AD-8923-BCD

Remote Controller (BCD)

INSTRUCTION MANUAL

A&D Company, Ltd.

The contents of this manual and the specifications of the instrument covered by this manual are subject to change for improvement without notice.

CONTENTS

1. INTRODUCTION

This manual describes how the AD-8923-BCD remote controller works and how to get the most out of it in terms of performance.
Read this manual thoroughly before using the AD-8923-BCD and keep it at hand for future reference.

1.1. Features

Connecting the AD-8923-BCD remote controller to a weighing instrument will enable transmission of RS-232C weight data from the weighing instrument to a PLC using BCD output.

● Displays the weight data transmitted from the weighing instrument.
● Can change the weighing speed of the AD-4212C/D/F, perform sensitivity adjustment with the AD-4212C/D/F using an external weight and share the power supply with the AD-4212C/D/F.

Note

□ **When connected to the following instruments, power can be supplied to both instruments by plugging the AC adapter into either the weighing instrument or the AD-8923-BCD. (Both instruments can have their AC adapter connected at the same time.)**

Compatible models: AD-4212C/D/F, FZ, FX, GX-A, GF-A, GX-M, GF-M, GX-L, GF-L, HR-AZ, HR-A (Refer to "3.3. Turning the power on")

2. DESCRIPTION OF EACH PART

Display

Keys
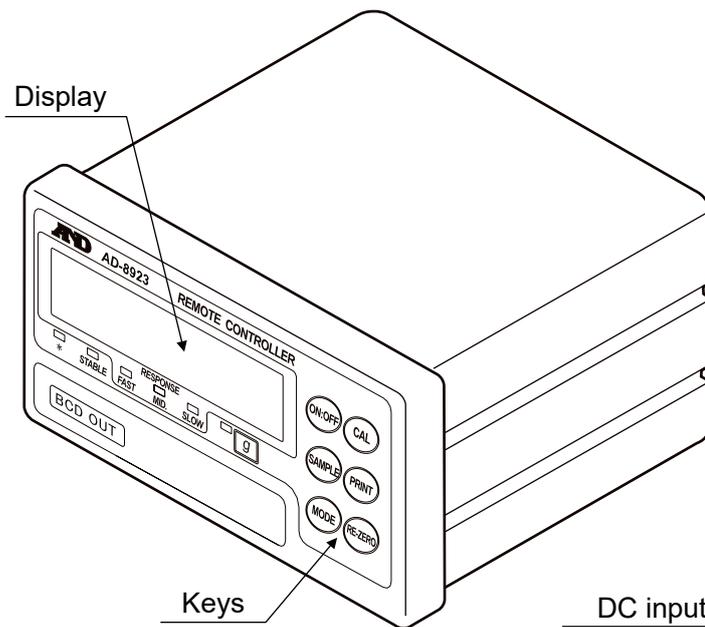
Accessories

BCD plug 1 pc.
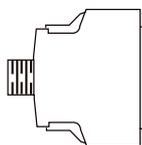
AC adapter 1 pc.

AD adapter
ID label
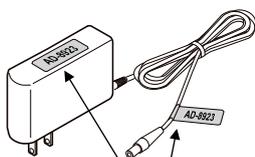
AD8923	AD8923
AD8923	AD8923
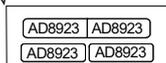
Attach the identification sticker for your
model to the AC adapter as shown.

DC input terminal

BCD connector

AC adapter
input jack

FG terminal
See the note below.

RS-232C connector
(D-Sub 9-pin)
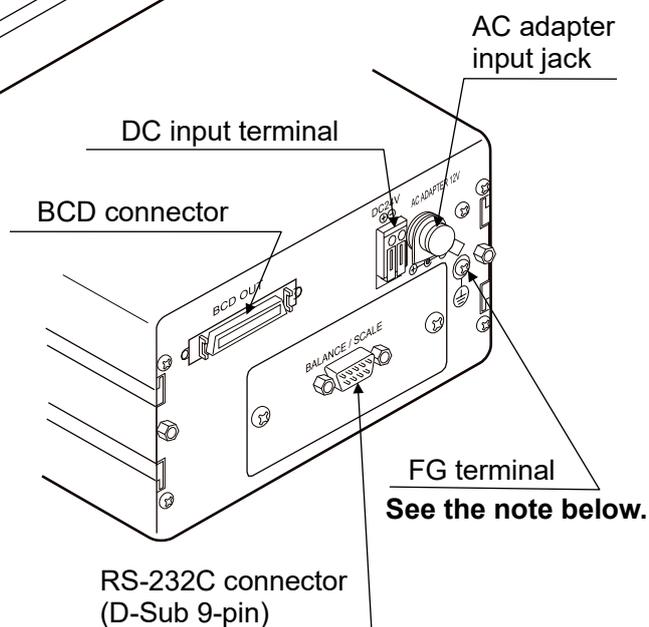
Rear View

Note

☐ **When the AD-8923-BCD is to be built into a
weighing system, be sure to ground the FG
terminal.**

☐ **Please confirm that the AC adapter type is
correct for your local voltage and receptacle
type.**

2.1.　Display

Turns on while the weighing instrument is in the standby mode.

STABLE indicator

Weighing speed indicators
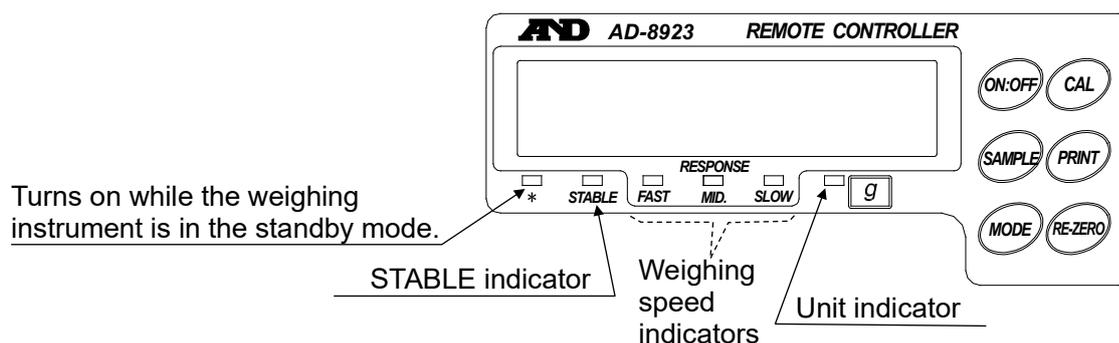
Unit indicator

- Displays the weight data received. When the unit is "g" (gram), the unit indicator turns on. If the balance outputs RS-232C weighing data that exceeds six digits, the AD-8923-BCD does not display the high-end digits (2 highest digits for an 8 digit display). The BCD data is output.
- When the weight value is stable (the header of the weight data received is "ST"), the STABLE indicator turns on.
- If the AD-8923-BCD does not receive the weight data for two seconds or more,
  │ - - - - - - │ is displayed (Bar display).
- Displays the AD-4212C/D/F weighing speed that is currently set, by turning on the weighing speed indicator.
  When connected to other instruments, the AD-8923-BCD weighing speed indicators have no function.

