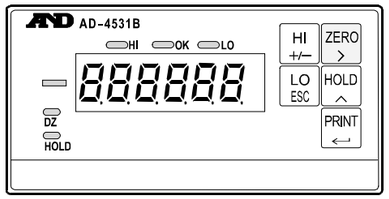
AD-4531B

Digital Indicator

Simplified Instruction Manual



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

This is a simplified instruction manual. For a detailed instruction manual, visit the A&D website.
URL: http://www.aandd.jp/

A&D Company, Limited

1WMPD4002617A

1. BEFORE USE

The AD-4531B digital indicator is a precision instrument. Unpack the digital indicator carefully and confirm that all items are present.

1.1. Precautions Before Use

- The AD-4531B is a precision instrument. Handle it with much care.
- Avoid water and moisture.
- Avoid vibration, shock, extremely high temperature and humidity, direct sunlight, dust and air containing salt or sulfurous gases.
- Avoid places where inflammable gases or vapors are present.
- The operating temperature range is –10 °C to +40 °C.
- A 100 VAC to 240 VAC power source is required. Use a stable power supply free from sudden dropout or noise as they can cause malfunctions. Avoid sharing the power line.
- Keep cables away from power cables and other sources of electrical noise.
- Connect only a non-inductive load of 10 kΩ or more to the analog voltage output terminals.
- Connect only a non-inductive load of 510 Ω or less to the analog current output terminals.
- When connecting long cables to the sensors, keep the cables away from power cables and other sources of electrical noise
- Do not connect the AD-4531B to the power supply before installation is completed. The AD-4531B has no switch to turn the power off.
- Use shielded load cell cables.
- Do not connect too many sensors. Otherwise, instrument damage may occur.

1.2. Precautions During Use

- The AD-4531B is a precision instrument that measures the microvolt output from sensors. Prevent noise sources such as power lines, radios, electric welders or motors from affecting the instrument.
- Do not try to modify the AD-4531B.
- In all hold modes, the hold data is saved digitally, so there is no drooping of the value displayed on the display panel or the analog output. Note that the hold function is disabled when the AD-4531B is disconnected from the power supply.

⚠WARNING

Disconnect from the power supply before removing the cover.
- When removing the cover, make sure that the power is disconnected.

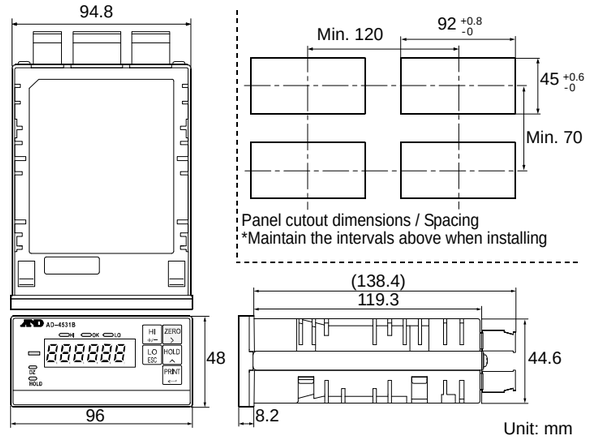
⚠WARNING

Do not touch the instrument immediately after it is disconnected from the power supply.
- To avoid electrical shock, do not touch the internal part of the instrument within ten seconds after disconnecting from the power supply.

⚠CAUTION

Be sure to fasten all the screws completely.
- Loose screws may come off during operation and a short circuit may occur or measurement errors may occur due to noise.

