ONO SOKKI

DA-4130

D/A Converter

INSTRUCTION MANUAL

ONO SOKKI CO., LTD.

Warranty

1. This product is covered by a warranty for a period of one year from the date of purchase.
2. This warranty covers free-of-charge repair for defects judged to be the responsibility of the manufacturer, i.e., defects occurred while the product is used under normal operating conditions according to descriptions in this manual and notices on the unit label.
3. For free-of-charge repair, contact either your sales representative or our sales office nearby.
4. The following failures will be handled on a fee basis even during the warranty period.
   (a) Failures occurring through misuse, mis-operation, or modification
   (b) Failures occurring through mishandling (dropping) or transportation
   (c) Failures occurring through natural calamities (fires, earthquakes, flooding, and lightening), environmental disruption, or abnormal voltage.

* For repairs after the warranty period expired, contact your sales representative or our sales office nearby.

PREFACE

Thank you for your selecting the ONO SOKKI DA-4130 D/A Converter. This document is the instruction manual for the DA-4130 D/A Converter and describes its functions, specifications, connecting method and operational precautions. In order to safely and correctly operate your DA-4130 D/A Converter, please read this document carefully until you familiarize yourself with the content before you start to use it.
Especially, the precautions described in this document include "the danger which may lead to a damage on property". Be sure to follow the instructions and operating procedures described in this document when you operate this instrument.
This document serves also as the letter of warranty and therefore needs to carefully be kept even after you finish reading it.

When you received a new instrument

1. This instrument was checked for normal operation before shipment.
2. When you unpack this instrument, make sure first that it has not been damaged during transportation, and then check operation according to this document.
3. If it is damaged or does not operate normally, please contact your dealer or a nearest ONO SOKKI sales office.

For Your Safety

Be sure to follow directions given within this document to ensure safe and proper use of your DA-4130 D/A Converter.
ONO SOKKI CO., Ltd., bears no responsibility for nor makes any warranty regarding damages or injury resulting from failure to follow directions given within this document during operation.

Meaning of Symbols

- In this document precautions are classified into two categories: WARNING and CAUTION. This depends on the degree of danger or damage possible if the precaution is ignored and this instrument is used incorrectly.

WARNING	This symbol is used to indicate precautions where there is a risk of death or serious personal injury to the operator if the product is handled incorrectly.
CAUTION	This symbol is used to indicate precautions where there is a risk of some personal injury to the operator or only material damage to the product if the product is handled incorrectly.

WARNING

Before Using

- Do not operate this instrument in a location where there is gas or steam. Using this product where there is steam or combustible or explosive gas may result in an explosion.
- Avoid using in locations of high temperature as there may be a risk of fire. Avoid using in locations of extremely high temperature. Using this product in a location having a temperature exceeding the operational temperature range (0 to +40°C) may cause the instrument to catch on fire.
- Do not block the heat radiation system as there is a risk of fire if heat builds up inside the instrument. Place this instrument away from the wall in a location with the best ventilation possible.
- Do not remove the casing or take apart this instrument. Use of this instrument without its casing or while taken apart may result in damage to equipment or electric shock. When internal adjustment, inspection or repairs are required please contact your dealer or a nearest ONO SOKKI sales office.
- Do not splash or spill water on this instrument as doing so may cause fire or electric shock due to short or increased heat. If water does happen to get inside the instrument, unplug the power cord immediately and call your dealer or a nearest ONO SOKKI sales office as soon as possible.

⚠ WARNING

Precautions Regarding Electric Shock

- Never cut the internal or external ground wire of this instrument or disconnect the wire connected to the protective ground terminal of the instrument as doing so may result in electric shock or damage to the instrument.
- Before connecting this instrument to a device to be measured or an external control circuit, be sure to check that the instrument is properly grounded and that its power is off. Connecting to external equipment while not grounded or while power is still on may result in electric shock.
- Check that power is off before touching parts of this instrument where voltage is output or circuits connected to parts where voltage is output. Touching such parts without turning power off may result in electric shock. Circuits shall sufficiently be insulated to withstand output voltage/current.
- Be sure the power always meets specified voltage, current and frequency requirements. Use of power other than that specified may result in electric shock, fire, or damage to this instrument.
- If you hear thunder, do not touch any metal parts of this instrument or the plug as there is a risk of electric shock from conducted lighting. Do not use this instrument outdoors if you hear thunder.