2.2.　Keys

- Operates the weighing instrument. For details, refer to "3.4. Operation".
- To enter the function setting of the AD-8923-BCD, press the │ CAL │ key while holding down the │ ON:OFF │ key. For details, refer to "4. FUNCTION SETTING".)

2.3.　Connectors

- RS-232C connector .... D-Sub 9-pin (male)
  Used for connection to the weighing unit. For the proper cable, refer to the instruction manual for the weighing instrument used.
- BCD connector .... Half pitch 50-pin (female)
  Used for connecting the AD-8923-BCD to another instrument. For details, refer to "6. BCD OUTPUT CONNECTOR".
- DC input terminal (24 DCV) / AC adapter input jack
  Either power supply can be used. For details, refer to "3.3. Turning the power on".

3. CONNECTION

3.1. Setting the weighing instrument and the AD-8923-BCD

Set the following items so that the weighing instrument and the AD-8923-BCD have the same value for each item.

Item	Weighing instrument	AD-8923-BCD
Baud rate	600, 1200, 2400*, 4800, 9600, 19200 bps	
Data bits, parity	7 bits EVEN*	
Stop bit	1 bit*	
Terminator	<CR><LF>*	
Data format	A&D standard format	–
Communication control	No RTS/CTS control	–
Data output mode	Stream mode	–

* Factory setting for the AD-8923-BCD. The factory setting for the weighing instrument is the same unless otherwise specified.

3.2. Connecting the cables

Connect the cables using the connectors located on the rear of the AD-8923-BCD.

Connection example to the AD-4212C and a PLC

RS-232C connector (D-Sub 9-pin)

BCD connector (Half pitch 50-pin)

AD-8923-BCD

Connect to the power supply
Refer to "3.3. Turning the power on".

Ground

AD-4212C

BCD signals

Ground

PLC

RS-232C cable provided
with the AD-4212C
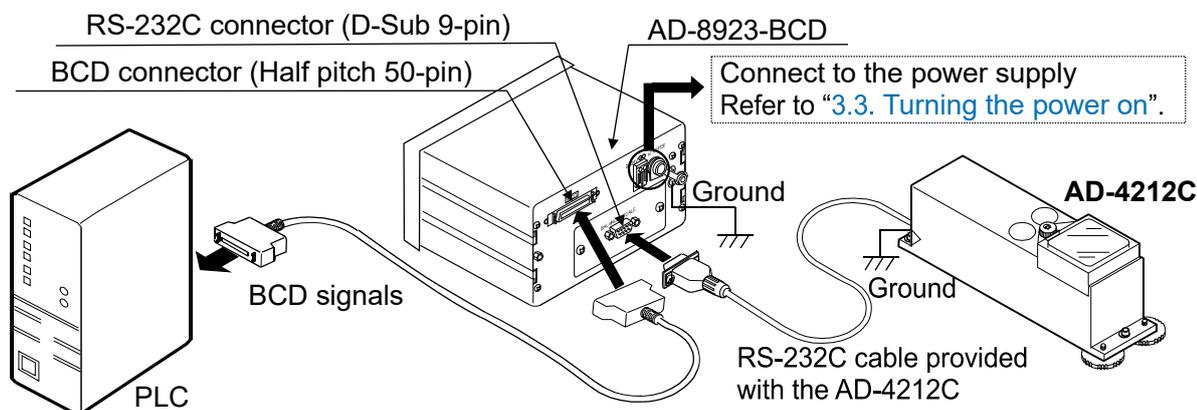
Note

□ **Be sure to ground the AD-4212C and the AD-8923-BCD.**

3.3. Turning the power on

As a power supply, an external 24-VDC power supply (24 VDC±10% / 700mA) or a 12-VDC AC adapter can be used.
When connected to the following instruments, power can be supplied to both instruments by plugging the AC adapter into either the weighing instrument or the AD-8923-BCD.
(Both instruments can have their AC adapter connected at the same time.)

Compatible models: AD-4212C/D/F, FZ, FX, GX-A, GF-A, GX-M, GF-M, GX-L, GF-L, HR-AZ, HR-A

When the external 24-VDC power supply is used

Connect an external 24-VDC power supply to the DC input terminal located on the rear of the AD-8923-BCD.

Precautions on using the external power supply

⚠ CAUTION

● Use a power supply within the rated voltage range (24 VDC±10%).
  Never use a power supply with a voltage exceeding the rated range.
  • It may cause damage or heat buildup.
  • The AD-8923-BCD may not function properly.
● Ground the FG terminal of the switching power supply used.
  • To avoid electrical shock and increase the system safety.
  • To increase the resistance against noises.

● Do not share the power line with other devices.
  • Strong noises introduced from other devices may cause damage to the AD-8923-BCD.
  • Inrush current from other devices may cause the AD-8923-BCD not to start up properly.
  • Circuit configuration of the AD-8923-BCD may affect other devices to prevent them from functioning properly.
● Select a switching power supply with a capacity of approximately 700mA for each AD-8923-BCD.
  Note that the AD-8923-BCD may not start up with a capacity less than 700mA.
  • If the power supply capacity is not sufficient, the AD-8923-BCD may not function properly.
● Be sure to add a noise filter on the front end of the switching power supply and ground the FG terminal.
  • This will increase the resistance against noises.
● Be sure to ground the FG terminal of the AD-8923-BCD and weighing instruments.
  • This will increase the resistance against noises.

Cable connection

⚠️ **CAUTION**

Before inserting the power line, make sure that the power to the AD-8923-BCD is turned off.

(1) Inserting the power line
Press down the release button on the DC input terminal using a screwdriver and insert the power line.
The recommended stripping length for the power line is 10 mm.

