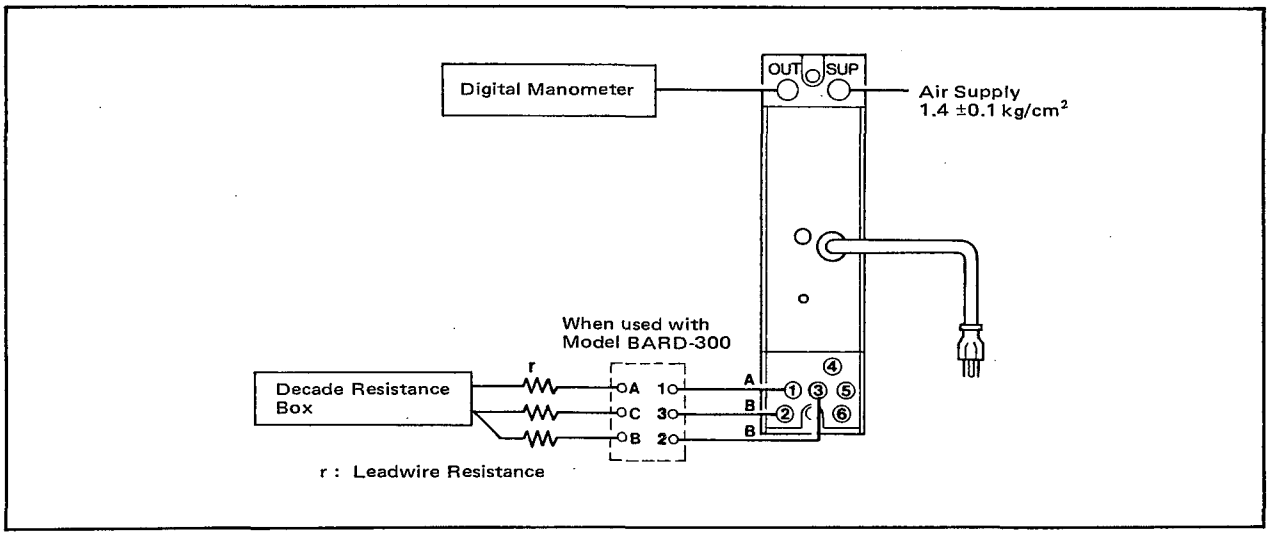


Figure 6-2. Calibrating the RTD Input Converter.

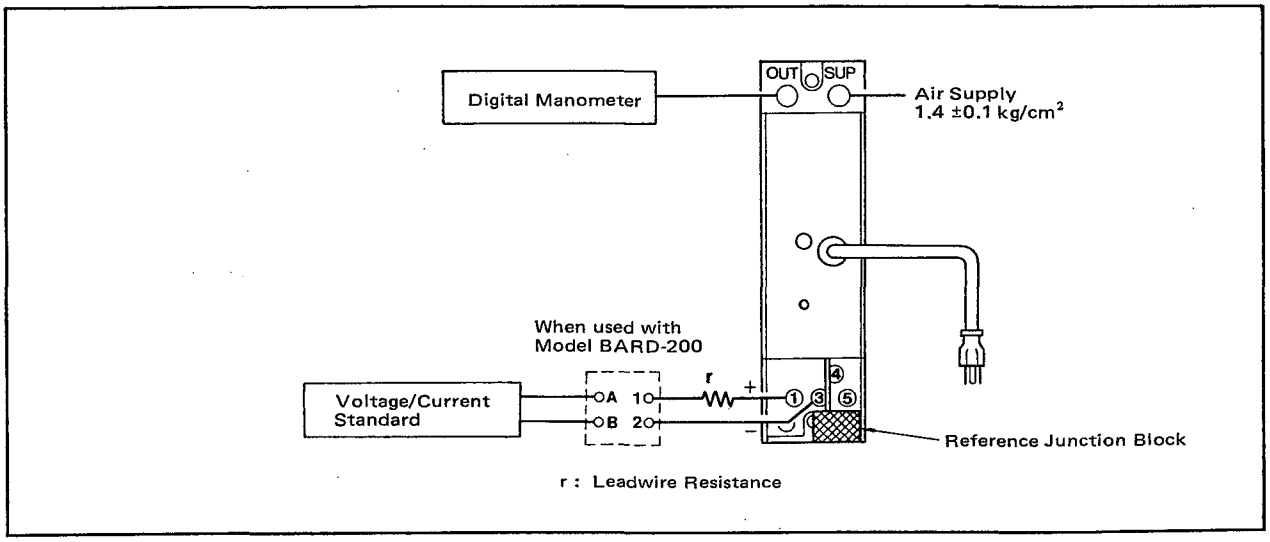


Figure 6-3. Calibrating the Thermocouple Input Converter using Terminals 1 and 3.