WARNING

If a Problem Occurs

- Unplug this instrument immediately if any metal, water, or foreign object should fall inside. Continued use after metal, water, or foreign object has fallen inside may result in fire or electric shock. After unplugging the instrument immediately, contact your dealer or a nearest ONO SOKKI sales office as soon as possible.
- Unplug this instrument if you sense smoke, strange noise or strange smell coming from it or if you accidentally dropped or damaged it. Continued use may result in fire or electric shock. After immediately unplugging the instrument, contact your dealer or a nearest ONO SOKKI sales office as soon as possible.

CAUTION

About Installation Place

- Do not install this instrument in locations where there is oily smoke or steam or where there is high humidity or lots of dust. Electricity could conduct through the oil, water vapor, or dust resulting in fire or electric shock.
- Do not install this instrument in locations subject to extremely high temperature or direct sunlight as doing so may result in fire.

CAUTION

About Inspection and Maintenance

- When this instrument is mounted in a rack or the like to be operated, regularly check the following items to assure normal operation. (These items need not be checked so frequently.)

  * Check terminal board on the rear panel for loose screws.

  * Check cable covering for tear or damage (especially for long cables).

  * Make sure that input signal is at specified level.

CAUTION

About Noise

- Although countermeasures against noise are incorporated in the design of this instrument, noise may not fully be removed depending on installation conditions. In such cases, take the following measures:

  * Separate the power line for this instrument from that connecting a load of large power consumption.

  * Keep signal cables away from power cables.

  * For signal line, use shielded cable as far as possible.

CAUTION

About Daily Care

- Plastic is used for this instrument. Therefore, cleaning this instrument with volatile organic solvent, such as benzene and thinner, or chemical duster may deform or discolor the casing. Pesticides may also cause deformation or discoloration.
- To remove dirt sticking on this instrument, wipe it lightly with soft cloth which is soaked with neutral detergent and wrung firmly.

CONTENTS

1. INTRODUCTION

1.1 Overview

The DA-4130 D/A Converter converts BCD output signal from ONO SOKKI gauge counter or other devices into analog signal to be recorded with pen recorder, etc.

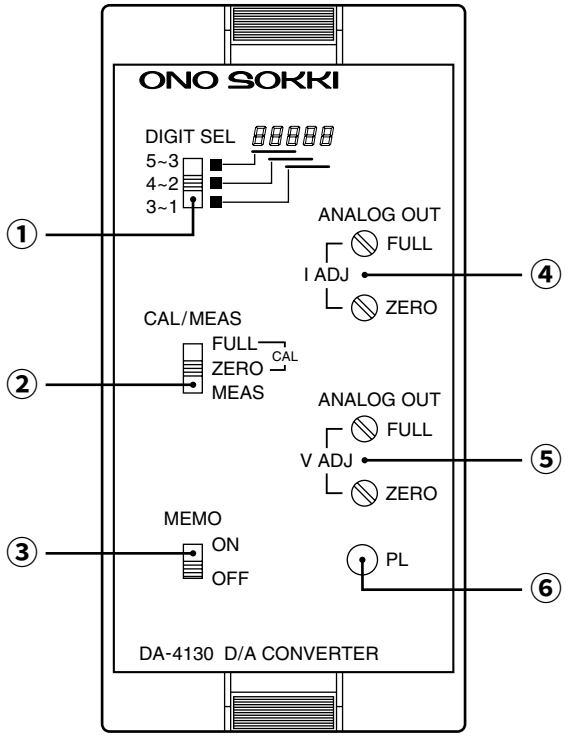
1.2 Applicable Products

This instrument can be used in combination with the following devices:

- DG-4120
- AB-1120
- RV-790
- TM-334B
- DG-4240
- RG-880
- QW-153B
- FT-243
- DG-4280
- RV-770
- QW-163B

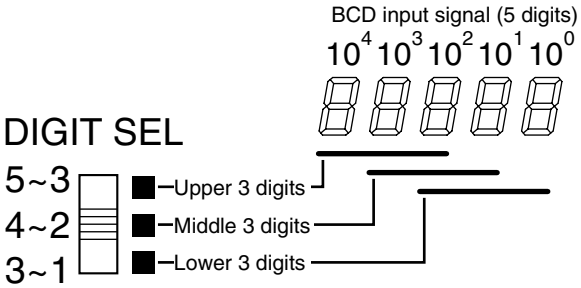
2. NAME AND FUNCTION OF EACH SECTION

2.1 Front Panel



① DIGIT SEL

Of 5 digits of BCD input signal, this switch selects consecutive 3 digits for D/A conversion.



② CAL/MEAS

When set to CAL-ZERO or -FULL, BCD data is forcibly set to "+000" (ZERO) or "+999" (FULL) internally, enabling calibration of analog output.

When set to MEAS, analog output can be obtained according to BCD input signal.

③ MEMO

When set to ON, MEMO IN and the input of memory command signal are enabled. The moment a memory command (print command) is input, BCD input data is stored internally while holding analog output. (See "5. MEMORY FUNCTIONS")

When set to OFF, D/A conversion is performed to output analog signal whenever BCD signal is input.

④ I ADJ

Zero/Full scale adjusting volume for current output

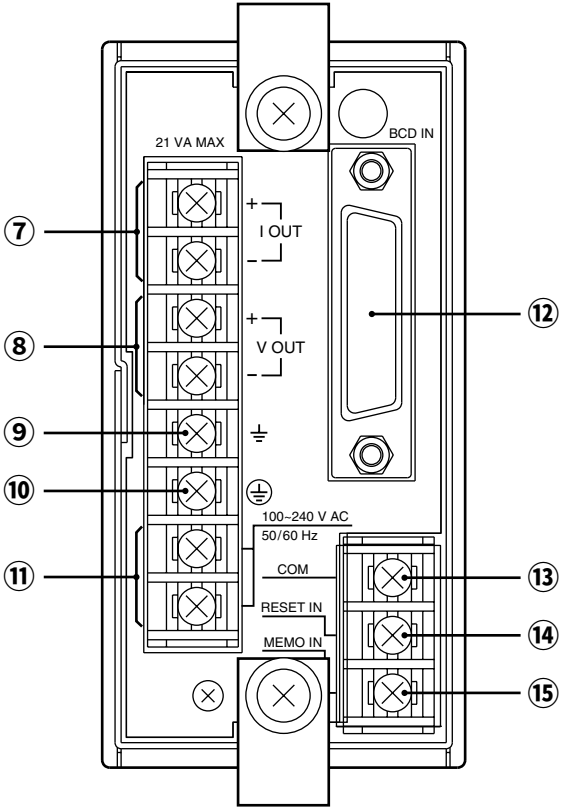
⑤ V ADJ

Zero/Full scale adjusting volume for voltage output

⑥ PL

Lights up when power is supplied.

2.2 Rear Panel



⑦ I OUT

Current output terminal

⑧ V OUT

Voltage output terminal

⑨ Function Ground

Function ground terminal

To remove noise, connect the shield of analog signal cable to this terminal.

⑩ Protective ground

Protective ground terminal

For safety and noise removal, be sure to ground this terminal.

㉑ Power input terminal

Connect 100 to 240 VAC, 50/60 Hz power line to this terminal.