2. EXTERNAL DIMENSIONS



3. GENERAL SPECIFICATIONS

Voltage requirement:	100 VAC to 240 VAC (50/60 Hz)
Power requirement:	Approx. 10 VA
Sensor power supply	5 volt, 120 Ω, one sensor maximum 5 volt, 350 Ω, three sensors maximum
Operating temperature:	-10 °C to +40 °C
Operating humidity:	Max. 85% RH (no condensation)
External dimensions:	96 x 48 x 127.5 mm (W x H x D)
Panel cutout:	92 x 45 mm
Spacing:	Width: 120 mm or more Length: 70 mm or more
Weight:	Approx. 290 g

4. OPTIONS

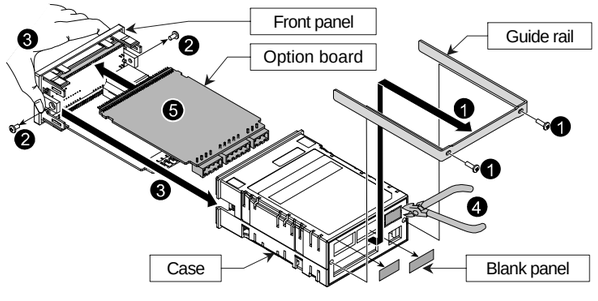
4.1. Options

AD-4530-200:	Relay output
AD-4530-030:	RS-485
AD-4530-040:	RS-232C
AD-4530-007:	Analog output
AD-4530-237:	Relay output, RS-485, analog output
AD-4530-247:	Relay output, RS-232C, analog output

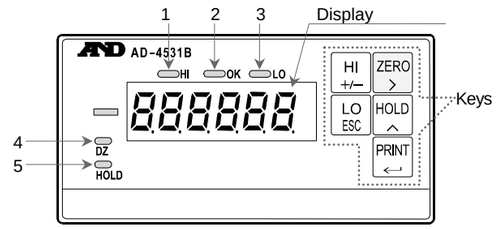
Note: Only one option can be installed in the AD-4531B at a time.

4.2. Installing an Option

1. Remove the two screws that secure the guide rail, and then remove the guide rail.
2. Remove the two screws that secure the case.
   Pull the case out of the front panel (holding it as shown).
4. Remove unnecessary blank panels with nippers, etc.
5. Insert the option board at the position specified on the rear of the front panel.
6. Reattach the case and guide rail by reversing the steps above.



5. FRONT PANEL



5.1. Display

Displays a measured or set value. To set the decimal point position, use the function mode *CF-01*. The display is composed of six seven-segment LEDs plus a minus sign.

5.2. Status Indicators

	Name	Description
1	**HI**	Turns on when the measured value is greater than the upper limit (HI).
2	**OK**	Turns on when the measured value is equal to or greater than the lower limit and equal to or less than the upper limit.
3	**LO**	Turns on when the measured value is less than the lower limit (LO).
4	**DZ**	Turns on when adjusting the zero value. (Digital zero)
5	**HOLD**	Turns on when a value is being held.

5.3. Keys

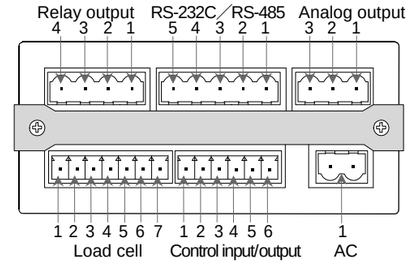
Operation	Function
HI +/–	Press to proceed to the upper limit value setting mode. When inputting a numerical value, press to change the polarity.
LO ESC	Press to proceed to the lower limit value setting mode. When inputting a numerical value, press to cancel the setting.
ZERO >	Press to turn the digital zero function on. When inputting a numerical value, press to shift the position of the blinking digit to the right or change the function group.
HI +/– + ZERO >	Press to turn the digital zero function off.
HOLD ^	Press to turn the hold function on or off. When inputting a numerical value, press to change the blinking digit or change the function parameter.
PRINT ↵	Press to output the serial data (print). When inputting a numerical value, press to enter the setting.
HI +/– + PRINT ↵	Press to proceed to the calibration mode.
LO ESC + PRINT ↵	Press to proceed to the function selection mode.
HI +/– + LO ESC + PRINT ↵	Press to proceed to the selection mode in the check mode.