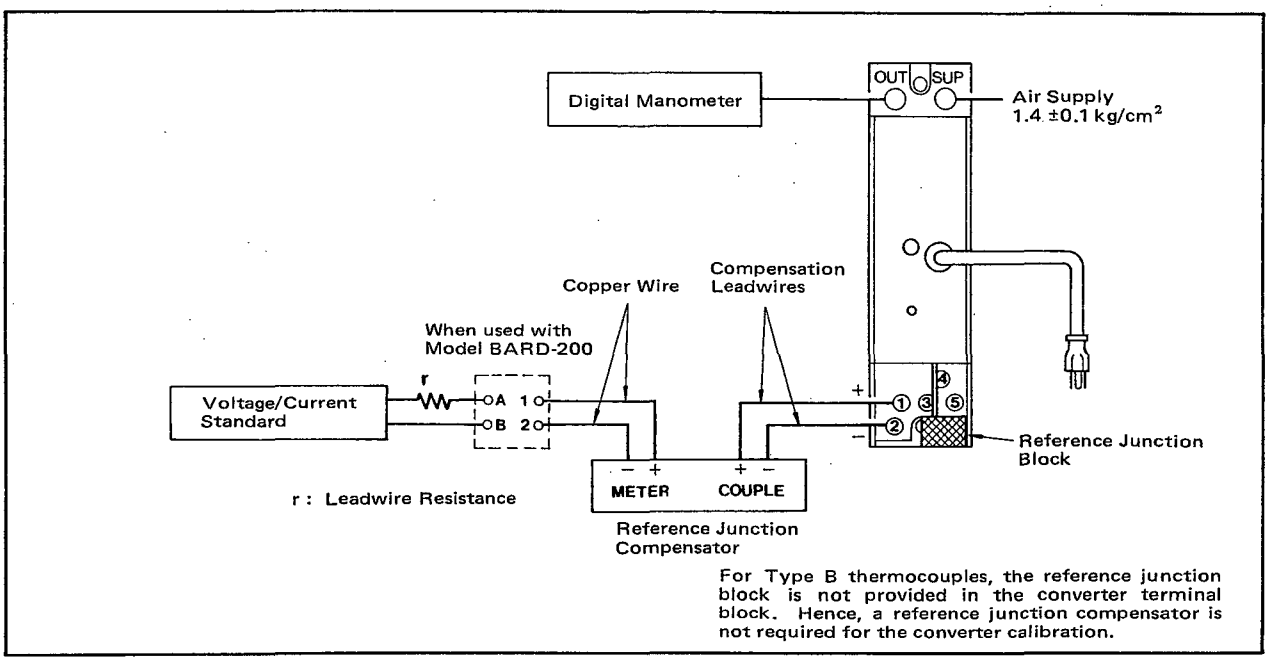


Figure 6-4. Calibrating the Thermocouple Input Converter with Reference Junction Compensator.

6-5. Cleaning the Restrictor.

Clean the restrictor when overhauling the converter.

(1) Loosen the two setscrews in the pneumetic amplifier to remove it.
(2) Remove the restrictor in the manifold using radio pliers.
(3) Pass a 0.13 mm diameter wire through the restrictor to clean it.

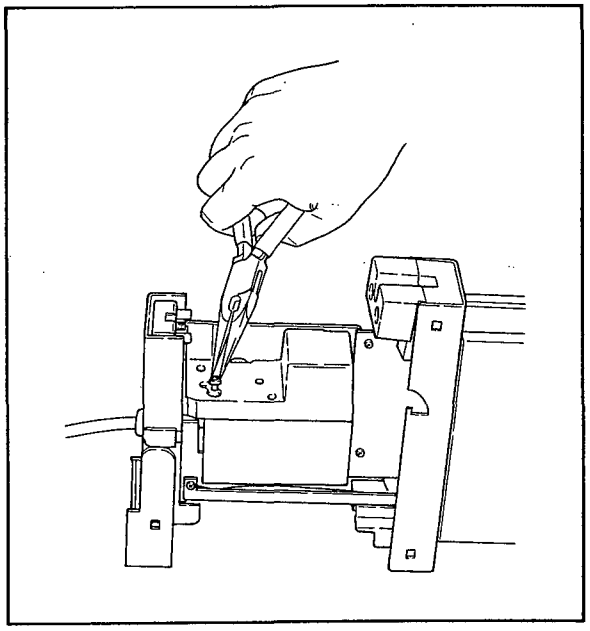


Figure 6-5. Removing the Restrictor.

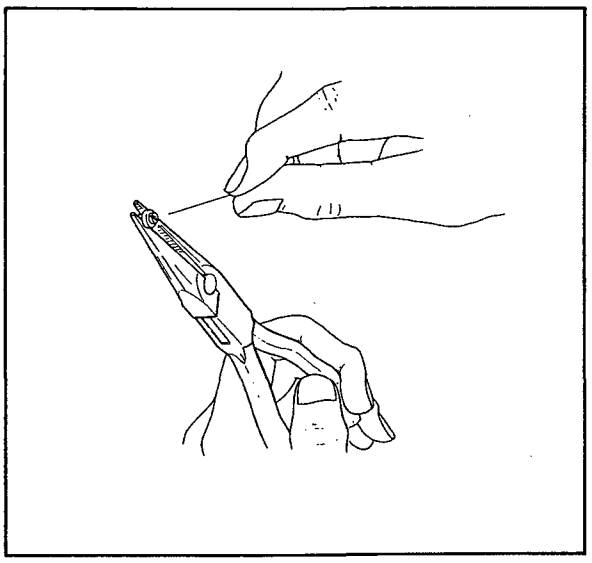


Figure 6-6. Cleaning the Restrictor.