DC input terminal

AD-8923-BCD rear

Power line

Release button

Screwdriver
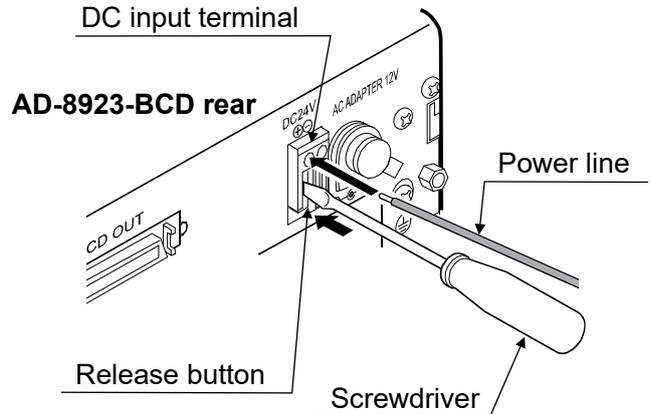
Applicable wire range
• Single wire: ϕ1.0 mm (AWG 26) to ϕ1.2 mm (AWG 16)
• Twisted wire: 0.3 mm^2 (AWG 22) to 0.75 mm^2 (AWG 20)
                Individual wire diameter ϕ0.18 mm or greater

(2) Securing or removing the power line
To secure the power line, return the release button to the initial position using the screwdriver. The power line will be locked. To remove the power line, press the release button again using the screwdriver, unlocking the power line.

When the AC adapter is used

Insert the AC adapter plug into the AC adapter input jack located on the rear of the AD-8923-BCD and insert the AC adapter into an electrical outlet.

AC adapter input jack

DC input terminal

AC adapter plug
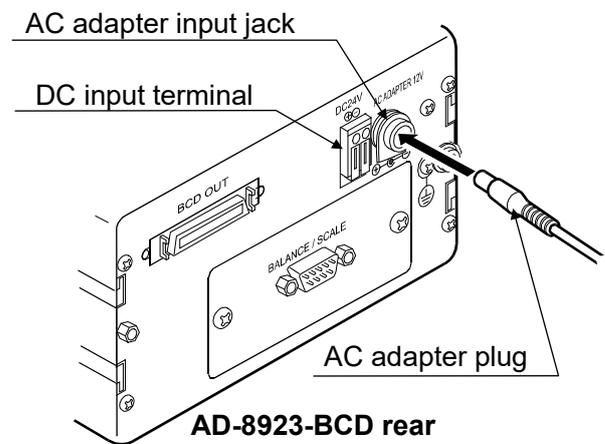
AD-8923-BCD rear

3.4.　Operation

- Displays the data transmitted by the weighing instrument connected.
- The keys on the AD-8923-BCD can control the weighing instrument. The key operation depends on the weighing instrument connected. For details, refer to "Table 2" of "8.1. Applicable Instruments".

3.5.　Performing Sensitivity Adjustment with the AD-4212C / F

The following is the sensitivity adjustment procedure when the AD-4212C/F is connected.
(An external weight is used.)

Caution

- Do not allow vibration, drafts or temperature change to affect the AD-4212C during sensitivity adjustment.

Caution on using an external weight

- The accuracy of the weight can influence the accuracy of weighing.
  Select an appropriate weight as listed below.
  A weight of 200 g is provided with the AD-4212C as a standard accessory.

Weighing instrument	Usable weight
AD-4212C-300 AD-4212C-301	50g, 100g, **200 g**, 300g
AD-4212C-600	50g, 100g, **200 g**, 300g, 400 g, 500 g, 600 g
AD-4212C-3000 AD-4212C-3100	50g, 100g, **200 g**, 300g, 500 g, 1000 g, 2000g, 3000g
AD-4212C-6000	**200 g**, 500 g, 1000 g, 2000g, 3000g, 4000 g, 5000 g, 6000 g
AD-4212F-6203D	50 g, 100g, 200 g, 300 g, 500 g, 1000 g, **2000 g**, 3000 g, 4000 g,5000 g, 6000 g
AD-4212F-10202	500 g, 1000 g, 2000 g, 3000 g, 4000 g, **5000 g**, 6000 g ,7000 g, 8000 g, 9000 g, 10000 g
AD-4212F-22001	1000 g, 2000 g, 5000 g, **10000 g**, 20000 g

**The weight in bold type: Factory setting**

Display

- This indicator means "the AD-4212C is measuring sensitivity adjustment data". Do not allow vibration, drafts or other external disturbances to affect the AD-4212C while this indicator is displayed.

Sensitivity adjustment procedure

Performs sensitivity adjustment with the AD-4212C using the external weight.

Operation

1. Warm up the AD-4212C for 30 minutes or more
   with nothing on the pan.

2. Press the CAL key. [CAL 0] is displayed.

   - If you want to cancel sensitivity adjustment, press the CAL key.
     The display will return to the weighing mode.

   - If you want to change the weight value, press the SAMPLE key.
     Press the RE-ZERO key to select the weight value, and press
     the PRINT key to store it. [CAL 0] is displayed.

3. Confirm that there is nothing on the pan and press
   the PRINT key. The AD-4212C measures the zero point.
   Do not allow vibration or drafts to affect the AD-4212C.
   The weight value is displayed.

4. Place a weight, of the weight value displayed, on the pan
   and press the PRINT key.
   The AD-4212C measures the weight.
   Do not allow vibration or drafts to affect the AD-4212C.

5. [End] is displayed. Remove the weight from the pan.

6. The display will automatically return to the weighing mode.

7. Place the weight on the pan and confirm that adjustment
   was performed correctly. If not, check the ambient conditions
   such as drafts or vibration, and repeat steps 2 through 7.
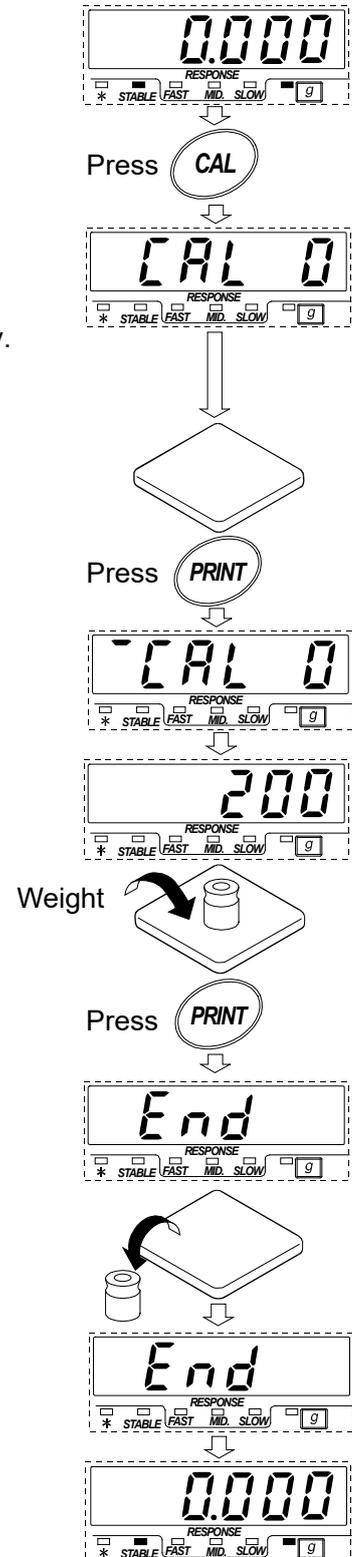
4. FUNCTION SETTING

Function setting specifies the AD-8923-BCD performance. The parameters are stored in non-volatile memory, and are maintained even if the power line or AC adapter is removed.