* The digital zero function sets a desired measurement point as zero and displays the deviation from this zero point. When weighing a load, it can be used as the tare, etc.
* The zero value is saved in non-volatile memory (EEPROM) and is maintained even if the power is disconnected.
* To change the zero adjustment operation, use the function *CF-11*.
To protect against accidental operation, press HI +/– + ZERO > or press and hold ZERO > for more than 1 second to turn the digital zero on.

5.4. Operation Mode

- Upper / lower limit setting mode
  Use this mode to set the upper and lower limit of the comparator.
- Calibration mode
  Use this mode to perform zero and span calibration with an actual load (calibration weight).
- Function mode
  Use this mode to set functions.
- Check mode
  Use this mode to confirm input and output operation.

6. REAR PANEL



⚠CAUTION

Confirm the terminal numbers when making connections.
- When making connections, confirm the terminal numbers printed on the top of the indicator case.

6.1. Connector Function

6.1.1. AC input connector
(1) AC Connect the AC power cord.
The power requirement is 100 VAC to 240 VAC, 50/60 Hz.

⚠CAUTION

When making connections:
- Switch off the power of all the instruments used.
- Keep cables away from power cables and other sources of electrical noise.

6.1.2. Load cell connector

(1) SHLD	Connect the shielded cable of the sensor cable
(2) SIG-	Negative signal input terminal for the sensors
(3) SIG+	Positive signal input terminal for the sensors
(4) EXC-	Negative excitation terminal for the sensors
(5) SEN-	Negative sensing input terminal for the sensors
(6) SEN+	Positive sensing input terminal for the sensors
(7) EXC+	Positive excitation terminal for the sensors

6.1.3. Control input/output connector

(1) EXT IN 1	Control input terminal 1
(2) EXT IN 2	Control input terminal 2
(3) IN COM	Control input common terminal
(4) EXT OUT 1	Control output terminal 1
(5) EXT OUT 2	Control output terminal 2
(6) OUT COM	Control output common terminal

6.1.4. Relay output connector (Option)

(1) COM	Relay output common terminal
(2) LO	Relay LO output terminal Outputs LO when the measured value is less than the lower limit.
(3) OK	Relay OK output terminal Outputs OK when the measured value is equal to or greater than the lower limit and equal to or less than the upper limit.
(4) HI	Relay HI output terminal Outputs HI when the measured value is greater than the upper limit.

⚠CAUTION

Comparator output
- To prevent damage, do not exceed the rated capacities of the output relays.
  To protect the output relays, use a varistor, CR circuits or diodes.

6.1.5. Serial communication connector (Option)
In the case of RS-232C

(1) IC	Internally connected (Do not use)
(2) IC	Internally connected (Do not use)
(3) SG	Signal ground terminal
(4) TxD	Sending terminal
(5) RxD	Receiving terminal

In the case of RS-485 (Two-wire connection)

(1) B	B terminal
(2) A	A terminal
(3) SG	Signal ground terminal
(4) B	B terminal
(5) A	A terminal

* Each of the A and B connections has two terminals.
These terminals are connected internally and can be used for a terminating resistor or multi-drop connection.

6.1.6. Analog output connector (Option)

(1) COM	Common terminal of the analog output
(2) IOUT	Analog current output terminal
(3) VOUT	Analog voltage output terminal

7. CALIBRATION

The AD-4531B measures voltage signals from sensors and displays the values. Calibration is performed so that the AD-4531B performs correctly.

The decimal point (CF-01), minimum division (CF-02) and rated capacity (CF-03) are set using the function mode.
The zero point input voltage (CF-04), the span input voltage (CF-05) and the displayed value for the span input voltage (CF-06) are adjusted using the calibration mode.
Calibration setting using the function mode is also available. (Digital span)

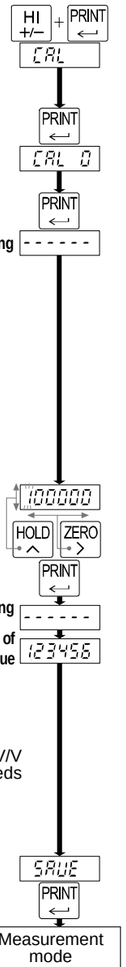
* During calibration, maintain a stable environment to prevent calibration errors.
* When the measured value is stable, the HOLD LED is turned on.
* The decimal point blinks to indicate that the current value is not a measured value.