㉟ BCD IN

BCD input connector

㉝ COM

Common terminal for external commands (RESET IN/MEMO IN)

㉓ RESET IN

Reset signal input terminal

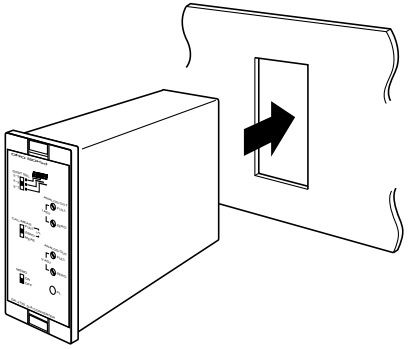
When short-circuited with COM terminal, RESET signal is output to a gauge counter connected.

⑬ MEMO IN

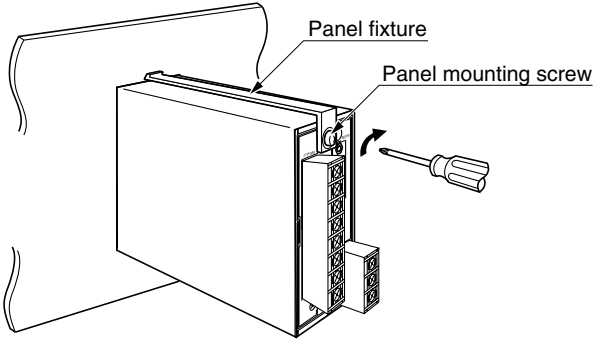
When short-circuited with COM terminal, HOLD signal is output to a gauge counter connected. (See "5. MEMORY FUNCTIONS")

3. MOUNTING ON THE PANEL

① Insert this instrument in the panel.
Up to 4 mm thick panel can mount this instrument.



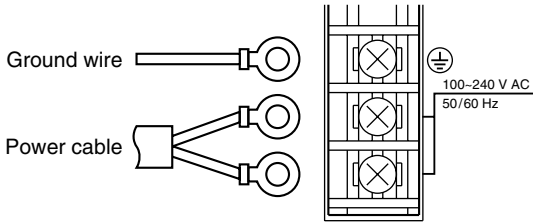
② Mount the panel fixture which is supplied with this instrument from rear side of the instrument, and tighten the mounting screw.



4. CABLE CONNECTION

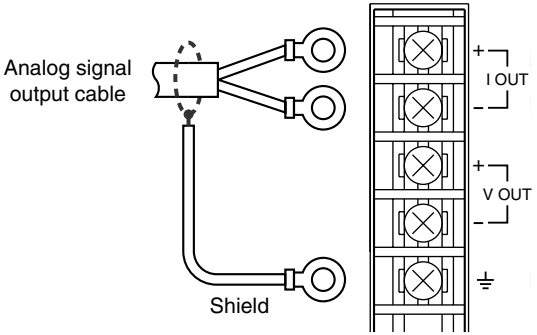
4.1 Connecting Power and Ground Cables

M3 screws are used for the terminal board.
This instrument becomes active the moment the POWER switch is turned ON. Be sure to complete all setting before turning the POWER switch ON.
For safety and noise removal, be sure to connected the protective ground terminal to an approved ground line.



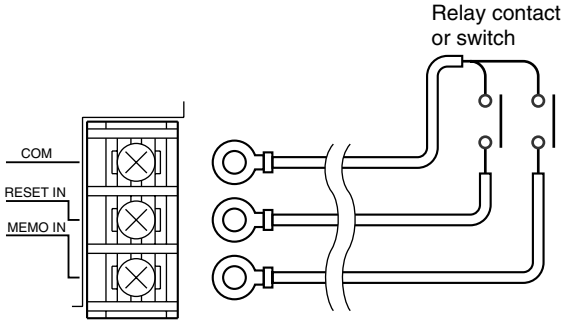
4.2 Connecting Analog Signal Output Cable

M3 screws are used for the terminal board.
Be sure to use shielded cable which is not too long.
Be sure to connect the shield to the function ground terminal.



4.3 Connecting External Commands Input Cable

The cable shall not be too long.
M3 screws are used for the terminal board.