The function setting menu consists of two layers. The first layer is the "Class" and the second layer is the "Item". Each item stores a parameter.

Press the ⌈ SAMPLE ⌉ key to select an item and press the ⌈ RE-ZERO ⌉ key to change the parameter. Then, press the ⌈ PRINT ⌉ key to store the new parameter.

Example

This example sets "Baud rate" to "9600 bps".
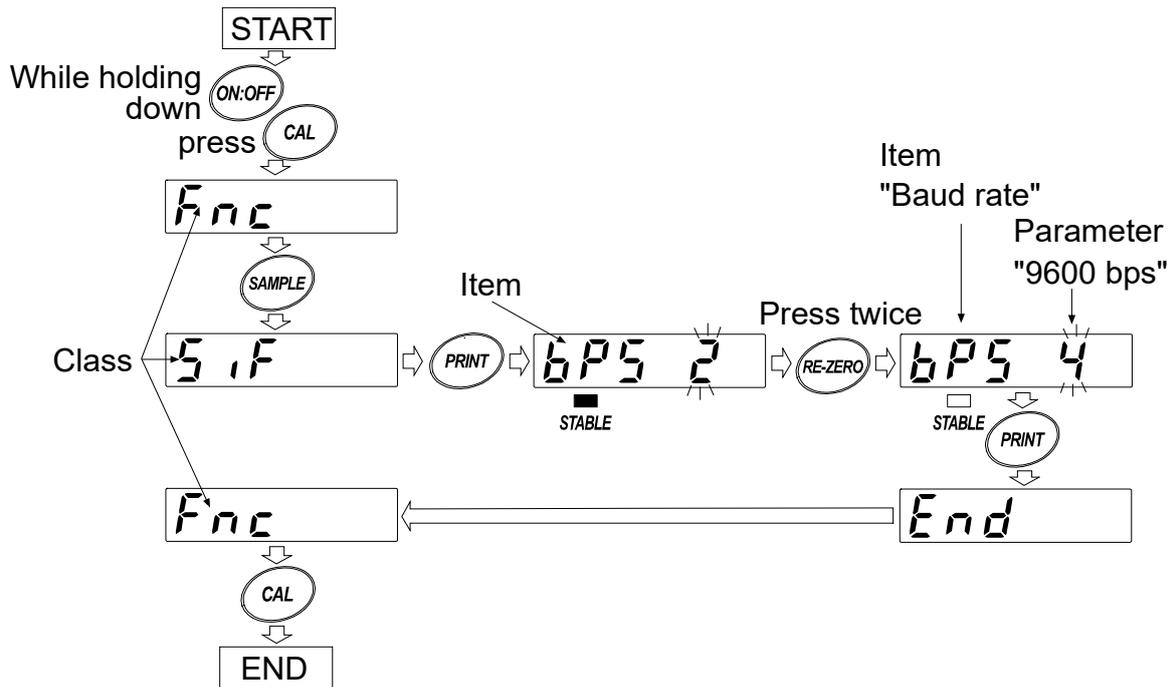
Note

☐ **The AD-8923-BCD may not function properly, depending on the settings and operating environment. Check the settings and change them as necessary.**

4.1. Display and keys
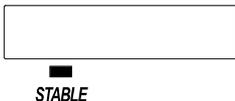
STABLE	The STABLE indicator turns on to indicate that the parameter displayed is in effect.
(SAMPLE)	Selects a class or item.
(RE-ZERO)	Changes the parameter.
(PRINT)	When a class is displayed, moves to an item in the class. When an item is displayed, stores the new parameter and displays the next class.
(CAL)	When an item is displayed, cancels the new parameter and displays the next class. When a class is displayed, exits the function setting mode and returns to the weighing mode.

4.2. Function table

| Class	Item and Parameter			Description
Fnc Environment Display	*dPP* Decimal point position	▪ –	Not fixed	Displays the decimal point position of the weight data received.
		0 to *5*	Fixed	Fixes the decimal point at the set digit. Even if the minimum display is switched using the SAMPLE key, the decimal point position does not change. For details, refer to "6.2. Fixing of the Decimal Point Position".
	SAPL Sample key function	*0*	Disabled	Disables the SAMPLE key function.
		▪ *1*	Enabled	Enables the SAMPLE key function.
SiF Serial interface	*bPS* Baud rate	*0*	600 bps	Set the same value as that of the weighing instrument to be connected.
		1	1200 bps	
		▪ *2*	2400 bps	
		3	4800 bps	
		4	9600 bps	
		5	19200 bps	

▪ Factory setting

4.3. Initializing the AD-8923-BCD

Initialization restores the function settings of the AD-8923-BCD to factory settings.

Operation

1. Turn the power on. ` - - - - - - ` or weighing mode display appears.

2. While holding down the ON:OFF key, press the PRINT key. `[Lr` is displayed.

3. Press the PRINT key.
   To cancel this operation, press the CAL key.

4. Press the RE-ZERO key to select "`Go`".

5. Press the PRINT key to perform initialization.
   After initialization, ` - - - - - - ` or weighing mode display appears.