6-6. Parts Replacement.

Replacing the Fuse:

When the fuse is blown, check the cause and replace it in accordance with the following procedure. Check that the fuseholder interior is contaminated and causes a poor contact to blow fuse.

Recommended replacement interval: About 3 years.

(1) To remove the fuseholder cap, turn it counter-clockwise (in the direction of the arrow).

(2) Before installing a new fuse, always check the rating and after replacing, secure the fuseholder cap.

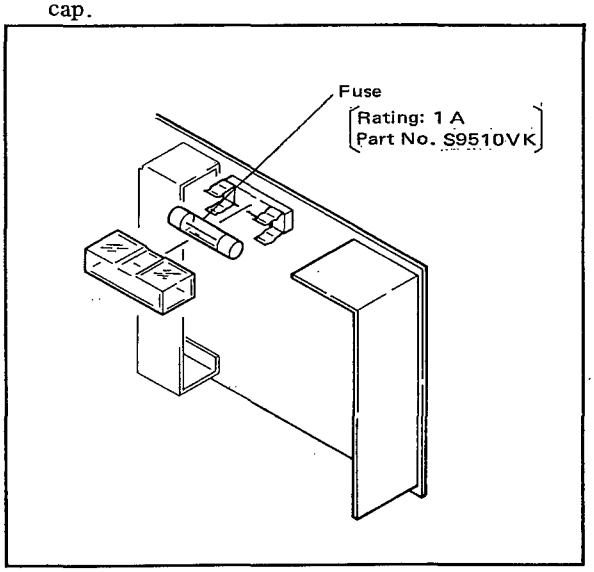


Figure 6-7. Replacing the Fuse.

Note: Use the dedicated fuse (S9510VK). Do not use a fuse for other products.

80A PNEUMATIC AMPLIFIER (Part No. F9138YA)

The function of the pneumatic amplifier is to convert a small change in the input signal (an air pressure signal) to a large change in the output signal. Typically a 0.07 kg/cm^2 (0.07 bar, 7 kPa, or 1 psi) change in the input will produce approximately a 0.8 kg/cm^2 (0.8 bar, 80 kPa, or 12 psi) change in the output.

1. Principles of Operation.

The air supply enters the pneumatic amplifier through a port on the surface of the instrument on which the amplifier is mounted. The input signal (nozzle pressure) enters the amplifier through another port and acts on the diaphragm. Since the stem valve is mounted on the diaphragm, the two move in unison.

As the input signal increases, the stem pushes against a ball valve which in turn moves a flat spring, allowing the supply air to enter the amplifier body. Further motion of the stem valve, causes it to close off the exhaust port. Thus, when the input pressure increases, the stem (exhaust) valve closes and the supply valve opens; when the input decreases, the stem valve opens and the supply valve closes. This varies the pressure to the output.

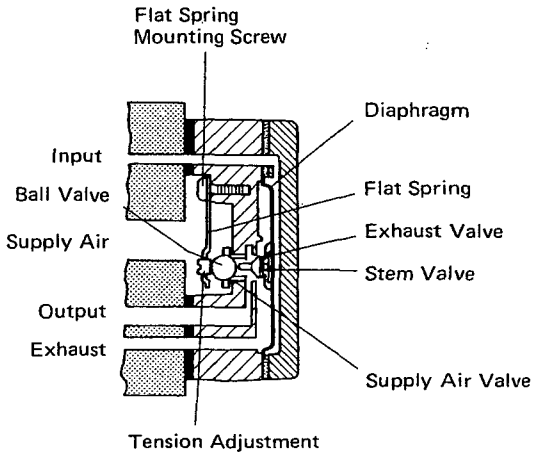


Figure 1. Cross Sectional View.

2. Cleaning the Pneumatic Amplifier.

Should the pneumatic amplifier require cleaning, remove it from the instrument. Loosen the two cover screws and the spring mounting screw to disassemble the pneumatic amplifier. Clean the disassembled parts with a suitable solvent (do not allow solvent to contact the gasket) and dry them carefully with compressed air. When reassembling the pneumatic amplifier, all corresponding holes must line up and all outside edges must coincide with other edge of the amplifier body casting. Tighten all screws.

CAUTION

After reassembling the amplifier, perform a calibration with the calibrator.

