INSTRUCTION MANUAL

A/D CONVERTER

MODELS DPO 108
DPO 112

'82, 7, 30

KIKUSUI ELECTRONICS CORPORATION

Power Requirements of this Product

Power requirements of this product have been changed and the relevant sections of the Operation Manual should be revised accordingly.
(Revision should be applied to items indicated by a check mark ☑.)

☐ Input voltage

The input voltage of this product is _____ VAC,
and the voltage range is _____ to _____ VAC. Use the product within this range only.

☐ Input fuse

The rating of this product's input fuse is _____A, _____VAC, and _____.

WARNING

- To avoid electrical shock, always disconnect the AC power cable or turn off the switch on the switchboard before attempting to check or replace the fuse.
- Use a fuse element having a shape, rating, and characteristics suitable for this product. The use of a fuse with a different rating or one that short circuits the fuse holder may result in fire, electric shock, or irreparable damage.

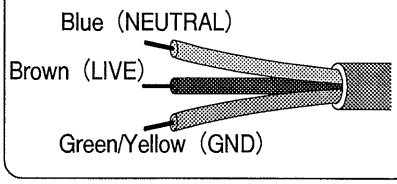
☐ AC power cable

The product is porvided with AC power cables described below. If the cable has no power plug, attach a power plug or crimp-style terminals to the cable in accordance with the wire colors specified in the drawing.

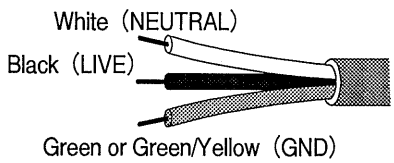
WARNING

- The attachment of a power plug or crimp-style terminals must be carried out by qualified personnel.

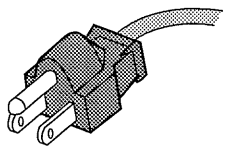
☐ Without a power plug



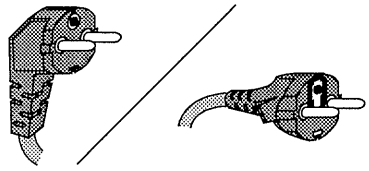
☐ Without a power plug



☐ Plugs for USA



☐ Plugs for Europe



☐ Provided by Kikusui agents

Kikusui agents can provide you with suitable AC power cable.
For further information, contact your Kikusui agent.

☐ Another Cable _____

 Kikusui Part No. Z9-000-027 IB001681

KIKUSUI

TABLE OF CONTENTS

SECTION 1: General

1-1. Description

The DPO 108 and DPO 112 D/A converters represent one of the digital programming options in the Kikusui DPO series and are designed to connect to the DPO 100-PC and to transform the digital signal from a microcomputer I/O port output bus to an analogue signal. Since input and output are insulated in the interior of the unit, worry-free connection to computers can be accomplished.

* Before operating this unit, please refer to the instruction manual for the DPO 100-PC and the instruction manuals for the power supplies and electronic loads to be connected.

SECTION 2: Specifications

Table 2-1

Specifications			
Model		DPO 108	DPO 112
1. Input	Input Signal	Binary	8 bit parallel
	Input Method	30mA current loop (34 pin flat cable connector)	
	Logic	Negative logic (provided current is flowing)	
2. Control Signal		Strobe ..... 1 bit (30mA current loop, negative logic) Acknowledge.. 1 bit (open collector, negative logic, TTL level)	
3. Output	Output Voltage	1 10V 2 1V (nominal value)*1	
	Resolution	0.39% *4	0.025% *4
	Accuracy	0.2 *4	0.015 *4
	Output Ripple	500μV rms (0-1 MHz)	
	Source Effect *2	0.005% + 1mV	
	Load Effect *3	0.005% + 1mV	
	Temperature Coefficient	50 PPM/°C (standard value)	
	Output Current	2mA	
4. Output Answering Time		500μSec.	
5. Accessory Functions		Switch for changeover to remote control	
6. Input Supply		Center tap AC 10V ±10%	
7. Operating Ambient Temperature and Humidity Range		0°C - 40°C, 10% - 90% RH	
8. Input - Output Isolation Voltage		AC 500V 1 min.	
9. Isolation Resistance		DC 500V more than 30MΩ	
10. Dimensions		W 140mm × H 26mm × D 110mm (case dimensions)	
11. Weight		Approx. 410g	
12. Accessories		15 pin output connector	

*1 With maximum input data. Set to conform to power supply, electronic load before shipping.
*2 For 10% change of line voltage.
*3 For 0% - 100% change of output current.
*4 For maximum output voltage (maximum output data).