4.4 Connecting BCD IN Connector

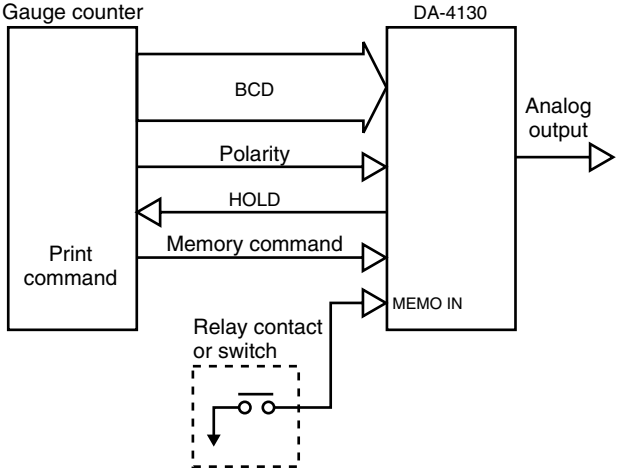
For BCD connection, be sure to use dedicated cable supplied from ONO SOKKI. Be careful that using other cable may cause malfunction.

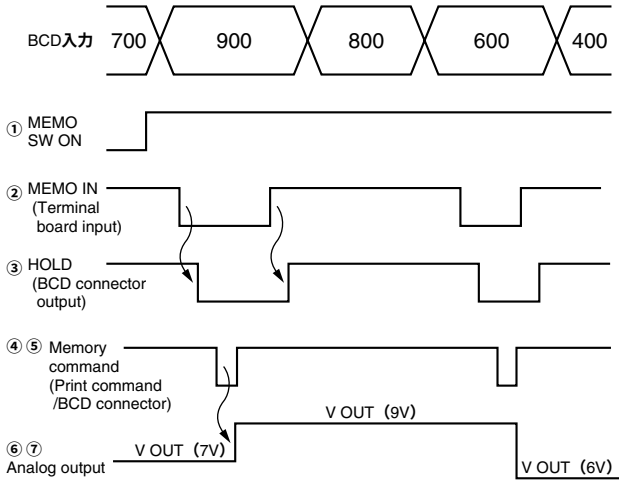
5. MEMORY FUNCTIONS

With memory functions, it is possible to internally store BCD input data and hold analog output.

* When memory functions are not used, D/A conversion is performed to output analog signal whenever BCD data is input.

5.1 Operation Flow





For delay time, see "8. TIMING CHART".

5.2 Explanation of Operation Flow

① Set the MEMO switch to ON on the front panel. Then MEMO IN and the input of memory command signal are enabled.

② Input relay contact/switch signal to MEMO IN of the terminal board on the rear panel.

③ Then gauge counter hold signal is output from pin 31 of the BCD IN connector.

④ Receiving the hold signal, gauge counter holds counter data and outputs print command pulse.

⑤ The print command pulse is input, as a memory command, to pin 35 of the BCD IN connector.

⑥ The BCD input data when the memory command was input is stored internally to hold analog output.

⑦ Analog output is fixed until the next memory command is input.

* When connected to a tachometer

- Synchronized with print command pulse which is output at a given interval from the tachometer, BCD input (analog output) is updated.
- When the tachometer does not have HOLD function, it is unnecessary to input signal to MEMO IN.

6. BCD IN

6.1 Pin Arrangement

Pin	Signal	Pin	Signal
1	1×10^0	19	4×10^4 (BCD input)
2	2	20	8 (BCD input)
3	4	21	N.C.
4	8	22	N.C.
5	1×10^1	23	N.C.
6	2	24	N.C.
7	4	25	N.C.
8	8	26	Polarity input –
9	1×10^2	27	N.C.
10	2	28	N.C.
11	4 (BCD input)	29	N.C.
12	8 (BCD input)	30	N.C.
13	1×10^3	31	HOLD output
14	2	32	RESET output
15	4	33	N.C.
16	8	34	N.C.
17	1×10^4	35	Memory command input
18	2	36	Common

Receptacle : DX10A-36S (from Hirose Electric Co., Ltd.)
Applicable plug : DX40-36P (from Hirose Electric Co., Ltd.)
Plug cover : DX36-CV1 (from Hirose Electric Co., Ltd.)