7.1. Calibration Modes

In the measurement mode, press HI +/– + PRINT to enter the calibration mode.

PRINT — Enter the zero point calibration mode.

LO ESC — Return to the measurement mode.



7.1.1. Zero point calibration mode

With nothing on the load cell, wait for the HOLD LED to turn on and press PRINT.

PRINT — Perform zero point calibration and proceed to the span calibration mode.

LO ESC — Cancel zero point calibration and proceed to the span calibration mode.

HI +/– — Hold down to display the mV/V value of the zero point.

7.1.2. Span calibration mode

Input the value to be displayed when the actual load for span calibration is applied to the load cell.
Wait for the HOLD LED to turn on and press PRINT.

ZERO > — Select the digit to be changed.

HOLD ^ — Increase the value of the digit to be changed.

HI +/– — Change the polarity.

PRINT — Perform span calibration and proceed to the storing mode.

LO ESC — Cancel span calibration and proceed to the storing mode.

* After span calibration, the AD-4531B displays the mV/V value of span calibration for 3 seconds, and then proceeds to the storing mode.

7.1.3. Storing mode

Save the calibration zero, span and displayed value acquired.
When calibration is not performed, data is not saved.

PRINT — Save the data acquired and return to the measurement mode.

LO ESC — Do not save the data acquired and return to the measurement mode.

7.2. Calibration Errors

Display	Cause	Remedy
C E2	Voltage at zero point calibration exceeds in the positive direction.	Confirm the rating and connection of the load cell.
C E3	Voltage at zero point calibration exceeds in the negative direction.	
C E4	The value of the calibration weight exceeds the rated capacity.	Use a proper calibration weight.
C E5	The value of the calibration weight is less than the minimum division.	Use a proper calibration weight.
C E6	The load cell sensitivity is insufficient.	Confirm the load cell connection. Use a proper calibration weight.
C E7	Voltage at span calibration is less than the voltage at the zero point.	Confirm the load cell connection.
C E8	The load cell output voltage is too high when loaded to capacity.	Use a load cell with a greater rated capacity or set a smaller rated capacity value.

8. FUNCTION MODE

Use the function mode to set various functions. The set values are saved in non-volatile memory and are maintained even if the power is disconnected.

8.1. Description of Functions

The first 2 digits of the function No. are the function group. The last 2 digits of the Function No. are the function item.

CF — Calibration function
F0 — Basic function
F1 — Comparator function
Use this function to set the comparator operation.
F2 — Analog output function
Use this function to set the output values of the analog voltage output and analog current output.
F3, F4 — Serial communication function
Use this function to set the RS-232C and RS-485.

* Set the zero point input voltage (CF-04), the span input voltage (CF-05) and the displayed value for the span input voltage (CF-06) in the calibration mode.
* Set the upper limit value (F1-01) and lower limit value (F1-02) in the comparator mode.
* When setting a function, the decimal point blinks to indicate that the current value is not a measured value.
* In the digital filter setting mode (F0-02), press HI +/– to confirm the measured value.
  When the measured value is displayed, the OK LED blinks.
  Press ZERO > to set the display to zero. And press HI +/– to return to the measurement mode.

8.2. Key Operation

In the measurement mode, press LO ESC + PRINT to enter the function selection mode.

8.2.1. Function selection mode

ZERO > — Select the function group. (First 2 digits)

HOLD ^ — Select the function item. (Last 2 digits)

PRINT — Enter the setting changing mode.

LO ESC — Save the setting in non-volatile memory and then return to the measurement mode.