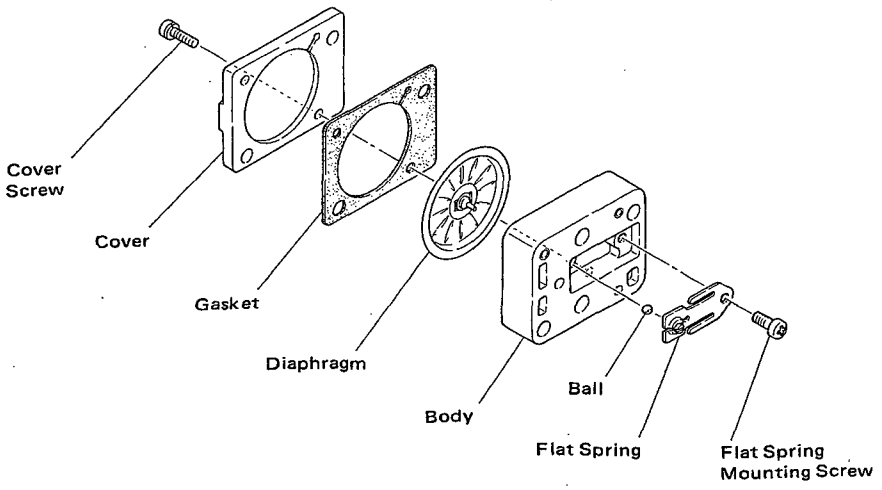


Figure 2. Exploded View.

3. Calibration Procedure using Calibrating Fixture.

This procedure requires a Model 6971 calibrator, which is available from Yokogawa.

(1) Mount the amplifier on the calibrator with the flat spring mounting screw to the left. (Be sure to mount the amplifier in the correct direction.) Fasten the amplifier with the two wing nuts.

(2) Air supply.
Apply air at 1.4 kg/cm^2 or bar, 140 kPa, or 20 psi to air supply coupling ② .

(3) Self-centering the stem valve.
   a. Seal nozzle ③ by manual contact for several seconds, until the nozzle pressure (diaphragm back-up pressure) is 1.4 kg/cm^2 or bar, 140 kPa, or 20 psi and confirm that the nozzle pressure exceeds 1.0 kg/cm^2 or bar, 100 kPa, or 15 psi.
   b. Open nozzle ③ and manually close the air check valve, until the nozzle input pressure is zero (atmospheric pressure).
   c. Repeat steps a and b above.

(4) Nozzle input pressure adjustment.
Turn nozzle ③ with a wrench while observing nozzle input pressure gauge ⑤ , so the nozzle input pressure is 0.25 kg/cm^2 or bar, 25 kPa, or 3.6 psi.

(5) Output pressure confirmation.
Read the output pressure on output pressure indicator ⑥ . When output pressure falls between 0.55 and 0.60 kg/cm^2 (0.55 and 0.60 bar, 55 and 60 kPa, or 7.8 and 8.5 psi), apply air pressure at 0 and 1.4 kg/cm^2 (0 and 1.4 bar, 0 and 140 kPa, or 0 and 20 psi) by one cycle the same as step (2). Next, confirm that output pressure falls between 0.55 and 0.60 kg/cm^2 (0.55 and 0.60 bar, 55 and 60 kPa, or 7.8 and 8.5 psi) under the same condition as step (4). When the output pressure falls within this range, output adjustment is completed, but if it does not, perform output pressure adjustment as per step (6).

(6) Output pressure adjustment.
   a. Close the air supply valve.
   b. Remove plug ⑨ using a 3/16 inch Allen wrench.
   c. Insert a screwdriver in the plug hole and turn the tension adjustment (turn it clockwise to decrease output, and counterclockwise to increase output).
   d. Install plug ⑨ .
   e. Repeat steps (2) through (6).