6.2 Explanation of Each Signal

① BCD input (pin 1 to pin 20)

Positive logic, 5 digits, parallel input

② Polarity input (pin 26)

Polarity is negative when high level signal is input.
Polarity is positive when low level signal is input.
No polarity signal exists when tachometer is used. Therefore, it is necessary to short-circuit pin 26 (polarity input) and pin 36 (common) on the cable side connector.

③ HOLD output

When MEMO IN signal is input, HOLD signal is output to a gauge counter connected.
This is enabled when the MEMO switch is set to ON.

④ RESET output

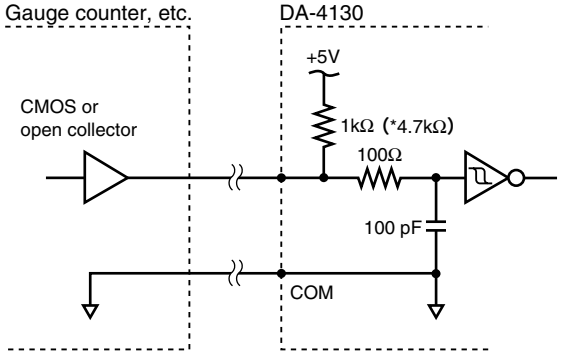
When RESET IN signal in input, RESET signal is output to a gauge counter connected.

⑤ Memory command input

When memory function is used, the BCD input data when memory command signal was input is stored to hold analog output.

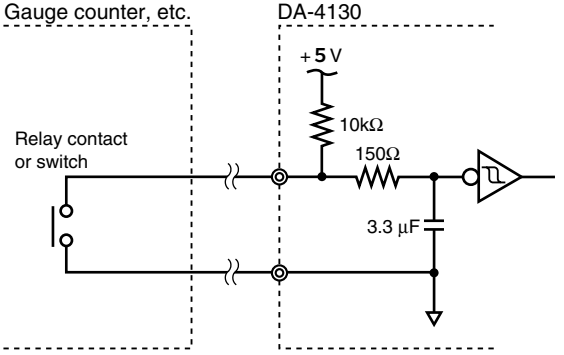
6.3 Recommenced Interface

① Interface circuit for BCD input, polarity and memory command (*) signals (BCD IN connector)



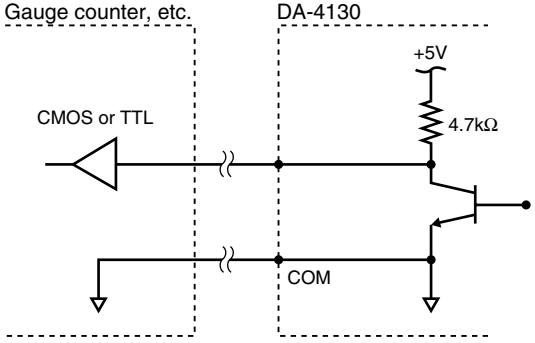
Polarity of input BCD	Positive logic	
Memory command	Negative logic	
Voltage signal input	High level 3.4 ~ 5.5V	
	Low level 0 ~ 0.8V	
No-voltage signal input	Open voltage	Approx. 5 V
	Short-circuit current	Approx. 6 mA (*Approx. 1.2 mA)

② Interface circuit for MEMO IN and RESET IN signals (terminal board)



Open voltage	Approx. 5 V
Short-circuit current	Approx. 1.2 mA
Contact resistance	Max. 100Ω

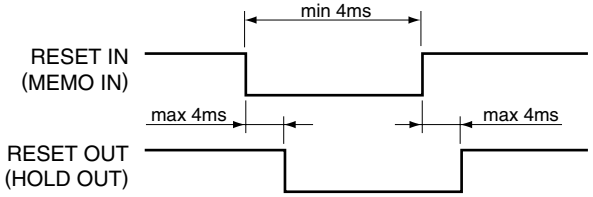
③ HOLD and RESET output signals (BCD IN connector)