While holding down ON:OFF

Press PRINT

`[Lr`

Press PRINT

`[Lrno`

Press RE-ZERO

`[LrGo`

Press PRINT

`[LrGo`

` - - - - - - `
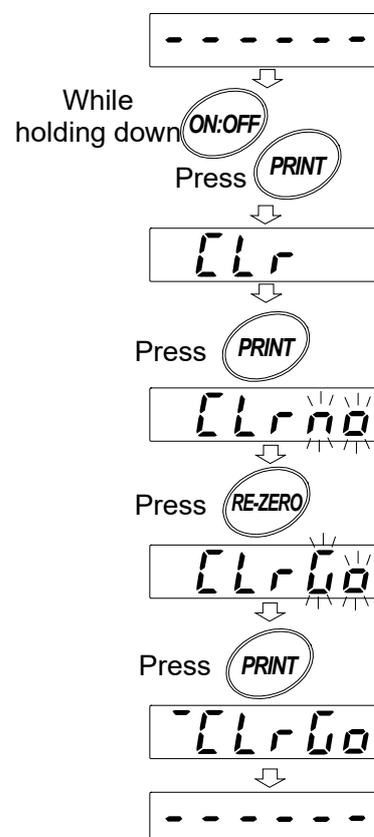
5. RS-232C CONNECTOR

5.1. RS-232C serial interface specifications

RS-232C

Transmission system : EIA RS-232C

Transmission form : Asynchronous, bi-directional, half duplex

Data format : Baud rate : 600, 1200, 2400, 4800, 9600, 19200 bps

Data bits : 7 or 8 bits

Parity : EVEN, ODD (Data bits 7 bits)

NONE (Data bits 8 bits)

Stop bits : 1 bit or 2 bits

Code : ASCII

Terminator : <CR> or <CR><LF>

RS-232C
1 -5V to -15V
0 +5V to +15V

Data bits
Start bit
Stop bit
Parity bit

Circuit

AD-8923-CC interior

To the weighing instrument

Inch screw (#4-40UNC)
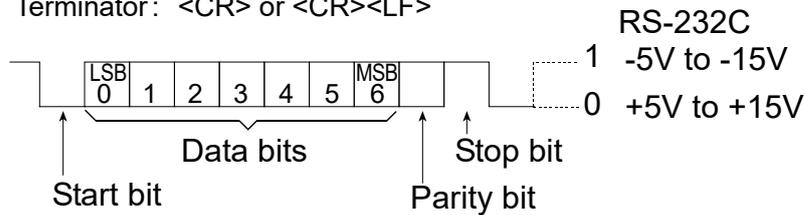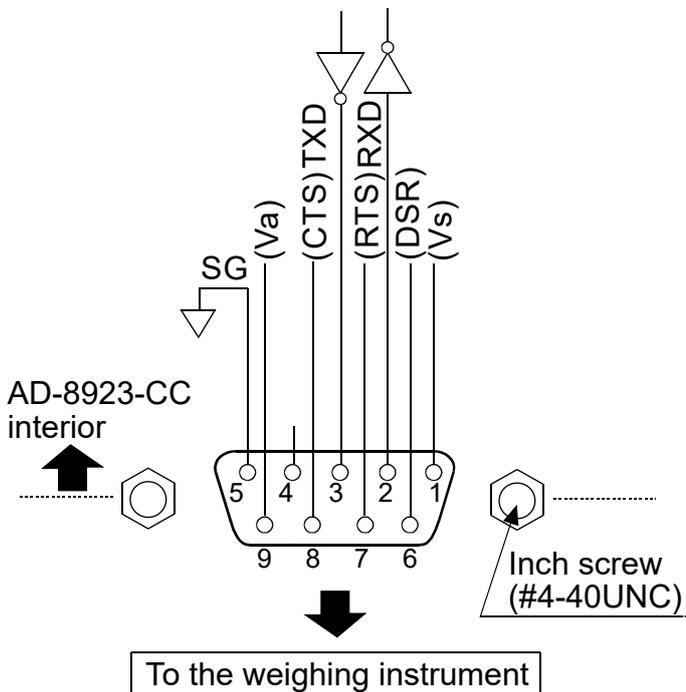
Connection to the weighing instrument
D-Sub 9-pin male

Pin No.	Signal name	Direction	Description
1	(Vs)	–	Used internally
2	RXD	Input	Receive data
3	TXD	Output	Transmit data
4	–	–	N.C.
5	SG	–	Signal ground
6	(DSR)	Input	Used internally
7	(RTS)	Output	Used internally
8	(CTS)	Input	Used internally
9	(Va)	–	Used internally

(The AD-8923-BCD is a DTE device. Connect to a DCE device such as the weighing instruments, using a straight through cable.)

Note

□ **When the user prepares a cable, do not connect to the pins that are used internally.**

6. BCD OUTPUT CONNECTOR

Outputs the weighing data received from the weighing instrument in BCD format, along with the polarity (+/-) and the data status (stable/unstable and over (E display)).

Using the STROBE signal, the data can be read easily. BUSY input enables the data to be held or prevents data refreshing during the reading operation.

Contact inputs are RE-ZERO and ON/OFF. They have same function as the key switches on the front panel.

6.1. Connector Pin No and Specifications

I/O connector of the rear panel

25 ———— 1
50 ———— 26
Half pitch 50 pin

Pin assignments and I/O logic

Output pin assignments			
Pin No.	Signal		
26	1	10^0	
27	2		
28	4		
29	8		
39	1	10^1	
40	2		
41	4		
42	8		
12	1	10^2	
13	2		
14	4		
15	8		
16	1	10^3	
17	2		
18	4		
19	8		
20	1	10^4	Data
21	2		
22	4		
23	8		
46	1	10^5	
47	2		
48	4		
49	8		
24	1	10^6	
25	2		
30	4		
31	8		
32	1	10^7	
33	2		
34	4		
35	8		
50	Polarity		Status
45	Stability		
44	Over		
43	Strobe		Controlling signals
1	Output signal GND		
Housing	Frame ground		

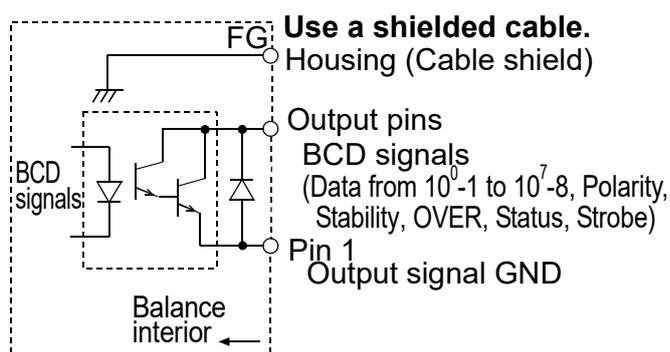| Input pin assignments		
Pin No.	Signal	
7	BUSY	
9	RE-ZERO	Switch
5	ON/OFF	
3	Input signal GND	
11	Do not use	

- The pins, which are not specified, have no connection. (2, 4, 6, 8, 10, 36, 38 pin)

Output logic

Output logic (Factory settings)		
Data	1	ON
Polarity	Positive or zero	ON
Stability	Stabilization indicator ON	ON
Over	E, -E	ON
Strobe	Changing data	ON*

* When changing OFF → ON, replaces the data.

- All output, open collector; withstand voltage 30 V; no pull-up resistor; low-level output current 10 mA

Use a shielded cable.