8.2.2. Setting changing mode (Two methods)

[P] Parameter selection method (All digits blinking)

HOLD ^ — Change the parameter.

PRINT — Enter the setting and return to the function selection mode.

LO ESC — Cancel the setting and return to the function selection mode.

[D] Digital input method (Change the blinking digit only)

ZERO > — Move the digit to be changed to the right.

HOLD ^ — Change the value of the blinking digit.

HI +/– — Change the polarity.

PRINT — Enter the setting and return to the function selection mode.

LO ESC — Cancel the setting and return to the function selection mode.

8.3. Function Items

8.3.1. Calibration (C function)

Function No. Setting range	Function	Description	Default value Setting type
CF-01 0 to 5	Decimal point position	Decimal point position of the measured value 0:000000 3:000.000 1:00000.0 4:00.0000 2:0000.00 5:0.00000	0 P
CF-02 1 to 50	Minimum division	Minimum division (d) of the measured value 1:1 10:10 2:2 20:20 5:5 50:50	1 P
CF-03 1 to 999999	Rated capacity	Measurement is possible up to the value of this setting plus 8 d (8 minimum divisions) Decimal point position depends on CF-01.	10000 D
CF-04 -7.00000 to 7.00000	Input voltage of zero point	Input voltage from the load cell at zero point (Unit: mV/V)	0.00000 D
CF-05 0.00001 to 9.99999	Input voltage of span	Input voltage from the load cell at span (measurement point - zero point) (Unit: mV/V)	3.20000 D
CF-06 -999999 to 999999	Displayed value for input voltage of span	Displayed value for span (measurement point - zero point) Decimal point position depends on CF-01.	32000 D
CF-07 0 to 100	Zero adjustment range	Range to enable zero adjustment by the ZERO key Expressed as a percentage of the rated capacity with the calibration zero point as the center.	100 D
CF-08 0.0 to 5.0	Zero tracking time	Performed in combination with zero tracking width. (Unit: second) When 0.0, zero tracking is not performed.	0.0 D
CF-09 0.0 to 9.9	Zero tracking width	Performed in combination with zero tracking time. (Unit: d) When 0.0, zero tracking is not performed.	0.0 D
CF-10 0 to 2	Power on zero	Digital zero when the power is connected 0: Digital zero function off 1: Perform digital zero 2: Use state when the power is disconnected	0 P
CF-11 1 to 3	Zero operation	1: On with ZERO > 2: On with HI +/– + ZERO > 3: On by pressing and holding ZERO > for more than 1 second * In all settings: When it is on, Off with HI +/– + ZERO >	1 P
CF-12 1 to 2	Zero of the I/O input	1: On / Off depends on the I/O input 2: Only digital zero on (no off)	1 P

8.3.2. Basic Functions

Function No. Setting range	Function	Description	Default value setting type
F0-01 00000 to 11111	Disable key	Each digit of the setting corresponds to a key switch. Only available in the measurement mode. Key assignment 0: Enabled 1: Disabled 0 0 0 0 0 — PRINT, HOLD ^, ZERO >, LO ESC, HI +/–	00000 (Binary) D
F0-02 0 to 9	Digital filter	Cutoff frequency 0: Off 5: 2.8 Hz 1: 11 Hz 6: 2 Hz 2: 8 Hz 7: 1.4 Hz 3: 5.6 8: 1 Hz 4: 4 Hz 9: 0.7 Hz	8 P
F0-03 1 to 20	Display update rate	1: 1 time/second 10: 10 times/second 2: 2 times/second 20: 20 times/second 5: 5 times/second	20 P
F0-04 0 to 4	Hold mode	0: Off 3: Bottom hold 1: Sample hold 4: Bipolar peak hold 2: Peak hold	1 P
F0-05 0.0 to 9.9	Hold averaging time	Set by the unit of 0.1 second. When 0.0, averaging is not performed.	0.0 D
F0-06 0000 to 1111	Latch function	Corresponds to an external input latch. Setting and latch assignment 0: Off 1: On 0 0 0 0 — Displayed value latch, Comparator latch, Analog output latch, Serial output latch	0000 (Binary) D
F0-07 0 to 6	External input 1	0: Off 4: Start hold 1: DZ key 5: Stop hold 2: Hold 6: Latch 3: Print	1 P
F0-08 0 to 6	External input 2		2 P
F0-09 0 to 9	External output 1	0: Off 5: OK 1: DZ key 6: Lo 2: Holding 7: Measuring (ON) 3: Hold busy 8: Measuring (1 Hz) 4: Hi 9: Measuring (50 Hz)	1 P
F0-10 0 to 9	External output 2		2 P