Negative logic voltage output	Level "0"	0 ~ 1.4V
	Level "1"	3 ~ 5.5V

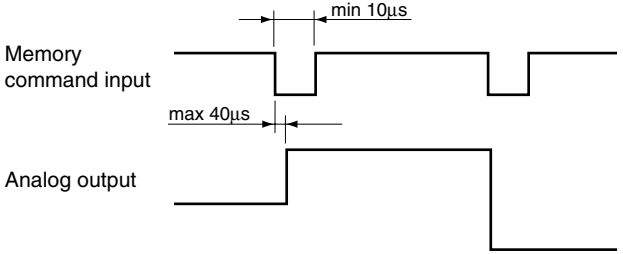
6.4 Timing Chart

① MEMO IN, RESET IN



* MEMO IN is output, as HOLD output, to gauge counter only when memory function is enabled (when the MEMO switch is set to ON).

② Memory command input



* For memory command, input print command signal from a connected external counter.

7. SPECIFICATIONS

7.1 D/A Conversion and Analog Output

① D/A conversion section

Converted digits: BCD 3 digits (000 to 999)

Digits change-over function:
According to the setting of DIGIT SELECT switch, of BCD 5-digit of measured data, upper, middle or lower 3 digits are subjected to A/D conversion.

Linearity error: Within ±0.1% of full scale

Conversion time: 40μs or less

② Analog output section

a. Voltage output

Output voltage: 0 to ±10 V
(Adjusted at shipment such that ±9.99 V is output when ±999)

Output voltage adjusting range:
±5% of full scale (FULL)
±0.5% of full scale (ZERO)

Connectable load resistance: 1 kΩ or more

Temperature stability: Gain drift ±0.01% of full scale/°C
Zero drift ±0.01% of full scale/°C

Protective circuit: Short protective circuit included

Setting error: ±0.5% of full scale (FULL)
±0.1% of full scale (ZERO)

* When the polarity of data changes, polarity data is delayed behind numeric data by maximum 1 ms.
* When the change in lowest bit of selected digits is 40μs or less, the width of 1 step for analog output becomes 0.2% of full scale.
* For stable measurement, use this instrument after aging for more than 30 minutes.

b. Current output

Output current:	0 to ±16 mA (Adjusted at shipment such that ±15.984 mA is output when ±999) (Can be modified to 4 to 20 mA by option.)
Output current adjusting range:	±5% of full scale (FULL) ±0.5% of full scale (ZERO)
Connectable load resistance:	250Ω or less
Temperature stability:	Gain drift ±0.01% of full scale/°C Zero drift ±0.01% of full scale/°C
Protective circuit :	Open protective circuit included
Setting error:	±0.5% of full scale (FULL) ±0.1% of full scale (ZERO)

* When the polarity of data changes, polarity data is delayed behind numeric data by maximum 1 ms.
* When the change in lowest bit of selected digits is 40μs or less, the width of 1 step for analog output becomes 0.2% of full scale.
* For stable measurement, use this instrument after aging for more than 30 minutes.

7.2 Signal I/O

① BCD, polarity signal (BCD connector)

Positive logic input
Polarity is "–" (negative) when high level.
For voltage signal,
High level: +3.4 to +5.5 V
Low level: 0 to +0.8 V
For no-voltage signal,
Open voltage: Approx. 5 V
Short-circuit current: Approx. 6 mA

Note: 5 V is output when BCD input is open.

② Memory command input signal (BCD connector)

Negative logic pulse
Operation edge: Trailing edge
Pulse width: 10μs or more
For voltage signal,
High level: +3.4 to +5.5 V
Low level: 0 to +0.8 V
For no-voltage signal,
Open voltage: Approx. 5 V
Short-circuit current: Approx. 6 mA

Note: 5 V is output when BCD input is open.