SECTION 3: Operating Instructions

3-1. Operating Precautions

(1) Ambient Temperature

The temperature range satisfactory for this unit's operation is 0 - 40°C. Generally, semiconductor life is highly affected by ambient temperature; it is considered that parts will deteriorate exponentially with increasing ambient temperature.

(2) Mounting Position

In some cases, this unit is installed on the backboard of the PAD-L. Keep this unit about 20 cm or more away from the wall so that hot air from the fan does not accumulate. Do not operate any equipment sensitive to heat near this unit.

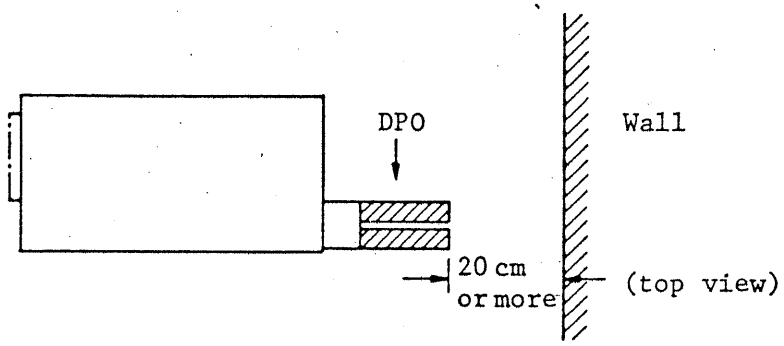


Figure 3-1

* The mounting position of the DPO varies depending on the unit.

Do not use this unit in a place with excessive dust or moisture. Place this unit in a relatively vibration-free location.

(3) Transfer

This unit can be mounted on the backboard of the PAD-L, thereby making transfer easy. In such a case, however, care must be exercised to prevent DPO breakage when transferring the PAD-L main unit with the DPO attached.

3-2. Explanation of Controls and Connectors

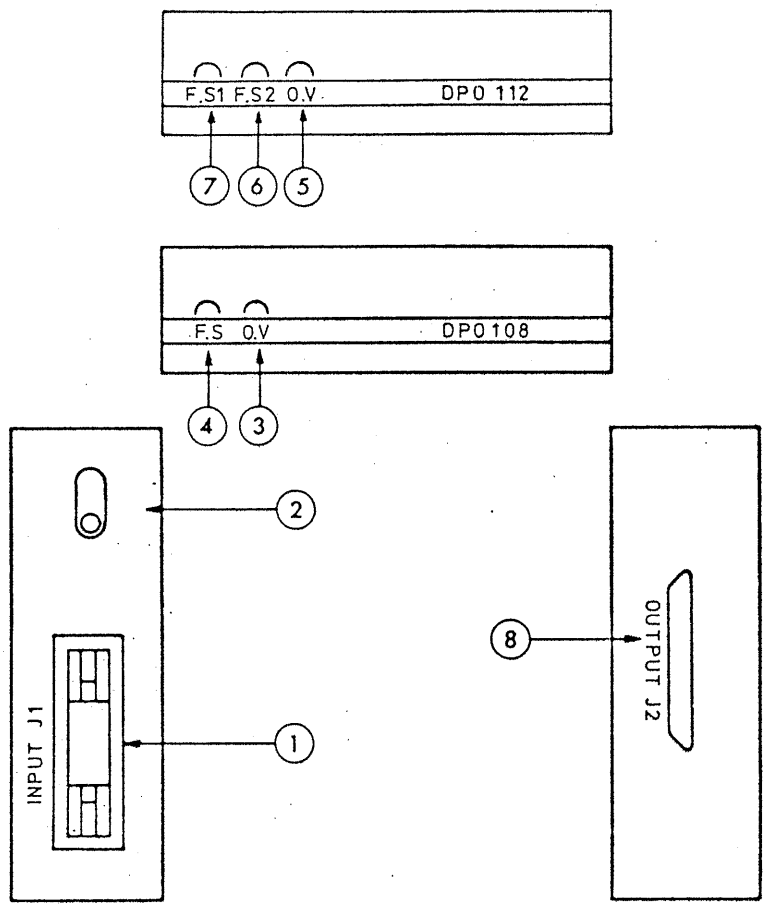


Figure 3-2

(1) Input Connector J1 (INPUT J1)