FG Housing (Cable shield)

Output pins
BCD signals
(Data from 10^0-1 to 10^7-8, Polarity, Stability, OVER, Status, Strobe)

Pin 1
Output signal GND

BCD signals

Balance interior

Input logic

BUSY	Data will be held during ON (when connected to input signal GND).
Switch input	Switch will be performed with ON (when connected to input signal GND).

- All input, no voltage contact or open collector (connected to 5 V internally)

16
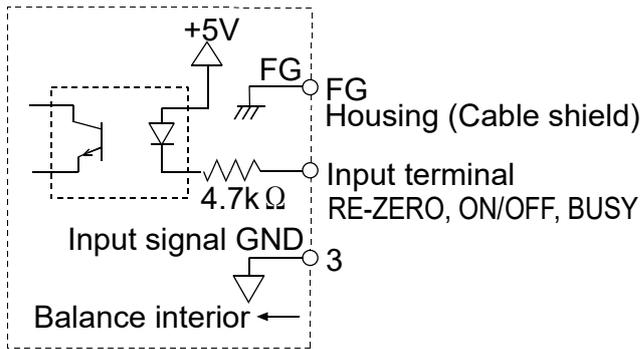
(1) When a switch is used

5, 9, 7 pin

Input signal GND

(2) When a photocoupler is used

5, 9, 7 pin

Input signal GND

(Upon switch-ON, make the voltage between the input terminal and the input signal GND terminal 0.2V or less)

Plug (Provided)

Part name	Product number	Manufacturer
Over mold cover	DX30M-50-CV	Hirose Electric
Plug unit (Soldered type)	DX40M-50P	

Note: The products above are subject to be replaced with the equivalent.

Cable

Wire size	AWG #28
Core configuration	7/0.127
O.D. of insulator	0.58

Note: Use a shielded cable. Connect the shield to the connector case.

I/O timing chart
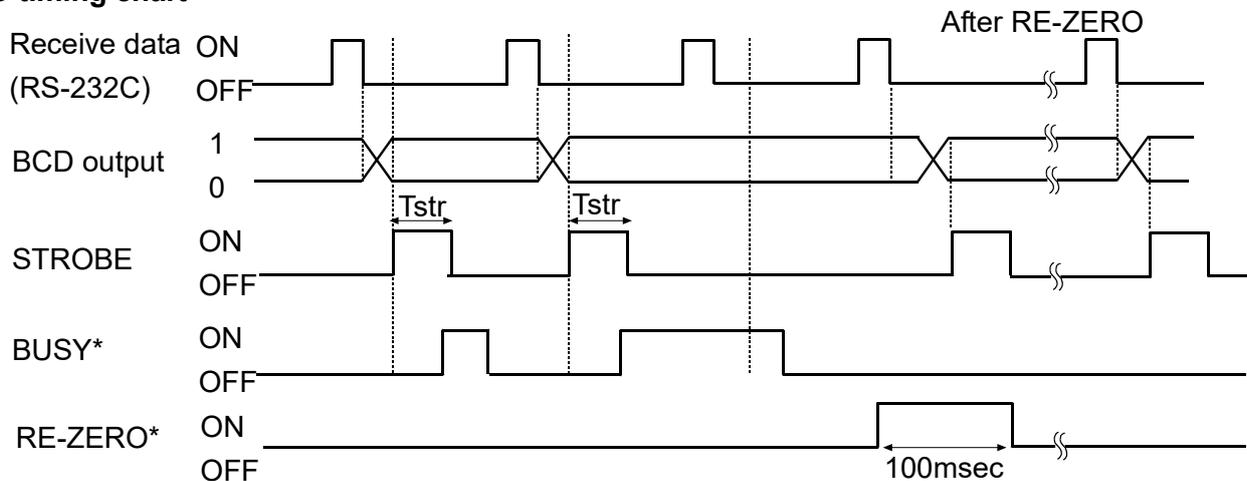
The factory setting of Tstr (Strobe pulse width) is approx. 10 msec. The BCD data should be acquired approximately 5 msec after the strobe changes from ON to OFF.

  * - "All input pins ON", is the condition, where all input signals are connected to GND (Pin 3).

    - When inputting RE-ZERO for 100 msec, the weighing instrument maintains the re-zero state.

Flow chart for inputting data

When inputting BCD data, follow the flow chart listed below.

```
                    ┌──────────────────┐
                    │ START            │
                    └────────┬─────────┘
        ┌────────────────────▼
        │              ◇ Strobe    change
        └──────────────◇ from ON to OFF  ◇
                         ◇              ◇
                          ▼
                    ┌──────────────────┐
                    │ 5msec  after     │
                    └────────┬─────────┘
                             ▼
                    ┌──────────────────┐
                    │ Input BCD data   │
                    └────────┬─────────┘
                             ▼
                    ┌──────────────────┐
                    │ END              │
                    └──────────────────┘
```
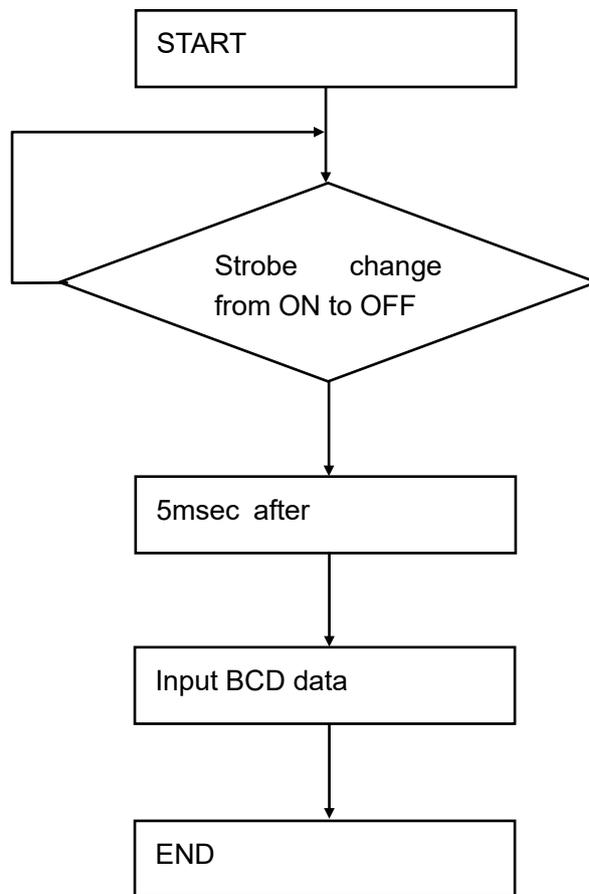
6.2. Fixing of the Decimal Point Position

The AD-8923-BCD can set the display digit and the BCD output digit by setting dPP of the function. When fixing the decimal point position, the BCD output digit does not change if changing the minimum display digit by pressing the ⎡SAMPLE⎤ key.