③ HOLD, RESET output signal (BCD connector)

Negative logic voltage output

Level "0":	0 to +1.4 V
Level "1":	+3 to +5.5 V
Pulse width:	Depends on external command input.

④ External command input (terminal base M3)

MEMO/RESET signal

External contact input

Open voltage :	Approx. 5 V
Short-circuit current:	Approx. 1.2 mA
Pulse width:	4 ms or more
Contact resistance:	Max. 100Ω

7.3 Functional Description

DIGIT SELECT: Of 5 digits of BCD input signal, selects consecutive 3 digits for D/A conversion.

MEMO ON/OFF

MEMO ON: Enables memory function (latch timing) for BCD input signal.
When MEMO is set to ON, BCD signal is held internally at the timing memory command is input through BCD IN connector, fixing analog output.

MEMO OFF: Performs D/A conversion when BCD is input.

* If bits deviate, analog output may change.

MEAS/FULL/ZERO

MEAS: BCD input signal is subjected to D/A conversion.

FULL: +999 is subjected to D/A conversion.

ZERO: 0000 is subjected to D/A conversion.

RESET input terminal: Resets the counter according to external contact signal. This instrument through-outputs signal to the RESET output of BCD connector.

MEMO input terminal: Holds the counter according to external contact signal. This instrument through-outputs signal to the HOLD output of BCD connector.
Enabled when MEMO switch is set to ON.

7.4 General Specifications

Supply voltage	:	100 to 240 VAC, 50/60 Hz
Withstand voltage	:	1500 VAC/1 minute
Insulation resistance	:	5MΩ or more
Current consumption	:	16 VA or less (at 100 VAC, 50 Hz)
Weight	:	Approx. 600 g
Working temperature	:	0 to +40°C
Storage temperature	:	–10 to 55°C
Outside dimensions	:	48mm(W) × 96mm(H) × 140mm(D)
Accessories	:	Panel mounting fixture Terminal board cover Instruction manual

7.5 Options

BCD cable:

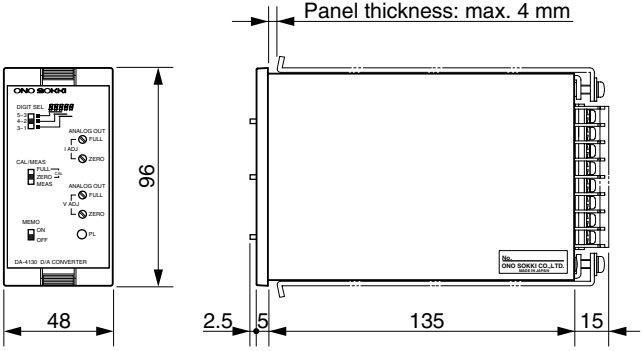
AA-8101 (3 m) for DG-4120/DG-4240/DG-4280/AB-1120

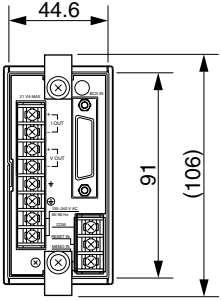
- BCD cable for connecting other applicable devices is a special order product.
- BCD cable is not included in the accessory and therefore needs to separately be ordered.
- Be sure to use dedicated BCD cable supplied from ONO SOKKI.
- Maximum cable length is 3 m. Using a longer cable may cause malfunction and therefore cannot be recommended.

Power cable:

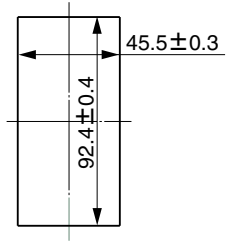
AX-204, 2.4 m, for 100 VAC with crimp-style terminals

7.6 Dimensional Outline Drawing





Rear



Panel cut dimensions

ONO SOKKI

*Outer appearance and specifications are subject to change without prior notice.
HOME PAGE: http://www.onosokki.co.jp/English/english.htm

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