This connector (manufactured by KEL Co., Ltd.) is for use with a 34 wire flat cable. (See pin layout in Fig. 3-12)

(2) Remote/Local Changeover Switch (REMOTE/LOCAL)

The output connector (8), as will be explained later, is connected to the power supply, and with the switch set on REMOTE, the D/A converter connects to the power supply, effecting digital control. When the switch is set on LOCAL, power supply is controlled by operation of the front panel. With electronic loads, switchover to remote or local can be performed by manipulation of the electronic load front panel switch.

③ DPO 108 offset adjustment variable resistor (O.V)
for adjustment of zero offset of D/A converter.

④ DPO 108 maximum voltage adjustment variable resistor (F.S)
for fine adjustment of maximum voltage of D/A converter.

⑤ DPO 112 zero offset adjustment variable resistor (O.V)
for adjustment of offset of D/A converter.

⑥ DPO 112 maximum voltage adjustment variable resistor I (F.S 1)
for fine adjustment of maximum output voltage in the range of 1 V or 0.5 V. Not effective for nominal 10 V output.

⑦ DPO 112 maximum voltage adjustment variable resistor II (F.S 2)
for fine adjustment of maximum output voltage in the 10 V range. Not effective for nominal 1 V output (1 V or 0.5 V).

⑧ Output connector (OUTPUT J2)
for use at D/A converter output terminal, remote/local switchover terminal, power supply to interface, and power supply to D/A converter input terminals. (See in Fig. 3-12)

3-3. Operating Method

(1) Connection of the Unit to the DPO 100-PC

Utilize a 34 wire flat cable to connect this unit with the DPO 100-PC.

A standard 7 cm long cable is included as an accessory to the DPO 100-PC. If the units are to be placed a greater distance apart, they can be connected to a cable (sold separately) at a distance of up to 50 m.

The ▽ marks on the cable should correspond with the ▽ mark on the input connector J1 (INPUT J1) and the ▽ mark on the DPO 100-PC output connector.

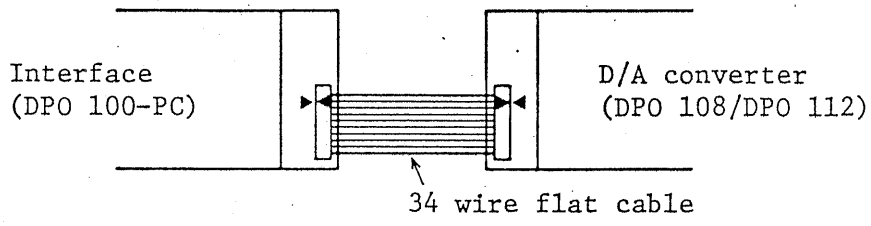


Figure 3-3

(2) Connection of Output Connector (OUTPUT J2) and Power Supply (Electronic Load)