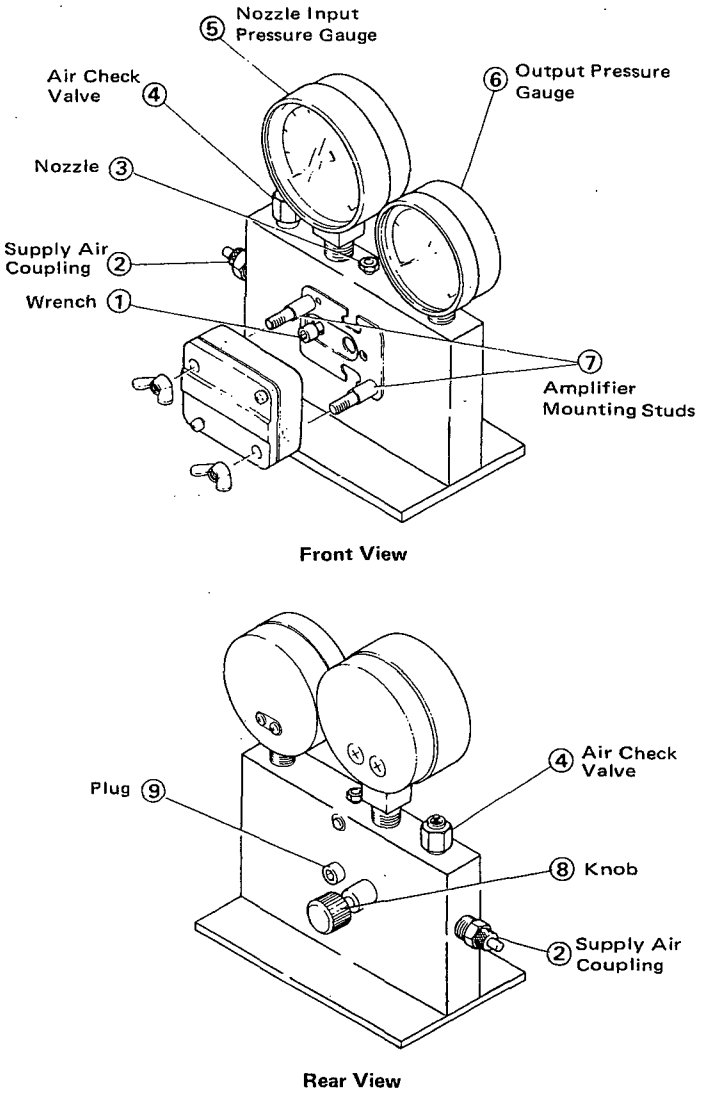


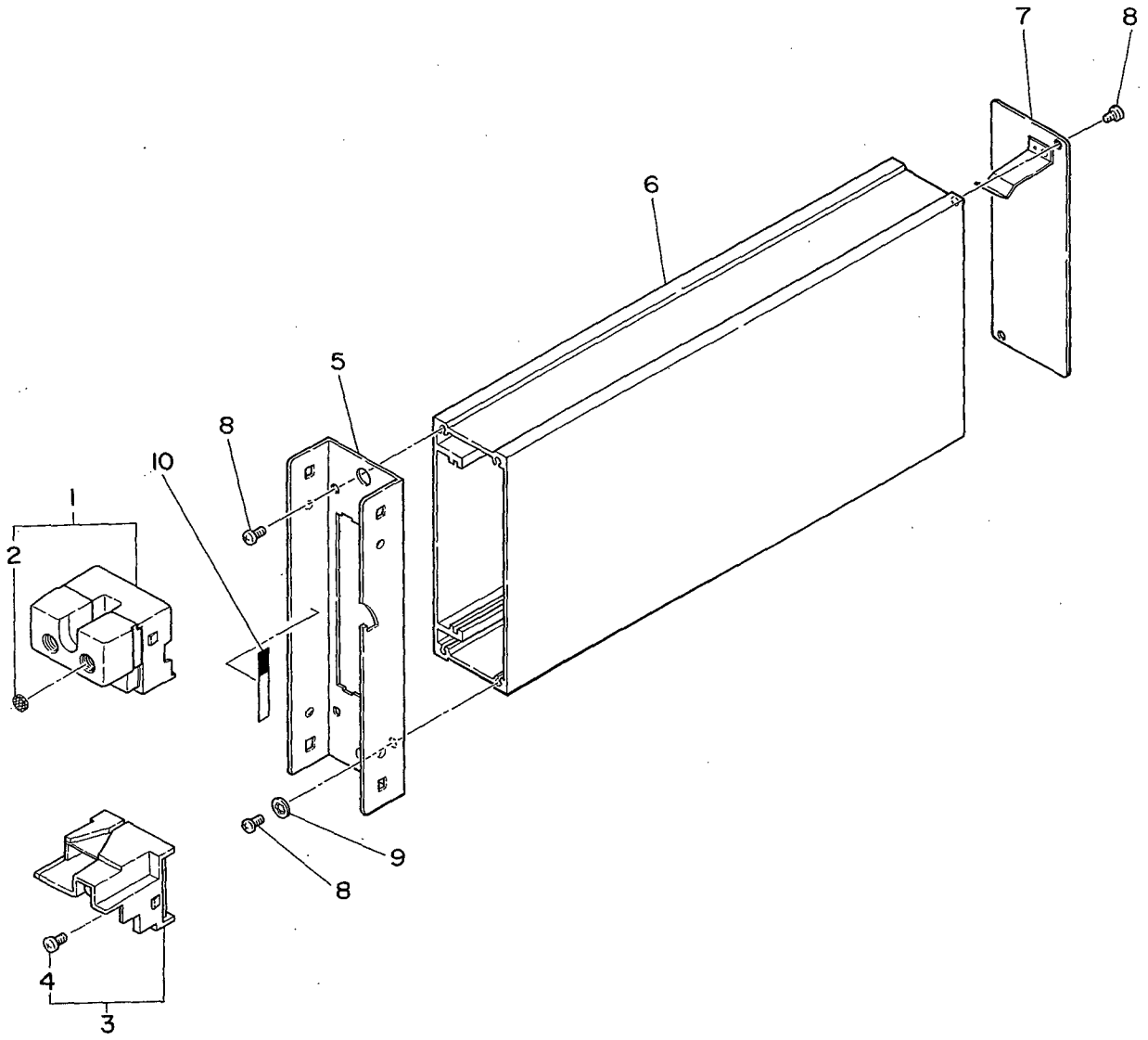
Figure 3. Model 6971 Pneumatic Amplifier Calibrator.

NOTE

The above amplifier output pressure adjustment can be performed by removing the amplifier from the calibrator.