Example 1) When not fixing the decimal point position. (dPP -)
[Factory setting]

Key	Balance output	AD-8923-BCD display	BCD output
SAMPLE	S T , + 0 0 1 2 3 . 4 6 ␣ ␣ g C_R L_F	*123.46*	00012346
	S T , + 0 1 2 3 . 4 5 6 ␣ ␣ g C_R L_F	*123.456*	00123456

Note

- ␣ **: space 20h**
- **When changing the minimum display digit by pressing** ⎡SAMPLE⎤ **key, the BCD shifts the output left and adds the last digit.**

Example 2) When fixing the decimal point at the third digit position. (dPP ∃)

Key	Balance output	AD-8923-BCD display	BCD output
SAMPLE	S T , + 0 0 1 2 3 . 4 6 ␣ ␣ g C_R L_F	*123.46*	00123460
	S T , + 0 1 2 3 . 4 5 6 ␣ ␣ g C_R L_F	*123.456*	00123456

Note

- ␣ **: space 20h**
- **When changing the minimum display digit by pressing the** ⎡SAMPLE⎤ **key, the BCD output does not change the number of digits.**
- **If the balance outputs RS-232C weighing data that exceeds six digits, the AD-8923-BCD does not display the high-end digits. (The BCD data is output.)**

7. TROUBLESHOOTING

Symptom	Description
$Error\ 10$ appears.	Communication settings of the AD-8923-BCD do not match with those of the weighing instrument. Check the settings such as baud rate and parity and correct them as necessary. For details, refer to "3.1. Setting the weighing instrument and the AD-8923-BCD".
------ (Bar display) remains and the weight value is not displayed.	• Is the data output mode of the weighing instrument set to "stream mode"? In a mode other than "stream mode", the weight values are displayed only when they are transmitted. • Check if the communication settings are correct. • Check if the cables are the correct type and are not damaged.
The display flickers.	Electrical noise may cause this symptom. Ground the FG terminal located on the rear of the AD-8923-BCD.

8. SPECIFICATIONS

Power supply   : External 24-VDC power supply (24 VDC±10% / 700mA)
                                        or
                                        AC adapter (Output: 12 VDC / 1A)
                                        Please confirm that the AC adapter type is correct for your local voltage and receptacle type.

Transmission system   : RS-232C, BCD

Communications connector : D-Sub 9-pin (male) (RS-232C connector to the weighing instrument)
                                        Half pitch 50-pin (female) (BCD connector)

External dimensions   : 144 (W) X 110 (D) X 72 (H) mm

Net weight   : Approx. 620 g

Operating environment   : 5 ºC to 40 ºC (41 ºF to 104 ºF), 85%RH or less (No condensation)

Standard accessories   : BCD plug   1 pc.

8.1. Applicable Instruments

The AD-8923-BCD functions in two ways as follows, depending on the weighing instrument used:
- A remote controller that displays the weighing data and remotely controls the weighing instrument.
- A remote display that displays the weighing data.

Available key operations depend on the weighing instrument used. (Refer to "Table 2")

Table 1   Applicable weighing instruments and what is required

Weighing instrument	What is required to connect to a weighing instrument	
	Option for the instrument	Communications cable (Length 2 m)
AD-4212C, AD-4212D	None (D-Sub 9-pin)	None (Use the cable provided for the AD-4212C/D) *1
AD-4212F	None (D-Sub 9-pin)	AX-KO3590-XXX *2
AD-4212A/B, GX, GF, GX-K, GF-K, GP, GR, MC	None (D-Sub 25-pin)	AX-KO1710-200
GX-A, GF-A, GX-M, GF-M, GX-L, GF-L, FZ, FX, EK-i, EW-i, EK-L, BM, GH, HR-i, HR-AZ, HR-A	None (D-Sub 9-pin)	AX-KO2741-180
EJ, HV-C, HV-CP, HW-C, HW-CP	OP-03 (D-Sub 9-pin)	AX-KO2741-180
HV-G, HV-WP, HW-G, HW-WP	None (DIN 8-pin)	AX-KO1786-200
FG-L, FG-M	OP-23 (DIN 8-pin)	AX-KO1786-200
FS-i, SC, SE, SW	OP-03 (Discrete wire)	AX-KO3285-320

*1: - When connecting to the AD-4212C/D, use the cable provided as a standard accessory
     for the AD-4212C/D.
  - The part number for standard accessory cable for the AD-4212C is AX-KO3590-1000 (10 m).
  - The part number for standard accessory cable for the AD-4212D is AX-KO3590-200 (2 m).
*2: For "XXX", choose from 200 (2 m), 500 (5 m), or 1000 (10 m).

Table 2   Applicable weighing instruments and key operations

Weighing instrument	AD-8923-BCD key					
	ON:OFF	CAL	SAMPLE	PRINT	MODE	RE-ZERO
AD-4212C, AD-4212F	Turns the weighing instrument display on or off. *1	Performs sensitivity adjustment using the external weight. *4	Switches the minimum display. *2	When setting, decide the operation.	Switches the response characteristic.	Sets the display to zero.
AD-4212D		Performs sensitivity adjustment using the internal weight.			Switches the unit displayed. *3	
GX, GX-A, GX-M, GX-L, GX-K, GP, GH, FZ, MC, BM, HR-AZ						
GR						
GF, GF-A, GF-M, GF-L, GF-K, AD4212A/B, HR-i, FX, HR-A		—				
EJ, EK-i, EW-i, EK-L, FG-L, FG-M, FS-i, SW, HV-G, HV-WP, HW-G, HW-WP, HV-C, HV-CP, HW-C, HW-CP	*5					

Note: "—" in the table indicates that the key operation is not available.