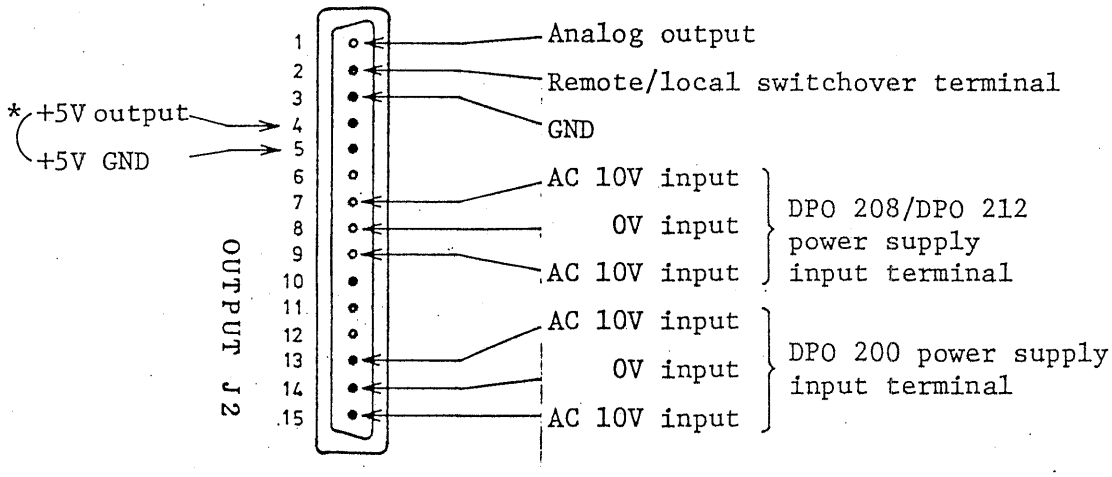


Figure 3-4

* There is no connection here for the DPO 112.

o Analog output terminal

To control power supply output voltage with the output voltage terminal switched over from digital to analog, connect to the "Output voltage control terminal with an external voltage" of the power supply. To control the current of the power supply (electronic load), connect the "Output current control terminal with an external voltage" along with the GND, to the electronic load EXT terminal. (See Fig. 3-10)

Remote/local switchover terminal

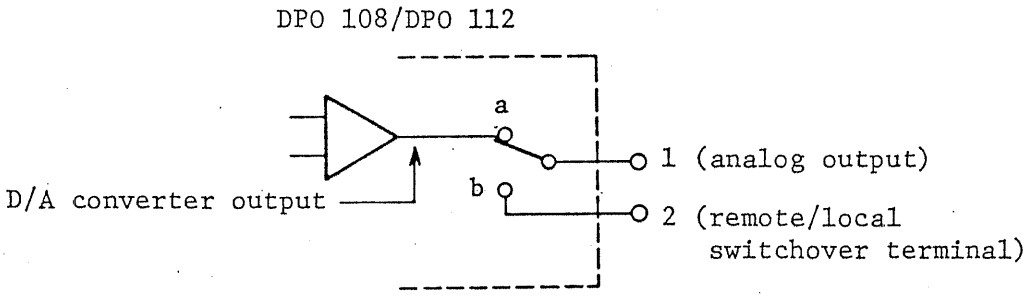


Figure 3-5

Internal connections are as shown in Fig. 3-5. When the remote/local switch is set on REMOTE, the switch is connected to "a", connecting the D/A converter output to terminal 1 (analog output), activating the D/A converter output. When set on LOCAL, the switch is connected to "b", cutting off the D/A converter output and shorting 1 and 2.

In this case, the power supply rear terminal strip acts as a jumper to complete wiring to 2. (See Fig. 3-10)

Power supply input terminals

This unit has two types of power supply terminals, one for the D/A converter (DPO 108) and one for use with the DPO 100-PC. Both connect to the AC 10 V center tap 300 mA.

The power is supplied by the PAD-L series or a power unit. (See Fig. 3-10)

(3) Input Signal

Input data and control signals can be added as shown in the timing chart in Fig. 3-11. Remember that the input signal utilizes current loop, while acknowledge utilizes open collector output.

A. With the DPO 108,

8 bits constitute one unit of data, as shown below.

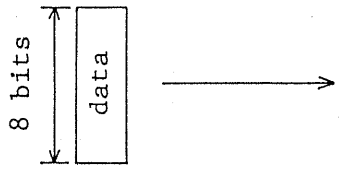


Figure 3-6

B. With the DPO 112,

methods of receiving the data can be switched over from mode 1 to mode 2 by adjustment of the internal switch.

Prior to shipping, it is set on mode 1 .