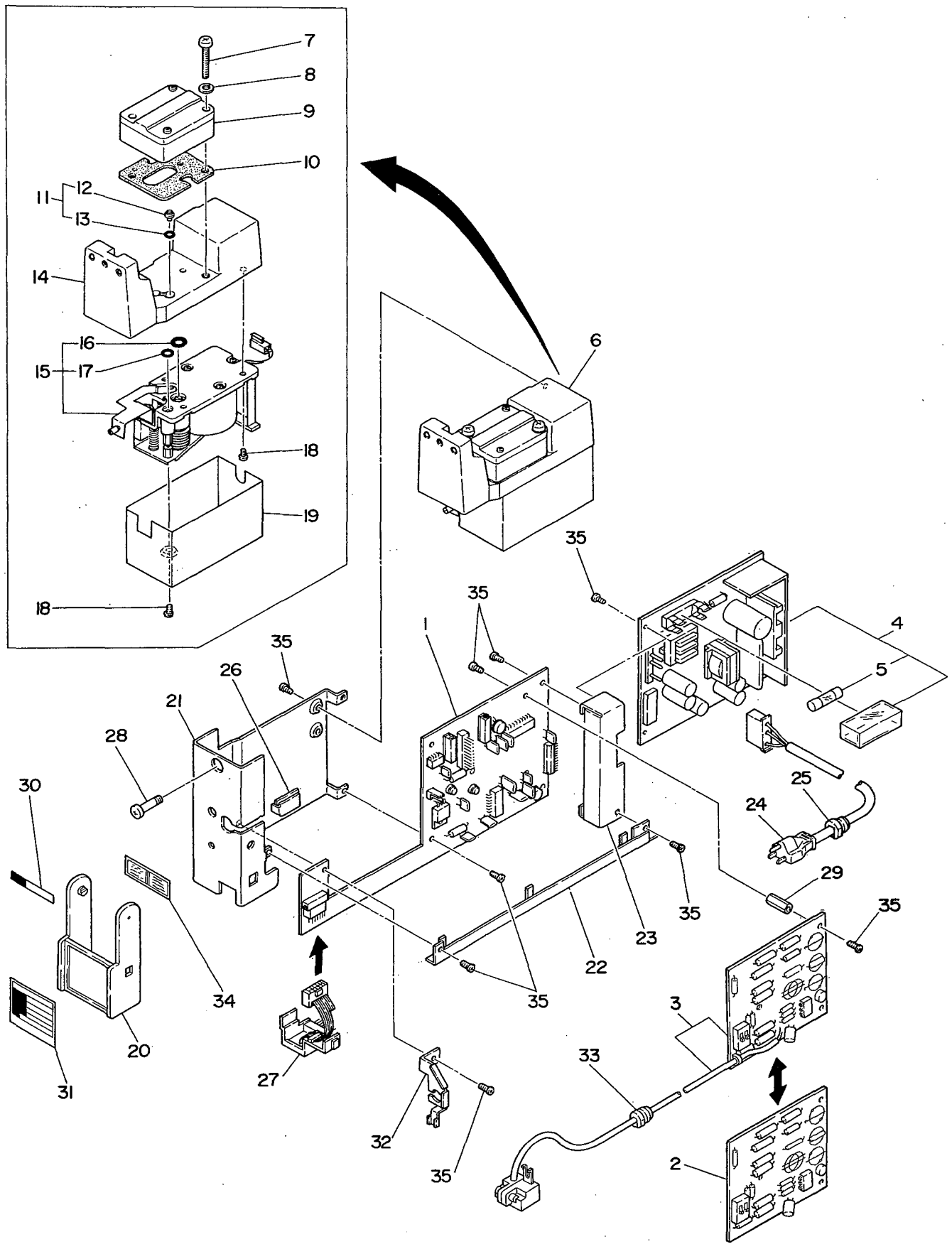
Parts List

Model PTED
EMF-/ RTD-TO-PNEUMATIC CONVERTER



Item	Part No.	Qty	Description
1	E9720AE	1	Connection Assembly
2	E9720AX	1	Screen
3	E9720AL	1	Terminal Assembly
4	Y9406LB	6	B.H. Screw, M4 x 6
—	E9720AP	1	Case Assembly (items 5 through 9)
5	E9720AQ	1	Bracket
6	E9713AS	1	Case
7	E9713AT	1	Plate Assembly
8	G9306ZC	6	Self-tapping Screw
9	Y9401WL	2	Toothed Lockwasher
10	Y9422NP	1	Tag No. Label (blank)