*1 : Switching the standby or weighing mode is available for the AD-4212C/D/F.
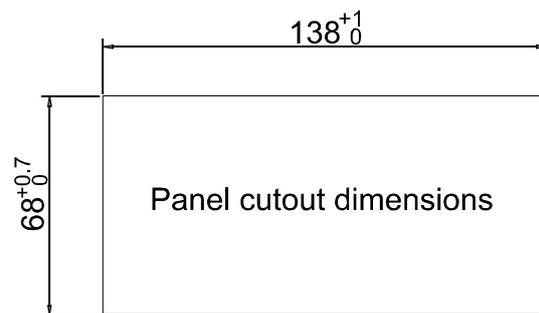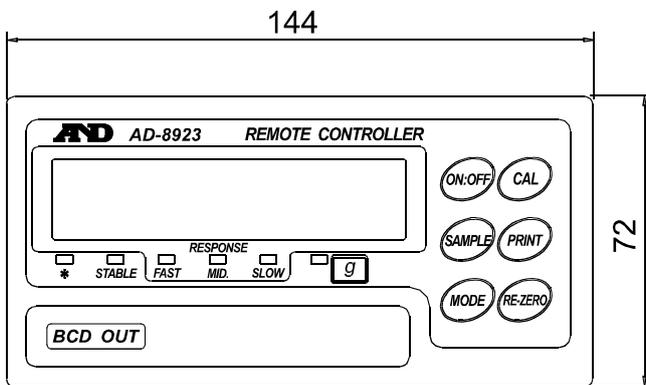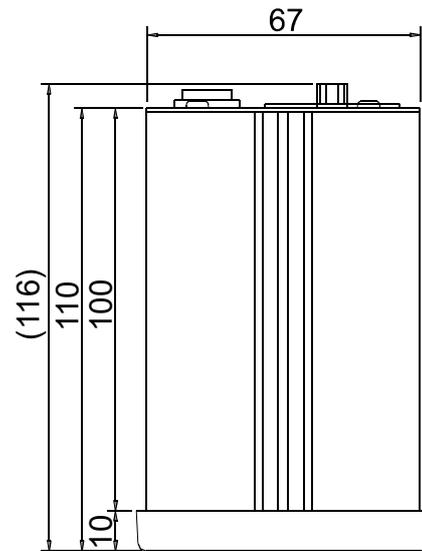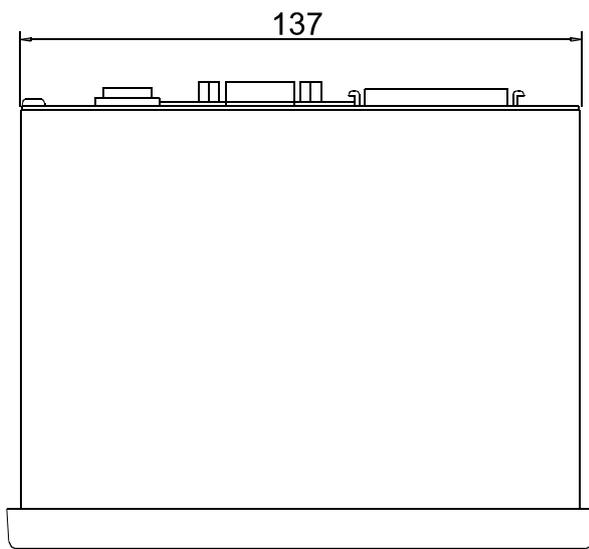
*2 : Not available for the counting mode or percent mode.

*3 : Not available for the AD-4212A/B.

*4 : For weighing instruments other than AD-4212C/D/F, the AD-8923-BCD displays "------".
   Use the display on the balance.

*5 : Do not operate by using the key on the AD-8923-BCD.

9. EXTERNAL DIMENSIONS

137

67

(116)
110
100
10

144

AND AD-8923   REMOTE CONTROLLER

ON:OFF   CAL

SAMPLE   PRINT

RESPONSE
* STABLE FAST MID. SLOW   g

MODE   RE-ZERO

BCD OUT

72

138^{+1}_{0}

$68^{+0.7}_{0}$

Panel cutout dimensions

Panel cutout dimensions when panel mounted

Unit: mm

MEMO

MEMO

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A&D Company, Limited

3-23-14 Higashi-Ikebukuro, Toshima-ku, Tokyo   170-0013,   JAPAN
Telephone: [81] (3) 5391-6132   Fax: [81] (3) 5391-1566

A&D ENGINEERING, INC.

47747 Warm Springs Blvd, Fremont, California   94539,   U.S.A.
Tel: [1] (800) 726-3364   Weighing Support:[1] (888) 726-5931   Inspection Support:[1] (855) 332-8815

A&D INSTRUMENTS LIMITED

Unit 24/26 Blacklands Way, Abingdon Business Park, Abingdon, Oxfordshire   OX14 1DY   United Kingdom
Telephone: [44] (1235) 550420   Fax: [44] (1235) 550485

A&D AUSTRALASIA PTY LTD

32 Dew Street, Thebarton, South Australia   5031,   AUSTRALIA
Telephone: [61] (8) 8301-8100   Fax: [61] (8) 8352-7409

A&D KOREA Limited   한국에이.엔.디(주)

서울특별시 영등포구 국제금융로6길33 (여의도동) 맨하탄빌딩 817   우편 번호 07331
(817, Manhattan Bldg., 33. Gukjegeumyung-ro 6-gil, Yeongdeungpo-gu, Seoul,   07331   Korea)
전화: [82] (2) 780-4101   팩스: [82] (2) 782-4264

OOO A&D RUS   ООО "ЭЙ энд ДИ РУС"

Почтовый адрес:121357, Российская Федерация, г.Москва, ул. Верейская, дом 17
Юридический адрес: 117545, Российская Федерация, г. Москва, ул. Дорожная, д.3, корп.6, комн. 8б
(121357, Russian Federation, Moscow, Vereyskaya Street 17)
тел.: [7] (495) 937-33-44   факс: [7] (495) 937-55-66

A&D Instruments India Private Limited   ऐ&डी इन्स्ट्रूमेन्ट्स इण्डिया प्रा0 लिमिटेड

D-48, उद्योग विहार , फेस –5, गुड़गांव – 122016, हरियाणा , भारत
(D-48, Udyog Vihar, Phase–Ⅴ, Gurgaon – 122016, Haryana, India)
फोन : [91] (124) 4715555   फैक्स : [91] (124) 4715599

A&D SCIENTECH TAIWAN LIMITED.   **A&D台灣分公司 艾安得股份有限公司**

台湾台北市中正區青島東路5號4樓
(4F No.5 Ching Tao East Road, Taipei Taiwan R.O.C.)
Tel : [886](02) 2322-4722   Fax : [886](02) 2392-1794

A&D INSTRUMENTS (THAILAND) LIMITED   บริษัท เอ แอนด์ ดี อินสทรูเม้นท์ (ไทยแลนด์) จำกัด

168/16 หมู่ที่ 1 ตำบลรังสิต อำเภอธัญบุรี จังหวัดปทุมธานี 12110 ประเทศไทย
(168/16 Moo 1, Rangsit, Thanyaburi, Pathumthani 12110 Thailand)
Tel : [66] 20038911