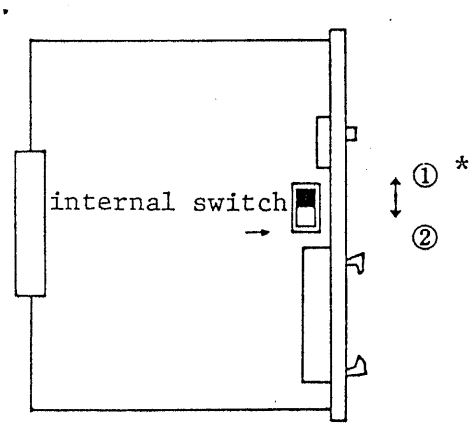
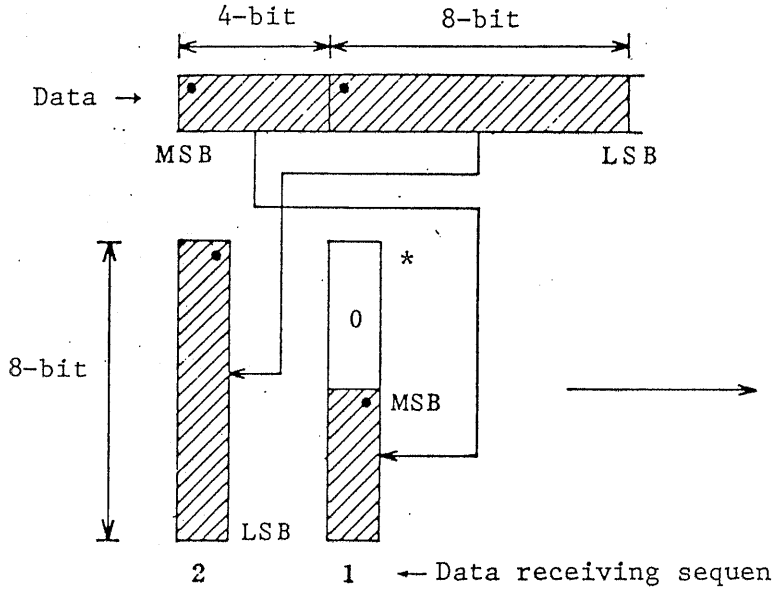


Figure 3-7

① As in the figure below, in the first reception of data, the upper 4 bits (data 0) and the lower 4 bits (4 bits starting from the MSB of the 12 bit data) are received together, forming 8 bit data. In the second reception, the remaining 8 bit data is received.



* This 4 bit data is ignored by the D/A at 0 or any other number.

Figure 3-8

② As in the figure below, 12 bit data is divided into three lots starting at the MSB. Each lot is then paired with the upper 4 bit data (1, 2, 3, respectively) and the resulting 8 bit data is received.