YOKOGAWA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Item	Part No.	Qty: Model PTED-110	PTED-210-□ *1	PTED-210-TB	PTED-310	PTED-510	Description
1	E9715TB	1					Main Card
	E9715TC		1	1			Main Card
	E9715TD				1		Main Card
	E9715TA					1	Main Card
2	E9715BK	1					Range Card*2
	E9715BM			1			Range Card*2
	E9715BF				1		Range Card*2
3	E9715BB		1				Range Card*2
4	E9715YB	1	1	1	1	1	Power Supply Unit (for 100V Version)
	E9715YS	1	1	1	1	1	Power Supply Unit (for 220V Version)
5	G9001ZF	1	1	1	1	1	Fuse – 1A
6	E9720CA	1	1	1	1	1	Converter Assembly
7	Y9525JB	2	2	2	2	2	Pan H. Screw, M5 x 25
8	Y9500SP	2	2	2	2	2	Spring Washer
9	F9138YA	1	1	1	1	1	Pneumatic Amplifier, 80A
10	C0100EM	1	1	1	1	1	Gasket
11	E9720CL	1	1	1	1	1	Restrictor Assembly
12	E9720CM	1	1	1	1	1	Restrictor Assembly
13	G9303NA	1	1	1	1	1	O-Ring
14	E9720CE	1	1	1	1	1	Base Assembly
15	E9720DA	1	1	1	1	1	Converter Assembly
16	G9303NE	1	1	1	1	1	O-Ring
17	G9303NB	2	2	2	2	2	O-Ring
18	Y9306JB	4	4	4	4	4	Pan H. Screw, M3 x 6
19	E9720CQ	1	1	1	1	1	Cover
20	E9713CA	1	1	1	1	1	Cover
21	E9720BA	1		1	1	1	Bracket
	E9720BH		1				Bracket
22	E9713EA	1	1	1	1	1	Bracket
23	E9713EB	1	1	1	1	1	Bracket
24	E9713EG	1	1	1	1	1	Cable Assembly (for 100V Version)
	E9713FS	1	1	1	1	1	Cable Assembly (for 220V Version)
25	S9079PB	1	1	1	1	1	Bushing
26	E9713CE	1	1	1	1	1	Cover
27	E9720BC	1	1	1	1	1	Connector Assembly
28	E9720BG	1	1	1	1	1	Screw
29	T9008ZB	3	3	3	2		Stud
30	Y9422NP	1	1	1	1	1	Tag No. Label (blank)
31	—	1	1	1	1	1	Nameplate (Data plate)
32	E9720BJ			1			Bracket
33	G9320EY		1				Bushing
34	E9713GD		1				Label
35	Y9306JB	18	18	18	16	12	Pan H. Screw, M3 x 6

Note:
*1: TK, TT, TJ, TE, TR or TS in □.
*2: When ordering Range Card specify:
- Measuring range.
- IPTS-68 for thermocouple input standard.
- Model, suffix codes, and serial No. for the instrument in use.

Instruction Manual

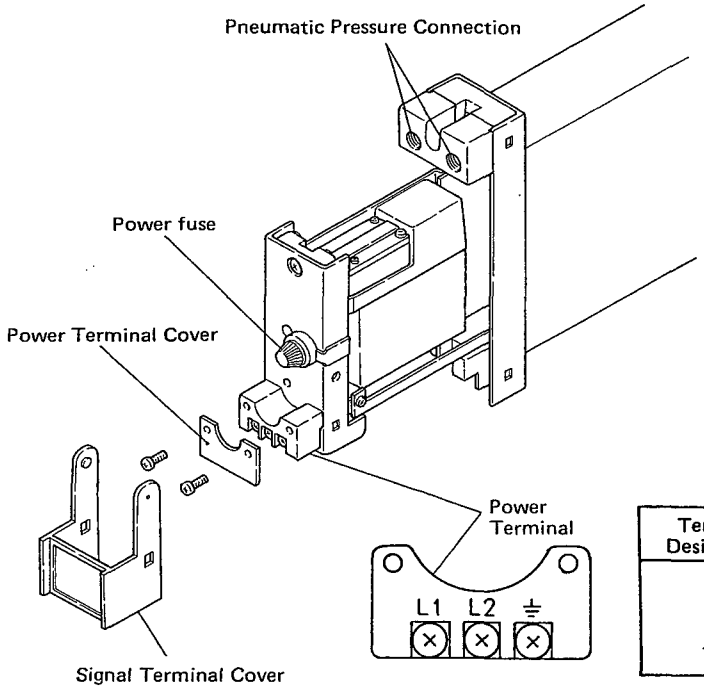
PTED

PTED/TB POWER SUPPLY TERMINAL CONNECTIONS (Option)

1. GENERAL.

If you specify the terminal board to which the power source is directly connected (suffix code /TB), the external wiring to the terminal board is necessary; therefore, drawing out of the inner chassis requires previous turning off of the power source and disconnection of the wiring from the terminal board.

3. EXTERNAL VIEW AND NAMES OF COMPONENTS.



Terminal Designation	Description
L1 L2	AC or DC Power Supply (DC: polarity reversible)
⏚	Ground

3. POWER SUPPLY AND GROUND WIRING.

(1) All cable ends must be furnished with crimp-on type solderless lugs (for 4 mm screw).

(2) Examples of applicable cables.
Cross-sectional area of the cable conductor: 2.0 mm^2.*
Applicable cable:
600 V vinyle insulated cable (IV), conforming to JIS C3307.
Vinyle sheathed cables for electric appliances (KIV), conforming to JIS C3316.