8.3.3. Comparator

Function No. Setting range	Function	Description	Default value setting type
F1-01 -999999 to 999999	Upper limit value	Upper limit value of comparator. Decimal point position depends on CF-01.	0 D
F1-02 -999999 to 999999	Lower limit value	Lower limit value of comparator. Decimal point position depends on CF-01.	0 D
F1-03 0 to 2	Comparator mode	0:Off 1:On excluding the zero band 2:Always on	2 P
F1-04 -999999 to 999999	Zero band	Set the zero band for the comparator mode.	0 D
F1-05 1 to 3	Hysteresis mode	Hysteresis direction 1:Upward 2-level judgment 2:Upper / lower limit judgment 3:Downward 2-level judgment	2 P
F1-06 0.0 to 5.0	Hysteresis time	Set the hysteresis time by the unit of 0.1 second. When 0.0, the hysteresis mode is not used.	0.0 D
F1-07 00 to 99	Hysteresis width	Set the hysteresis width by the unit of d. When 0.0, the hysteresis mode is not used.	99 D

8.3.4. Analog

Function No. Setting range	Function	Description	Default value setting type
F2-01 -999999 to 999999	0 V output	Measured value at DAV 0V output. Decimal point position depends on CF-01.	0 D
F2-02 -999999 to 999999	10 V output	Measured value at DAV 10V output. Decimal point position depends on CF-01	10000 D
F2-03 -999999 to 999999	4 mA output	Measured value at DAI 4 mA output. Decimal point position depends on CF-01.	0 D
F2-04 -999999 to 999999	20 mA output	Measured value at DAI 20 mA output. Decimal point position depends on CF-01.	10000 D

8.3.5. Serial Communication

Function No. Setting range	Function	Description	Default value Setting type
F3-01 2400 to 38400	Baud rate	2400: 2400 bps 19200: 19200 bps 4800: 4800 bps 38400: 38400 bps 9600: 9600 bps	2400 P
F3-02 7 to 8	Data bit length	7:7 bits 8:8 bits	7 P
F3-03 0 to 2	Parity	0:None 1: Odd 2: Even	2 P
F3-04 1 to 2	Stop bit	1:1 bit 2:2 bits	1 P
F3-05 1 to 2	Terminator	1:CRLF 2:CR	1 P
F3-06 1 to 6	Output mode	1: Stream mode 2: Manual print mode 3: Auto print mode (Outputs data once when the measured value exceeds the zero range and is stabilized for the first time.) 4: Auto print mode (Outputs data each time the measured value exceeds the zero range and is stabilized.) 5: Command mode 6: Jet stream mode (Outputs data at each sampling, depending on the baud rate.)	2 P
F3-07 00 to 99	Instrument No.	ID that is added to the serial output When 00, the ID is not added.	00 D

8.3.6. Unit

Function No. Setting range	Function	Description	Default value Setting type
F4-00 0 to 4	Unit	0: Specify the unit character (F4-01 to F4-05) 1: kg 3: t 2: g 4: lb	1 P
F4-01 F4-02 F4-03 F4-04 F4-05 00 to 7F	Unit character 1 Unit character 2 Unit character 3 Unit character 4 Unit character 5	Unit character added to the serial output. Set using the hexadecimal ASCII code. 00 : none	00 (Hexadecimal) D

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