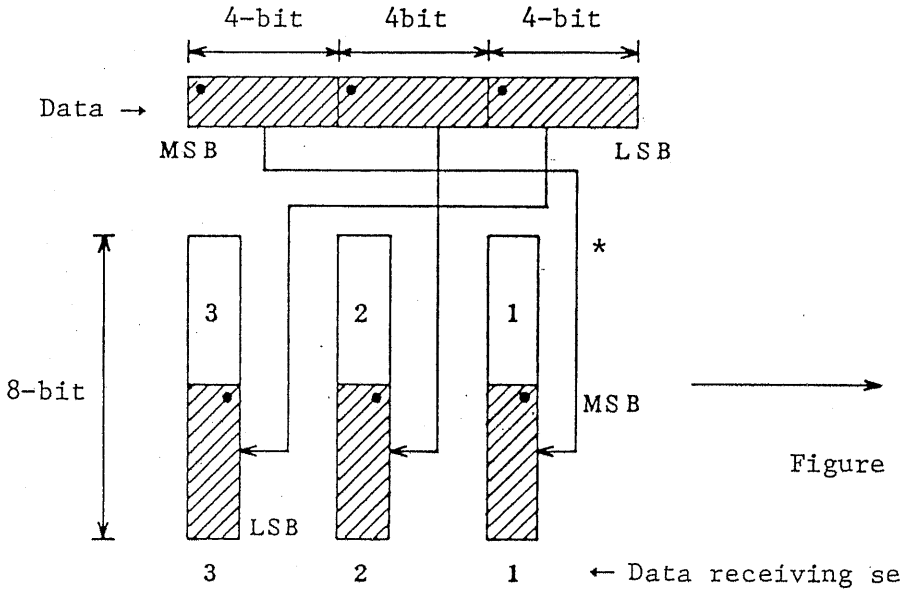
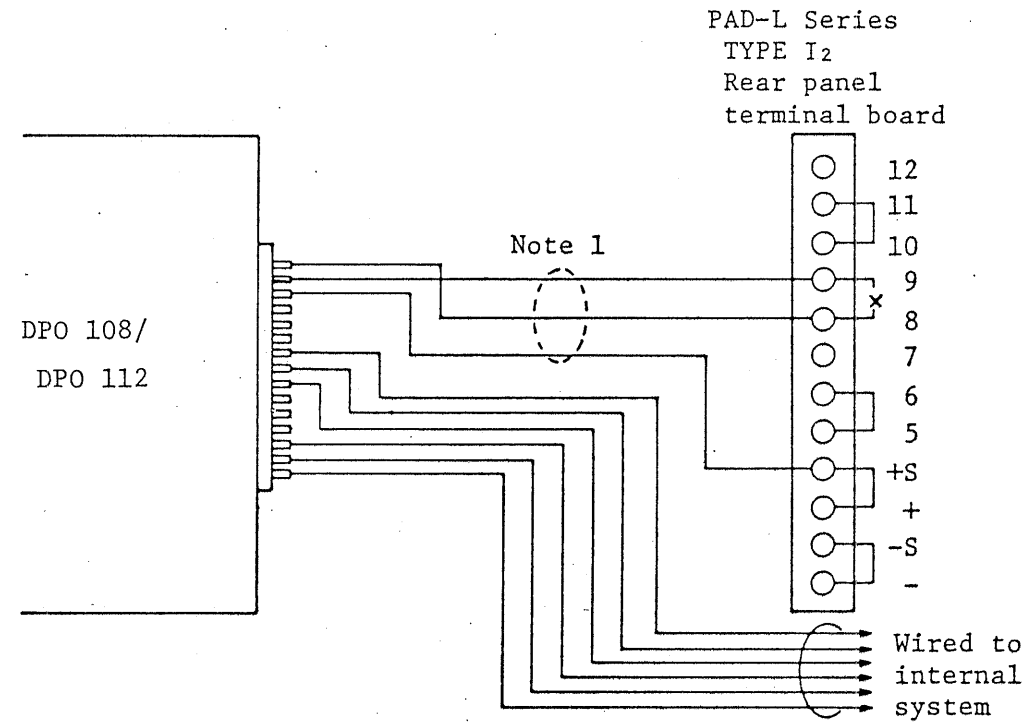


Figure 3-9

* Upper 4 bits with numbers other than 1, 2, and 3 are not received.



Note 1: 3 wire shielding is used for wiring to the power supply +S.

Figure 3-10 Example of Connection of the Unit to the PAD-L Series TYPE I_2

(4) Offset Adjustment

The electric current and electronic load are adjusted to zero with zero input data, but fine adjustment can be performed with the offset adjustment variable resistor. (See Fig. 3-2)

(5) Maximum Output Voltage Adjustment

With maximum input data this unit is set in accordance with the individual buyer's needs in terms of desired power supply output voltage, electric current and electronic load. Fine adjustment of the voltage and current can be performed by the maximum voltage adjustment variable resistor. (See Figure 3-2)

DPO 108/DPO 112 Input Timing

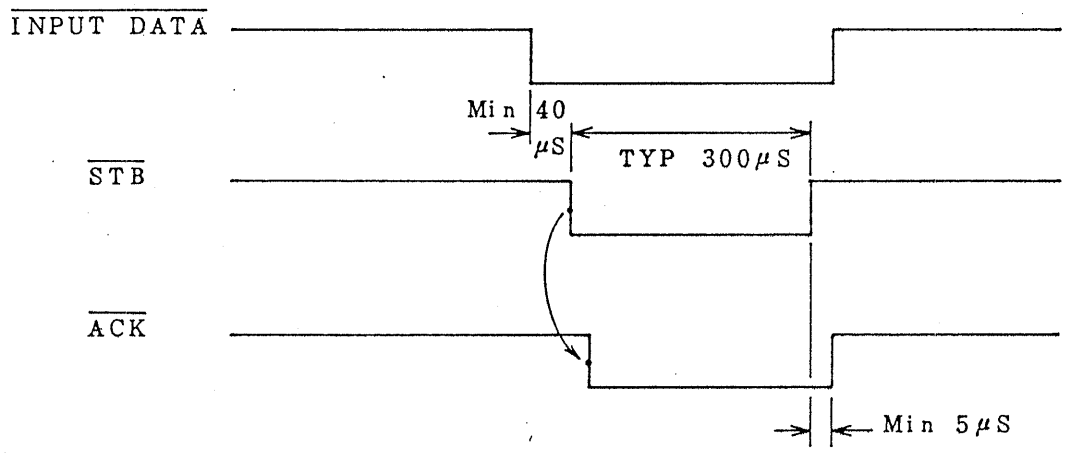


Figure 3-11

* Timing for INPUT DATA, STB, and ACK are shown in Fig. 3-11. For safety, leave sufficient leeway for STB, as shown.