Note *: Power supply cables should be determined from the instrument power consumption – they must have conductors with cross-sectional area of at least 1.25 mm^2.

(3) Wirings to power supply and ground terminals should be made after completion of signal terminal wirings. (To facilitate connecting input signal, pull the internal instrument module approximately half way out of the housing. Do not remove the power terminal block.)

(4) After completing the power supply and ground wiring, mount the power terminal cover.

YOKOGAWA ◆

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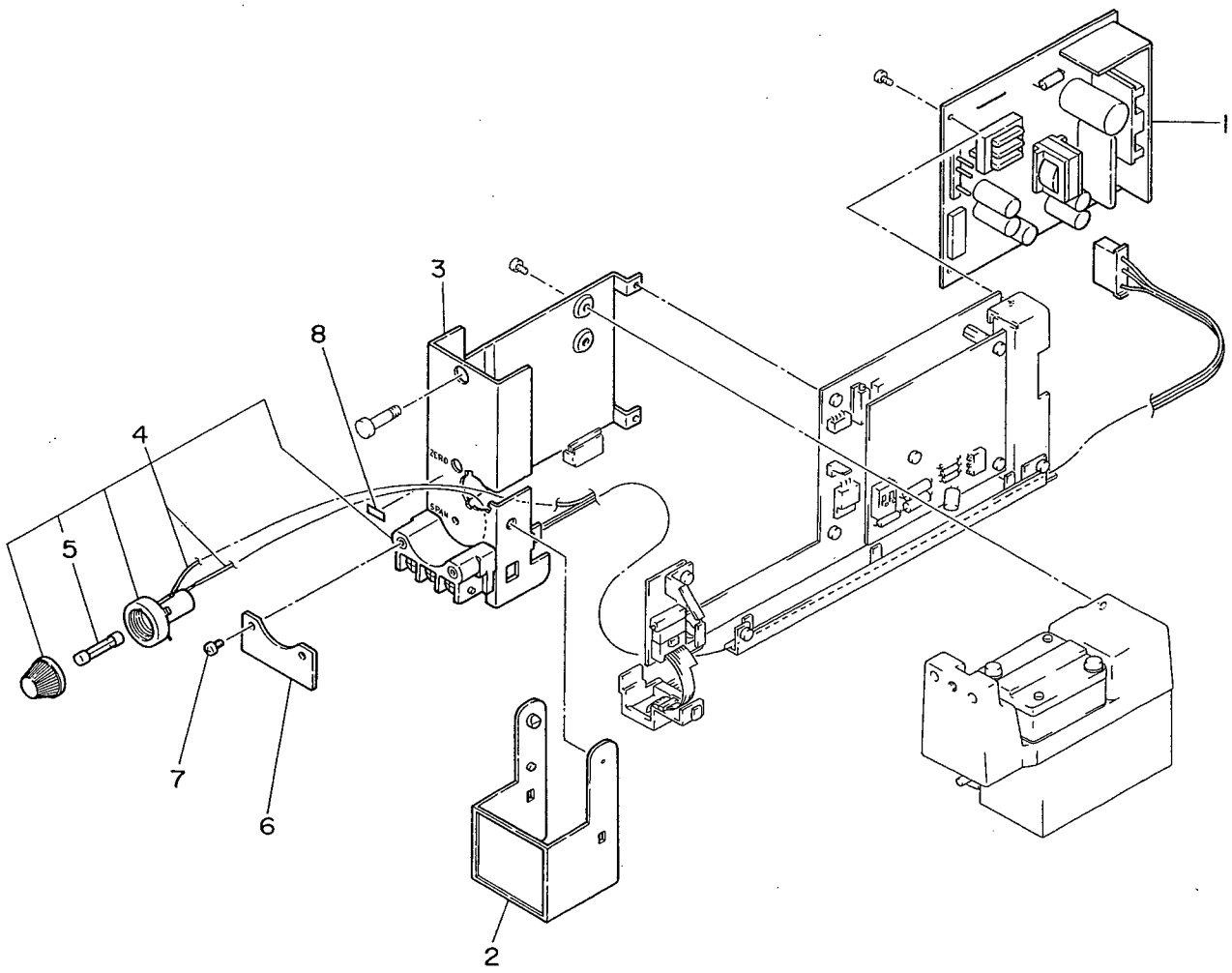
IM 2N1B2-11E
1st Edition : Oct. 1984(Y)

Parts List

PTED

/TB
POWER SUPPLY TERMINALS
for Model PTED (Option)



Item	Part No.	Qty	Description
1	E9715YJ	1	Power Supply Unit
2	E9720FS	1	Cover
3	E9720FT	1	Bracket
4	E9713ET	1	Terminal Assembly
5	G9001ZF	1	Fuse (1 A)
6	E9713CV	1	Cover
7	Y9306JB	2	Pan H. Screw, M3 x 6
8	G9325EM	1	Label (1 A)

YOKOGAWA

Printed in Japan; Dec. 1984 / 100 (Y)

YOKOGAWA ◆

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