DPO 108/DPO 112 connection number

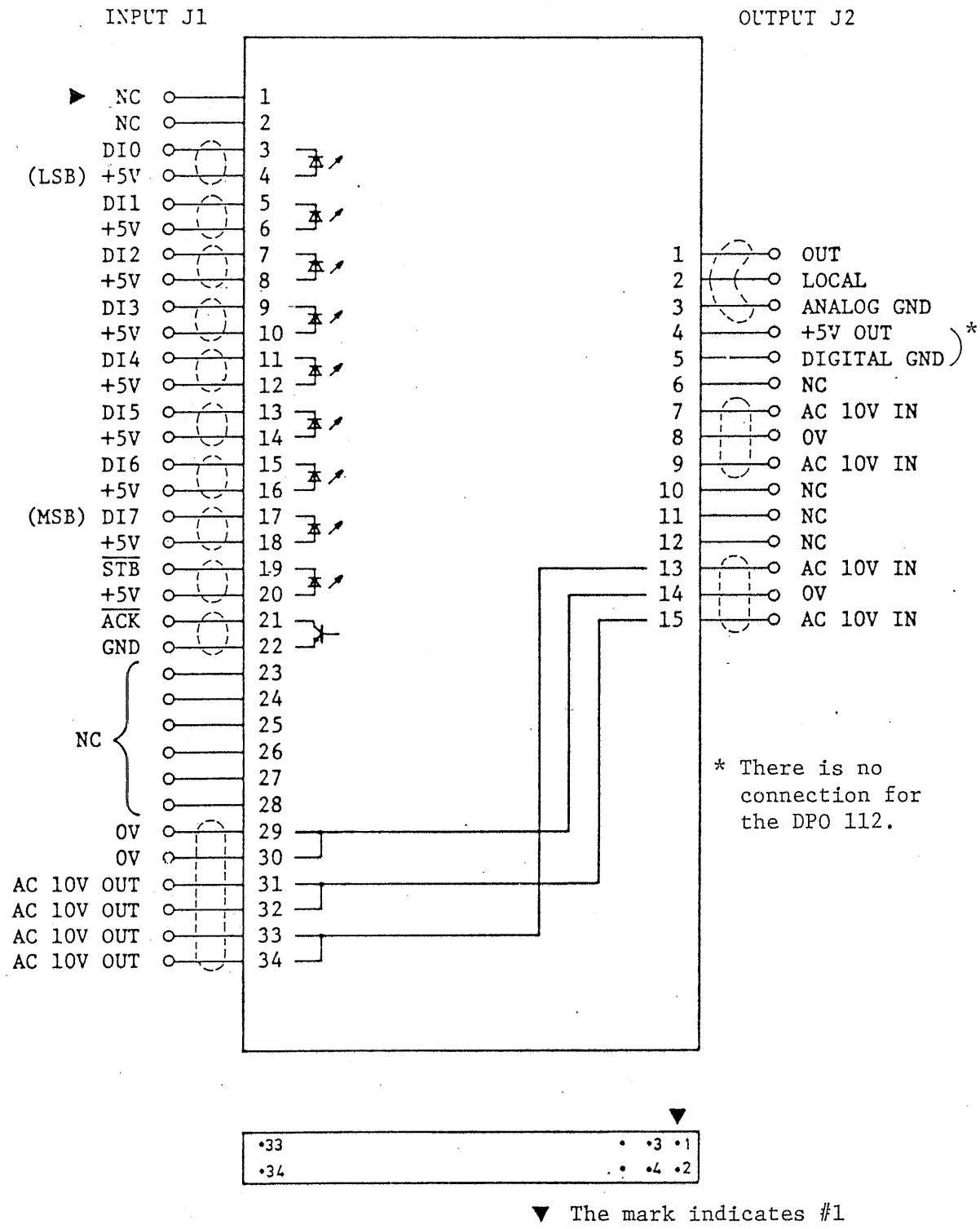
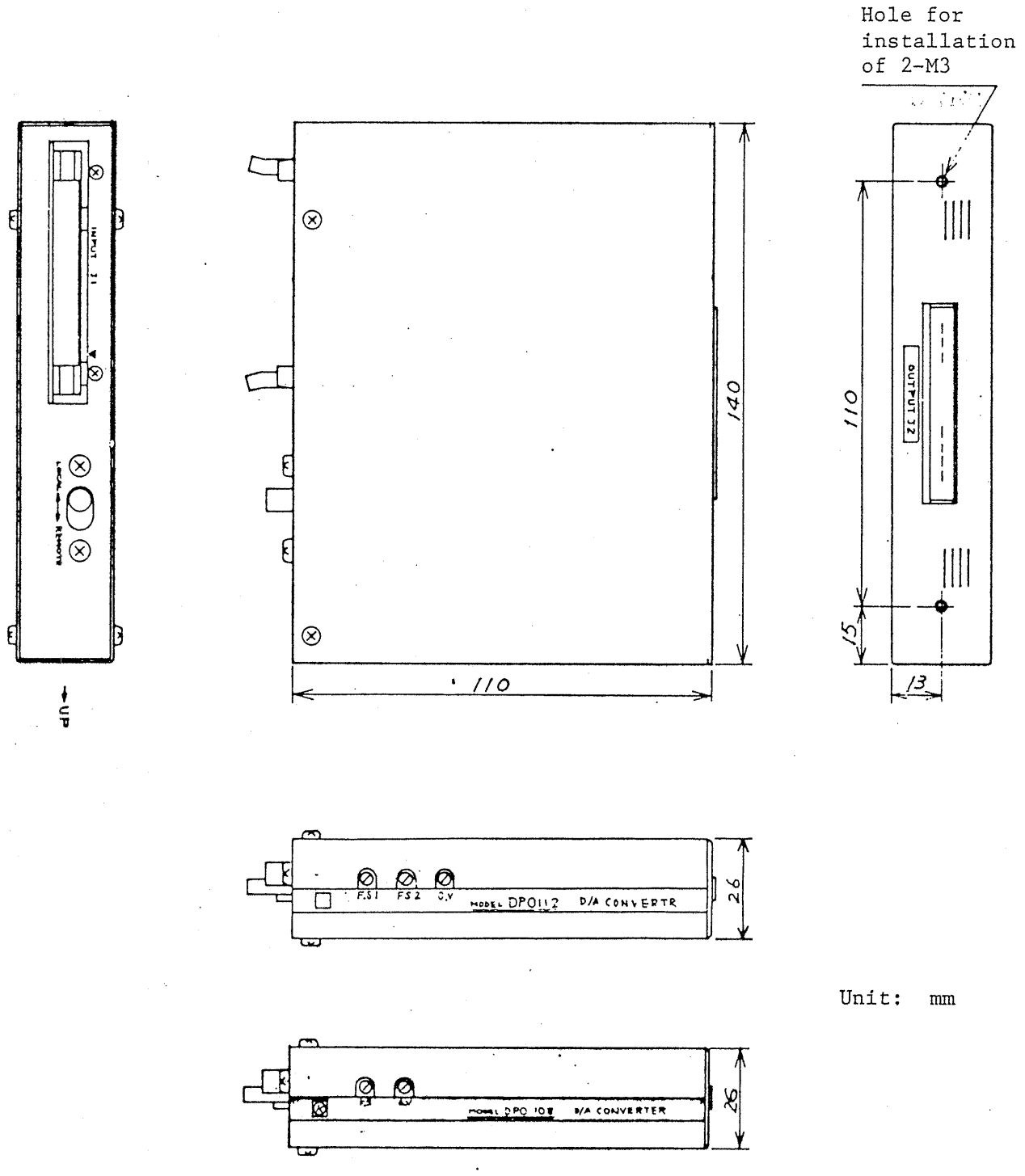


Figure 3-12



Unit: mm

DPO 108/DPO 112

Mechanical outline drawing